



CITY OF REDMOND

CITY HALL
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CITY COUNCIL December 15, 2020 Council Chambers • 411 SW 9th Street

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Council President

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Councilor

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Clark-Endicott
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Councilor

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Councilor

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Councilor

DECEMBER 15, 2020

SPECIAL MEETING AGENDA

6:00 PM

I. CALL TO ORDER / ESTABLISH A QUORUM

II. ORDINANCES

In accordance with the City of Redmond Charter, an ordinance takes effect 30 days after its enactment except when a later effective date is specified in the ordinance; when the ordinance contains an emergency clause, it takes effective immediately.

- A. Ord. 2020-18 - An ordinance updating the Redmond Transportation System Plan, inclusive of the 2018 Airport Master Plan, making it the transportation element of the Redmond Comprehensive Plan.

III. OTHER BUSINESS

IV. ADJOURN

Regular Council meetings are broadcast live on COTV11 – BendBroadband Channel 11 beginning at 6:00 p.m. on the 2nd and 4th Tuesdays of each month. Rebroadcasts are scheduled for the non-meeting Tuesdays at 6:00 p.m.

The City of Redmond encourages all citizens to participate in its programs and activities. This meeting location is accessible to people with disabilities. Requests for accommodation may include sign language interpreter service, assistive listening devices, materials in an alternate format or any other accommodation. If any accommodations are needed, please contact the ADA Coordinator at 541-504-3036 or access@redmondoregon.gov. Requests should be made as soon as possible, but at least 3 business days prior to the scheduled meeting.

The City of Redmond does not discriminate on the basis of disability status in the admission or access to, or treatment, or employment in, its programs or activities



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STAFF REPORT

DATE: December 15, 2020
TO: Redmond City Council
THROUGH: Keith Witcosky, City Manager
John Roberts, Deputy City Manager
FROM: Deborah McMahon, Planning Manager
SUBJECT: Ord. 2020-18 - An ordinance updating the Redmond Transportation System Plan, inclusive of the 2018 Airport Master Plan, making it the transportation element of the Redmond Comprehensive Plan.

Addresses Council Goal:

7. COMPREHENSIVE PLANNING: Enhance the quality of life through adoption of programs, policies, and standards that balance growth while maintaining our unique character.

C. Update Transportation System Plan and associated plans that advance the City's long-term development goals.

Report in Brief:

This item requests City Council adopt Ordinance #2020-18 which authorizes the incorporation of the updated Transportation System Plan (TSP) and Airport Master Plan into the City Comprehensive Plan. The TSP establishes a system of transportation investments (facilities and programs) to serve the City over the next 20-years.

Attachments - City of Redmond Transportation System Plan (TSP):

- Volume 1
- Volume 2 (Appendix A – K)
- Errata Table (Topics 1 – 4)
- Errata Map - Functional Classification Redmond, Oregon (Figure X)
- Fly Redmond – Redmond Municipal Airport Master Plan

Background:

On December 8, 2020, City Council held a public hearing, received testimony, closed the public hearing and completed a first and second reading of the ordinance. Because adoption of the ordinance was not unanimous, it requires consideration by the Council at a second meeting.

As part of planning for the City's future, frequent updates are made to master plans, pertinent reports and documents that support and implement the Redmond Comprehensive Plan.

The TSP is the mandated transportation element to the Comprehensive Plan and was last updated in 2008. The TSP also includes the Airport Master Plan. The TSP provides for a long-term community approach to accommodate new growth while maintaining and improving transportation facilities for all users over the next 20-years.

The TSP satisfies the state's requirements for a local transportation system plan as prescribed by Oregon Statewide Planning Goal 12: Transportation.

The Oregon Revised Statutes require that the TSP be based on the Comprehensive Plan land uses and provide for a transportation system that accommodates the expected growth in population and employment.

The City enlisted the expertise of transportation consultant Kittleson to complete the work. The City also collaborated the Oregon Department of Transportation (ODOT), Deschutes County, businesses and community members during this multi-year update effort which began in 2018.

Kittelson analyzed a breadth of current data to guide the process and develop the plan, such as transportation model details and mobility scenarios and growth projections. A significant public participation effort was also conducted to ensure community involvement.

Engagement included:

- A public facing project website that included web-based surveys and all technical reports, draft goals and policies, meeting summaries, a document library, and links to other regional planning activities;
- Regular updates and work sessions with the Redmond Urban Area Planning Commission;
- Three Public Advisory Committee Meetings;
- Two public open houses;
- Targeted outreach with local community, neighborhood and service organizations; and
- City Urban Area Planning Commission, City Council, and Deschutes County Board of Commissioners work sessions and public hearings.

Through these activities, the City provided community members with a variety of forums to identify their priorities for future transportation projects, programs, and policies.

Airport Master Plan

The Airport Master Update was updated by Mead and Hunt through a separate process.

The Airport Master Plan was approved and accepted by the Federal Aviation Administration on July 29, 2019. However, the Statewide Planning Program requires the Airport Master Plan be an element of the TSP, and the December 8 City Council action will accomplish this task. The Airport Master Plan occurred across three years and was guided by a twelve member Planning Advisory Committee. Five advisory committee meetings, three open houses and two stakeholder meetings were conducted throughout the region as part of the update.

The Redmond Urban Area Planning Commission held a public hearing on the TSP and Airport Master Plan on September 8, 2020. The planning commission unanimously recommended approval.

Discussion:

Transportation is the backbone that supports the City as it continues to grow and accommodate new residents. The TSP update articulates City goals, policies and priorities. Additionally, it provides a list of construction projects and programs to ensure that the transportation system continues to support the City's needs and vision, and conforms to state and regional policies. The TSP must remain relevant and responsive and typically receives smaller scale updates every five years.

TSP Organization

The TSP comprises two volumes. Volume 1 is the main document and includes the items that are of interest to the broadest audience.

Volume 2 contains the technical memoranda, data, and related transportation plans that support Volume 1. While not all of Volume 2 is adopted as part of the TSP, all of the documents provide useful information regarding the basis for the decisions represented in Volume 1.

Purpose

The TSP serves as a resource for future transportation and land use decision-making by providing:

- Solutions to address existing and future transportation needs for biking, walking, using transit, driving, freight, air, and rail;
- A blueprint for investments in transportation projects and programs that improve safety and access for all travelers, improve Regional and State resilience, and support City and Regional economic development priorities;
- A tool for coordination with regional and local agencies and governments;
- Information to ensure prudent land use and transportation choices;
- Order of magnitude cost estimates for transportation infrastructure investments needed to support economic development and growth, and possible sources of funding these improvements;
- Function, capacity and location of future streets, sidewalks, bikeways, pathways, transit, and other transportation facilities; and

- Potential programs to help improve opportunities to travel by walking, bicycling and transit in the future.

Guiding Principles and Context

The TSP provides a flexible, adaptable framework for making transportation decisions. Decisions about the City's transportation system will be guided by the goals and policies contained in Chapter 2, but ultimately the decisions will be made within the overall context of the City's land use plans, support for local and regional Economic Development, and the City's role in the Oregon Resilience Plan. These guiding plans and principles provide a foundation for the TSP's goals, policies, and potential actions.

Among the implementation steps of the TSP is the adoption of land use and land division ordinance amendments needed to protect transportation facilities and provide active transportation facilities between residential, commercial, and employment/ institutional areas. As required by the Transportation Planning Rule, the TSP was developed in coordination with local, regional and state transportation plans.

Goals

The TSP Goals are intended to be broad statements that characterize the community's desires and vision for the future transportation system. The goals are intended to be aspirational and may not be fully attained within the 20-year planning horizon of this plan. The goals are intended to be supported by the policies as well as specific implementation items for the City to address after the TSP has been adopted.

The seven TSP goals:

1. Provide a safe and efficient transportation network to complement key economic development priority areas, the comprehensive plan, recreational needs, and adopted state, regional and local plans and policies.
2. Advance community and statewide emergency preparedness efforts through support of the Oregon Resiliency Plan.
3. Provide transportation choices and address the needs and safety of all travelers, including people of all ages, abilities, ethnicities, and incomes.
4. Provide comfortable, convenient and safe pedestrian and bicycle facilities for all users.
5. Provide reliable and convenient transit service to Redmond residents, its businesses, and its connection to surrounding cities, as well as special transit options for the City's elderly and disabled residents.
6. Ensure efficient and effective freight transportation infrastructure is developed and maintained to support local and regional economic expansion and diversification consistent with City and Regional economic plans and policies.
7. Implement the plan in a timely fashion and keep it up to date with respect to local and regional priorities.

Policies

The TSP policies are statements adopted to provide a consistent course of action and move the community toward attainment of its goals. Policies in the TSP guide the work of the City staff in formulating proposed changes to the Development Code and other regulatory documents, to guide other work programs and long-range planning projects, and to prepare budget and capital improvement program. These policies will not be used in determining whether the City shall approve or deny individual land use applications.

Existing Transportation System Conditions

Existing transportation needs, opportunities, and constraints reflect an inventory of the multimodal transportation system characteristics conducted in 2017. This inventory included all major transportation-related facilities and services within the Urban Growth Boundary (UGB) at that time. Key roadway features, traffic conditions, safety performance, bicycle and pedestrian facilities, and transit service, among other topics, were analyzed.

Detailed findings of the technical analysis are summarized in Volume 2, Appendix D: Existing Conditions Analysis.

Key findings were:

- Approximately 57% of Redmond's population consists of demographic groups related to age, disabilities and income that typically rely on public transportation in transit heavy communities. However, less than one percent of the Redmond population (0.4%) utilizes public transportation.
- Citywide, sidewalks networks are frequently missing on one or both sides of the street, there is a lack of consistent street lighting, and there are long distances between protected pedestrian crossings. Walking can be improved by filling gaps in the sidewalk network, improving buffers from traffic, and providing improved crossings and other safety measures.
- A number of arterial roadway corridors and key intersections could benefit from strategic capital improvements to

the existing system to provide better connectivity, improved safety measures and an improved walking and cycling effort.

- An increase in low-stress bicycle facilities is needed citywide.
- Freight access, particularly on the east side of town, is a critical component of the Redmond economy.

Transportation Priorities and Project Categories

The TSP recommends transportation programs and infrastructure improvements to fulfill the plan's goals and policies. These are organized into the following categories that suggest timeframes for implementation based on complexity, likely available funding (including potential funding sources), and assessment of need:

1. Strategic Street Capacity Investment Corridors
2. New Planned Streets
3. Intersection Capacity Improvements
4. Grade-Separated Intersection Improvements
5. Key Multi-Use Pathways, Bicycle Corridors, Pedestrian Improvements.

Note: Kittleson identified a few refinements/clarifications since the public hearing with the Planning Commission. These are contained in an errata sheet the consultant will present at the public hearing. The two errata sheets are attached.

Fiscal Impact:

The TSP includes projects under the jurisdiction and ownership of ODOT, Deschutes County, the City, and Cascade East Transit (CET), as well as projects that will be implemented by private developers. Individual TSP projects will be funded through a different combination of federal, state, City, county, SDC revenue, and or private sources.

The TSP discusses current and possible new funding mechanisms that may be available to implement projects during the life of the TSP. A complete list of the multimodal projects and planning level cost estimates is provided in Chapter 5 of the TSP.

The forecasted cost of the TSP listed improvements is approximately \$500 million. The difference between available funding and needed funding is around \$400M - \$445M. Like most cities, City funding is insufficient to address TSP needs. Thus, as noted, the City will need to partner with other agencies (like ODOT) and private developers, and pursue alternative funding sources over the next 20 years.

The timing of project implementation will depend on future policy direction and funding availability at the federal, state, or local level; changes in local development priorities; or the formation of public-private or public-public partnerships.

Alternative Courses of Action:

Courses of action include:

1. Approve Ordinance 2020-18.
2. Do not approve Ordinance 2020-18.

As required by City Charter, notices regarding this public hearing were posted in three places (the Library, the Police Department, and the Redmond Chamber of Commerce) in addition to City Hall on December 1, 2020, and three copies of the ordinance were available for review at City Hall.

Recommendation / Suggested Motion:

"I move to approve Ordinance #2020-18." (Roll call vote)

**CITY OF REDMOND
ORDINANCE NO. 2020-18**

AN ORDINANCE UPDATING THE REDMOND TRANSPORTATION SYSTEM PLAN, INCLUSIVE OF THE 2018 AIRPORT MASTER PLAN, MAKING IT THE TRANSPORTATION ELEMENT OF THE REDMOND COMPREHENSIVE PLAN.

WHEREAS, the City of Redmond Urban Area Planning Commission conducts periodic review of the Transportation System Plan, considers needed updates and recommends changes in accordance with Oregon Revised Statutes Chapter 227 that regulate and control the development of land within the City; and

WHEREAS, the City Council has an adopted set of goals that include: “Enhance the quality of life through the adoption of programs, policies and standards that balance growth while maintaining our unique character” and “Update Transportation System Plan and associated plans that advance the City’s long-term development goals”; and

WHEREAS, the Redmond Urban Area Planning Commission held one work session, and a public hearing on September 8, 2020, and, after reviewing the record and gathering public testimony, has recommended that the City Council adopt updates to the Transportation System Plan; and

WHEREAS, the City Council held a public hearing on December 8, 2020, to consider the recommendations of the Redmond Urban Area Planning Commission, review the existing record and gather additional evidence and public testimony; and

WHEREAS, the City Council determines that the findings for the adoption of the amendments to the Transportation System Plan have fully addressed the City’s Comprehensive Plan, applicable state law, Statewide Planning Goals and the City’s standards and criteria for an amendment to the Code; and,

WHEREAS, the City Council finds that the attached amendments to the Transportation System Plan and Airport Master Plan are necessary to further these interests.

NOW, THEREFORE, THE CITY OF REDMOND ORDAINS AS FOLLOWS:

SECTION ONE: The City of Redmond hereby amends the Transportation System Plan, inclusive of the Airport Master Plan. The updated Transportation System Plan are attached hereto as “Exhibit A.”

SECTION TWO: In support of the amendments in Section One, the City hereby adopts the findings, attached hereto as “Exhibit B” which were prepared by City staff and demonstrate compliance with the City’s Comprehensive Plan and the applicable Statewide Planning Goals.

SECTION THREE: The provisions of this Ordinance are severable. The invalidity of any section, clause, sentence, or provision of this Ordinance shall not affect the validity of any other part of this Ordinance, which can be given without such invalid part, or parts.

PASSED by the City Council and **APPROVED** by the Mayor this 15th day of December 2020.

George Endicott, Mayor

ATTEST:

Kelly Morse, City Recorder



Exhibit A (attached hereto):

City of Redmond Transportation System Plan:

- Volume 1
- Volume 2 (Appendix A – K)
- Errata Table (Topics 1 – 4)
- Errata Map - Functional Classification Redmond, Oregon (Figure X)
- Fly Redmond – Redmond Municipal Airport Master Plan

Exhibit B

FINDINGS FOR AMENDMENTS/UPDATES TO THE CITY OF REDMOND TRANSPORTATION SYSTEM PLAN AND REDMOND COMPREHENSIVE PLAN

FILE NO. 711-000021-TA

REQUEST: A Legislative Amendment to the Redmond Transportation System Plan, inclusive of the Airport Master Plan to make revisions, update growth data and maps.

APPLICANT: City of Redmond, 411 SW 9th Street Redmond, OR 97756

STAFF: Deborah McMahon, Planning Manager

HEARINGS

BODY: City Council & Redmond Urban Area Planning Commission

DATE& TIME: September 8, 2020 at 4:30 pm; Redmond Urban Area Planning Commission
December 8, 2020 at 6:00 pm; Redmond City Council

LOCATION: Virtual Meeting through 'GoTo' as noticed and published - City Council Chambers, 411 SW 9th Street, Redmond, OR 97756

I. APPLICABLE CODE SECTIONS AND CRITERIA:

- Oregon Revised Statutes (ORS) – ORS 197.250, 197.610, 197.763.
Oregon Administrative Rule (OAR), LCDRC, Division 15, Statewide Planning Goals and Guidelines – OAR 660-015-0000 (as applicable) OAR 660-012 – Transportation Planning, OAR 660-034 – Airport Planning
- Development Code Section 8.0760 (Criteria for Amendments).

II. BACKGROUND SUMMARY:

As part of planning for the City's future, frequent updates are made to master plans, pertinent reports and documents that support and implement the Redmond Comprehensive Plan. The Redmond Transportation Plan (TSP) is the mandated transportation element to the Comprehensive Plan and was last updated in 2008. The TSP also includes the Airport Master Plan. The adoption prepares Redmond for accommodating transportation needs and facilities within its urban growth boundary (UGB) through the 2040 planning horizon.

The 2020 TSP identifies the transportation facilities and services to support the City's adopted Comprehensive Plan. The TSP provides for a long-term community approach to accommodate new growth while maintaining and improving transportation facilities for all users over the next 20-years.

The 2020 TSP satisfies the state's requirements for a local transportation system plan as prescribed by Oregon Statewide Planning Goal 12: Transportation. The Oregon Revised Statutes (ORS) require that the TSP be based on the Comprehensive Plan land uses and provide for a transportation system that accommodates the expected growth in population and employment.

The 2020 TSP has been developed to build on the City's successes while proposing improvements to better achieve community values related to safety, mobility, accessibility, economic vitality, equity, environmental stewardship, and financial sustainability. The updated TSP identifies needs, under existing conditions and under projected future conditions. Transportation solutions are proposed to address those needs, including new and upgraded infrastructure and new and ongoing system improvement programs.

The amendments to the 2020 TSP were initiated legislatively by the City in a cooperative program with the Oregon Department of Transportation. The findings contained herein demonstrate that the adoption of the updated TSP is consistent with relevant Statewide Land Use Planning Goals, Oregon Transportation Plan policies, Oregon Highway Plan policies, Oregon Administrative Rules, Redmond Comprehensive Plan policies, and Development Code Section 8.0760. The criteria set forth in the Section 8.0760 are addressed herein, as well as applicable state laws and requirements.

- III. PROPOSAL:** The request is for a Legislative Amendment to update the Redmond Transportation System Plan, inclusive of the Airport Master Plan. The update helps the City better guide and manage growth. It is important to update the TSP when new information is available through new State law, and local needs related to transportation needs.

Transportation is the backbone that supports the City as it continues to grow and accommodate new citizens. The TSP update articulates City goals, policies and priorities. Additionally, it provides a list of construction projects and programs to ensure that the transportation system continues to support the City's needs and vision, and conforms to state and regional policies. The TSP must remain relevant and responsive and will be revisited over time.

- IV. EXHIBITS:** The following exhibits make up the record in this matter:

1. The proposed text of the updated Transportation System Plan (Volume I and II), errata sheets and Airport Plan Master Plan (Exhibit A).
2. Proposed Findings and Conclusions included herein (Exhibit B).
3. Notices to Department of Land Conservation and Development (DLCD), Notice of Redmond Urban Area Planning Commission Public Hearing in the "Bulletin", Notice of City Council Public Hearing in the "Bulletin".

4. Staff reports and hearing minutes prepared for City Council and Redmond Urban Area Planning Commission work session or public hearings.
5. Public testimony received.

V. FINDINGS AND CONCLUSIONS:

A. REDMOND DEVELOPMENT CODE (RDC), Chapter 8, Sections 8.0750 through 8.0775 (Amendments) sets forth the procedure and standards for an amendment to the text of the Code or to the adopted Redmond Comprehensive Plan or Zoning map. Specifically, Section 8.0760 - Criteria for Amendments, sets forth four (4) criteria that must be met:

1. Conformity with all applicable State statutes:

Finding: The State statutes that directly apply to this application include:

1. ORS 197.610, *Local Government Notice of Amendment or New Regulation/*
2. ORS 197.250, *Compliance with Goals Required.*
3. ORS 197.763, *Conduct of Local Quasi-Judicial Land Use Hearings; Notice Requirements.*

The Oregon Revised Statutes require that the TSP be based on the Comprehensive Plan land uses and provide for a transportation system that accommodates the expected growth in population and employment. Development of this TSP was guided by Oregon Revised Statute (ORS) 197.712 and the Department of Land Conservation and Development (DLCD) administrative rule known as the Transportation Planning Rule (TPR, OAR 660-012-0060).

The applicable RDC standards (sections 8.0750 to 8.0775, *Amendment Procedures and Notice Requirements*), and (sections 8.1100 through 8.1125, *Legislative Procedures*), were developed in compliance with the applicable State Statutes listed above regarding noticing and public hearings. Applicability of the Statewide Planning Goals is addressed below. The relevant findings, incorporated by reference herein, show compliance with the aforementioned Statutes.

Regarding Statutory noticing requirements, notice of the proposed amendment has been provided to DLCD and advertised in the local newspaper (public notice) as required by City Code and State Statute.

Regarding Statutory public hearing requirements, this proposal is legislative. Sections 8.1100 through 8.1125 of the RDC implement the quasi-judicial Statutory requirements in similar fashion and have been met. The Redmond Urban Area Planning Commission and City Council's

public hearing and review processes meet the Statutory requirements for the purpose of the review.

Notwithstanding the Statutory requirements addressed herein, the Oregon Administrative Rules (OAR) also implement the Statutes. The applicable Rules are addressed in the ensuing review.

Conclusion: Based on the findings addressing amendment criterion 1, the proposed text amendments to the Transportation System Plan and Comprehensive Plan conform to applicable State statutes.

2. Conformity with the State-wide planning goals whenever they are determined to be applicable;

Goal 1- Oregon's Statewide Planning Goals: Citizen Involvement.

To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

Finding: The Redmond Urban Area Planning Commission serves as the City's formal citizen advisory committee to fulfill Goal 1 and is made up of Redmond area residents. The City conducted two public meetings (Planning Commission work sessions) and one public hearing over the past 12-months regarding the amendments.

Public notices and agendas for Planning Commission meetings where and when the proposed amendments were discussed were provided in accordance with law. All documents were available for public review. Further, public notice advertising the public hearing was published in the Bend Bulletin.

The City continually provided public review and involvement opportunities during public work sessions and public hearings conducted by both the Planning Commission and City Council.

Moreover, as part of the project a variety of outreach was conducted to ensure effective public outreach and engagement.

Specific opportunities for engagement included:

- Project website that included web-based surveys and all technical reports, draft goals and policies, meeting summaries, a document library stocked by members of the public, and links to other planning activities in the region;
- Monthly Project Management Team Meetings attended by City, ODOT and County staff;

- Regular updates and work sessions with the Redmond Urban Area Planning Commission;
- Three Public Advisory Committee Meetings;
- Two public open houses co-led with the South Corridor Project;
- Targeted outreach with local community, neighborhood and social service organizations; and
- City Urban Area Planning Commission, City Council, and Deschutes County Board of Commissioners work sessions and public hearings.

Through these public involvement activities, the City provided community members with a variety of forums to identify their priorities for future transportation projects, programs, and policies.

Airport Master Plan

The Airport Master Update was updated by Mead and Hunt and was a completely separate process. The Statewide Planning Program requires the Airport Master Plan be an element of the TSP, and said adoption accomplishes this. The Airport Master Plan update was a three-year process guided by a twelve member Planning Advisory Committee. Five advisory committee meetings, three open houses and two stakeholder meetings were conducted throughout the region as part of the update.

Conclusion: Based on these actions, Oregon Planning Goal 1 for Citizen Involvement has been met.

Goal 2- Oregon's Statewide Planning Goals: Land Use Planning.

To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions.

Finding: Through the course of review of the update and amendments to the Transportation System Plan, input was received from: ODOT, Deschutes County, City staff, Redmond Urban Area Planning Commission, State legislators, developers, stakeholders, and residents of the community.

The City Council has determined adequate factual and policy basis exists to support the proposed amendments. The amendments will better implement policies of the Comprehensive Plan and provide clearer regulations and policies for the City staff to administer.

The TSP serves as a resource for future transportation and land use decision-making by providing:

- Solutions to address existing and future transportation needs for biking, walking, using transit, driving, freight, air, and rail;
- A blueprint for investments in transportation projects and programs that

improve safety and access for all travelers, improve Regional and State resilience, and support City and Regional economic development priorities;

- A tool for coordination with regional and local agencies and governments;
- Information to ensure prudent land use and transportation choices;
- Order of magnitude cost estimates for transportation infrastructure investments needed to support economic development and growth, and possible sources of funding these improvements;
- Function, capacity and location of future streets, sidewalks, bikeways, pathways, transit, and other transportation facilities; and
- Potential programs to help improve opportunities to travel by walking, bicycling and transit in the future.

Conclusion: Based on these findings, the proposed amendments meet Goal 2.

3. Conformity with the Redmond Comprehensive Plan, land use requirements and policies;

Chapter 1 – Redmond Comprehensive Plan: Citizen Involvement.

To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

Finding: The Redmond Urban Area Planning Commission serves as the City's formal citizen advisory committee (as required by State Administrative Rule) and is made up of Redmond area residents. The Planning Commission is formally recognized through City Code and is appointed by the Mayor and City Council. As such, the Planning Commission is the appropriate public review and recommendation body to the City Council to meet this goal.

The City, through the Planning Commission, has conducted public meetings, and one public hearing over the past 12 months regarding the proposed text amendments. Public notices and agendas for Planning Commission meetings where the proposed amendments were discussed were provided. All documents were available for the public review. Further, notice of the public hearing was published in the Bend Bulletin.

The City has continually provided public review and involvement opportunities during public work sessions and public hearings both at the Planning Commission and City Council levels as deemed necessary by such bodies.

The proposed amendments to the TSP and Comprehensive Plan serve

the following Policies of Chapter 1 of the Redmond Comprehensive Plan to meet citizen involvement requirements:

1. The City shall establish a citizen involvement program to provide for widespread citizen involvement.
2. The citizen involvement program shall involve a cross-section of affected citizens in all phases of the planning process.
3. The City shall assign the Redmond Urban Area Planning Commission as its officially recognized committee for citizen involvement (CCI).
4. The City shall establish mechanisms to assure two-way communications between citizens and elected and appointed officials.
5. The City shall provide the opportunity for citizens to be involved in all phases of the planning process.
6. The City shall assure that technical information is available to citizens in an understandable form.
7. The City shall assure that recommendations resulting from the citizen involvement program shall be retained and made available for public assessment. Citizens who have participated in this program shall receive a response from policy-makers.
8. The City shall allocate adequate human, financial and informational resources for the citizen involvement program.

Chapter 2 – Redmond Comprehensive Plan: Land Use Planning.
Establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions.

Finding: The Redmond Urban Area Planning Commission, City Council, and staff have provided opportunities for and have received public input throughout the review process. Based on this input, the City Council finds that the proposed text amendments are necessary to implement Chapters 1 and 2 of Redmond's Comprehensive Plan. The Council has determined that enough factual and policy basis exists to support the proposed language amendments. The proposed amendments will better implement policies of the Comprehensive Plan and State law and will provide clearer regulations and policies for the City staff to administer.

The proposed amendments serve the following Policies of Chapter 2 of the Redmond Comprehensive Plan to serve land use planning framework requirements:

(***)

2. The plan shall be the basis for specific implementation measures. These measures shall be consistent with and adequate to carry out the

plans. Each plan and related implementation measure shall be coordinated with the plans of affected governments.

3. All land use plans and implementation ordinances shall be adopted by the governing body after public hearing and shall be reviewed and, as needed, revised on a periodic cycle to take into account changing public policies and circumstances, in accord with a schedule set forth in the plan.
4. Opportunities shall be provided for review and comment by citizens and affected governmental units during preparation, review and revisions of plans and implementing ordinances
5. To provide a sound basis for orderly and efficient urbanization by establishing proper relationships between residential, commercial, industrial, public and open land uses, and transportation uses.

(***)

The following Statewide Planning Program Goals are not subject to the text amendments to the Transportation System Plan and deemed to not be applicable:

Goal 3 Agricultural Lands

Goal 4 Forest Lands

Goal 5 Natural Resources, Scenic and Historic Areas, and Open Spaces

Goal 6 Air, Water and Land Resources Quality

Goal 7 Areas Subject to Natural Hazards

Goal 8 Recreational Needs

Goal 10 Housing

Goal 13 Energy

Goals 15 – 19

Chapter 9 – Economic Development

Provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

Finding: The Redmond Urban Area Planning Commission, City Council, and staff have provided opportunities for and have received public input throughout the review and update process. Based on this input, the City Council finds that the amendments are necessary to implement Chapters

1 and 2 of the City of Redmond's Comprehensive Plan and other Chapters related to economic development. The Council has determined that enough factual and policy basis exists to support the proposed language amendments. The text amendments will better implement policies of the Comprehensive Plan and will provide clearer regulations for the City staff to administer as it relates to transportation planning.

Many of Redmond's Comprehensive Plan's concepts, goals and policies are consistent with the proposed text amendments. Updating the Transportation System Plan provides current data, greater clarity and ease of use and reduces cost and effort for citizens as they prepare proposals for review. The updated Transportation System Plan assures the community that growth needs are identified.

Chapter 11 – Public Facilities and Services

Plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

Finding: The Redmond Urban Area Planning Commission, City Council, and staff have provided opportunities for and have received public input throughout the update review and update process. Based on this input, the City Council finds that the proposed text amendments are necessary to implement Chapters 1 and 2 of the City of Redmond's Comprehensive Plan and other Chapters related to public facilities and services. The City Council has determined that enough factual and policy basis exists to support the proposed language amendments. The proposed amendments will better implement policies of the Comprehensive Plan and will provide clearer regulations for the City staff to administer. Many of the Plan's existing concepts, goals and policies are consistent with the proposed amendments. The proposed text amendments serve the following Goal of Chapter 11 of the Redmond Comprehensive Plan as it relates to the development of public facilities and services.

1. To provide for a close correlation between the provisions of urban services and urban development in order to bring about a more orderly and efficient development pattern, and thereby avoid unnecessary tax burdens and excessive utility costs normally associated with scattered, unrelated development.

(***)

Chapter 12 - Transportation

To provide and encourage a safe, convenient and economic transportation system.

Finding: The TSP provides a flexible, adaptable framework for making transportation decisions in an increasingly unpredictable and financially constrained future. Decisions about the City's transportation system will be guided by the goals and policies contained in Chapter 2 of the TSP, but ultimately the decisions will be made within the overall context of the City's land use plans, support for local and regional Economic Development, and the City's role in the Oregon Resilience Plan. These guiding plans and principles provide a foundation for the TSP's goals, policies, and potential actions.

The TSP identifies multimodal transportation needs to serve users of all ages, abilities, and incomes. As such, solutions to address existing and future transportation needs for bicycling, walking, transit, motor vehicles, freight, and rail, and improved safety for all travelers are included. Further, one of the implementation steps of the TSP will include adoption of land use and land division ordinance amendments needed to protect transportation facilities and provide active transportation facilities between residential, commercial, and employment/ institutional areas. Finally, as required by the Transportation Planning Rule, the TSP was developed in coordination with local, regional and state transportation plans.

Finding: The Redmond Urban Area Planning Commission, City Council, and staff have provided opportunities for and have received public input throughout the review and update process. Based on this input, the City Council finds that the proposed amendments are necessary to implement Chapters 1 and 2 of the City of Redmond's Comprehensive Plan and other Chapters related to transportation. The City Council has determined that enough factual and policy basis exists to support the proposed language amendments. The proposed amendments will better implement policies of the Comprehensive Plan and will provide clearer regulations for the City staff to administer. Many of the Plan's existing concepts, goals and policies are consistent with the proposed amendments. The proposal text amendments to the Transportation System Plan serves the following Goal of Chapter 12 of the Redmond Comprehensive Plan as it relates to transportation:

Within the Redmond Urban Growth Boundary, an urban area transportation system will be developed which enhances the livability of Redmond and accommodates growth and development through careful planning and management of existing and future transportation facilities.

Policy 1 - Transportation System Management

Plan or ordinance amendments which significantly affect a transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and level of service of the facility.

(***)

Finding: The Redmond Urban Area Planning Commission, City Council, and staff have provided opportunities for and have received public input throughout the review and update process. Based on this input, the City Council finds that the proposed Transportation System Plan Update and amendments are necessary for growth management. The proposed updates assure that land uses are consistent with the identified function, capacity, and level of service of the community's transportation facilities.

(***)

Chapter 14 – Urbanization

Provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.

Finding: The Redmond Urban Area Planning Commission, City Council, and staff have provided opportunities for and have received public input throughout the review and update process. Based on this input, the City Council finds that the proposed amendments are necessary to implement Chapters 1 and 2 of the City of Redmond's Comprehensive Plan and other Chapters related to urbanization.

The City Council has determined that enough factual and policy basis exists to support the proposed text amendments. The proposed amendments will better implement goals and policies of the Comprehensive Plan and will provide clearer regulations for the City staff to administer. Many of the Plan's existing concepts, goals and policies are consistent with the proposed amendments. The proposed text amendments to the TSP and Comprehensive Plan serves the following Goal of Chapter 14 of the Redmond Comprehensive Plan:

1. To direct development within the Redmond UGB at urban level densities in a phased and orderly manner, and with the provision of an adequate level of urban services, including but not limited to public water, sewer, and urban streets.
4. **That there is a change of circumstances or further studies justifying the amendment or mistake in the original zoning;**

Finding: Since 2008 there were a change of circumstances or further studies justifying the amendment. The proposed amendments responds to a change of circumstances where new data from the State regarding

transportation, as well as a need to manage growth and identify needed transportation improvements. The update process and changes in the community require evaluation and updates to the Transportation System Plan. The amendment is necessary to reflect new information and support implementation of the Comprehensive Plan.

Based on the findings addressing RDC amendment criterion 4, the proposed amendments support the need to provide more clarity and improve processes for better outcomes in transportation planning.

COMPLIANCE WITH OREGON TRANSPORTATION PLAN

The Oregon Transportation Plan (OTP) is the state's long-range, multimodal transportation plan. The OTP is the overarching policy document for a series of modal and topic plans that together form the state's TSP. Per direction from the Department of Land Conservation and Development, a local TSP must make findings to demonstrate compliance with applicable OTP goals and policies will be part of the basis for TSP approval. The TSP update complies with the OTP. The following demonstrates how the TSP update complies with state transportation policy:

Policy 1.1 – Development of an Integrated Multimodal System. It is the policy of the State of Oregon to plan and develop a balanced, integrated transportation system with modal choices for the movement of people and goods.

Findings: Included in the TSP is direction to plan, fund, and develop a balanced multi-modal transportation system that meets the needs of the community. The TSP update includes many policies addressing modal choices for the movement of people and goods. In particular, see attached TSP Goals and Policies.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 1.1. **Policy 1.2 – Equity, Efficiency and Travel Choices.** It is the policy of the State of Oregon to promote a transportation system with multiple travel choices that are easy to use, reliable, cost-effective and accessible to all potential users, including the transportation disadvantaged.

Findings: The TSP update includes policies addressing choice and equity.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 1.2. **Policy 1.3 – Relationship of Interurban and Urban Mobility.** It is the policy of the State of Oregon to provide intercity mobility through and near urban areas in a manner which minimizes adverse effects on urban land use and travel patterns and provides for efficient long distance travel.

Findings: The TSP update includes policies addressing mobility, efficiency travel, and minimization of adverse effects on urban land use.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 1.3. Policy 2.1 - Capacity and Operational Efficiency It is the policy of the State of Oregon to manage the transportation system to improve its capacity and operational efficiency for the long term benefit of people and goods movement.

Findings: The TSP update includes policies addressing capacity enhancements and efficiency improvements.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 2.1 Policy 2.2 – Management of Assets. It is the policy of the State of Oregon to manage transportation assets to extend their life and reduce maintenance costs.

Findings: The TSP update includes addressing operations and maintenance of transportation infrastructure.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 2.2. Policy 3.1 – An Integrated and Efficient Freight System. It is the policy of the State of Oregon to promote an integrated, efficient and reliable freight system involving air, barges, pipelines, rail, ships and trucks to provide Oregon a competitive advantage by moving goods faster and more reliably to regional, national and international markets.

Findings: The TSP update includes modal plans and planned improvements include a description of the air, freight, pipeline, rail, aviation systems in the Redmond area, and plan for a system to move goods throughout the planning area.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 3.1. Policy 3.2 – Moving People to Support Economic Vitality. It is the policy of the State of Oregon to develop an integrated system of transportation facilities, services and information so that intrastate, interstate and international travelers can travel easily for business and recreation.

Findings: The TSP update plans for an integrated system of transportation facilities that meet the needs of people who live, work, and travel in and to the Redmond area.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 3.2. Policy 3.3 – Downtowns and Economic Development. It is the policy of the State of Oregon to provide transportation improvements to support downtowns and to coordinate transportation and economic development strategies.

Findings: The TSP update includes transportation programs and improvements to support downtown and was created in coordination with the City's economic development strategies. The TSP update includes policies to provide a multi-modal transportation system to meet the needs of the community into the future, including

accommodating future employment growth and the transport of goods and services needed to support economic development. The transportation system identified in the TSP update was developed using the City's current land use patterns, and designed to connect people, services, goods, and to meet the economic needs of the City.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 3.3. Policy 3.4 – Development of the Transportation Industry. It is the policy of the State of Oregon to promote, incubate and develop transportation related industry and services in Oregon.

Findings: The TSP update includes modal plans, improvements and policies, including a description of the air, freight, pipeline, rail, aviation systems in the Redmond area, and plan for a system that promotes the movement of goods throughout the planning area.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 3.4. Policy 4.1 - Environmentally Responsible Transportation System. It is the policy of the State of Oregon to provide a transportation system that is environmentally responsible and encourages conservation and protection of natural resources.

Findings: The TSP update includes infrastructure improvements and policies that will provide an environmentally responsible transportation system, and result in an overall reduction in vehicle miles traveled by 2040.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 4.1. Policy 4.2 - Energy Supply. It is the policy of the State of Oregon to support efforts to move to a diversified and cleaner energy supply, promote fuel efficiencies and prepare for possible fuel shortages.

Findings: The TSP update includes infrastructure improvements and policies that will support a more diversified and cleaner energy supply and promote fuel efficiencies, including support of electric vehicles and other alternatives to the internal combustion engine.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 4.2. Policy 4.3 - Creating Communities. It is the policy of the State of Oregon to increase access to goods and services and promote health by encouraging development of compact communities and neighborhoods that integrate residential, commercial and employment land uses to help make shorter trips, transit, walking and bicycling feasible; Integrate features that support the use of transportation choices.

Findings: The TSP update includes infrastructure improvements and policies that will increase access to good and services and support the City's plans for increased density and mixed-use within key areas of the City to help make shorter trips, transit, walking and bicycling feasible. Included in the TSP is direction to plan, fund, and develop a multi-modal transportation system that meets the needs of the community and region

and supports compact communities and mixed-use neighborhoods. The TSP update includes facility improvements, both on-street and off-street, intended to provide improved connectivity for people walking and bicycling. It also includes policy direction and facility improvements intended to provide improved public transit efficiency and connectivity.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 4.3. Policy 5.1 – Safety. It is the policy of the State of Oregon to continually improve the safety and security of all modes and transportation facilities for system users including operators, passengers, pedestrians, recipients of goods and services, and property owners.

Findings: The TSP update includes policies, improvements, and programs that promote safety for all modes and system users.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 5.1. Policy 5.2 – Security. It is the policy of the State of Oregon to provide transportation security consistent with the leadership of federal, state and local homeland security entities.

Findings: The TSP update supports and enables the provision of transportation security consistent with the leadership of federal, state and local homeland security entities. Deschutes County Fire/EMS services, the Bend/Redmond MPO, and Redmond police, fire and other public safety and first responders were consulted during TSP preparation.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 5.2. Policy 6.1 – Funding Structure. It is the policy of the State of Oregon to develop a transportation finance structure that addresses the public funding aspects of all modes and reinforces plan strategies. This structure should include provisions for flexibility in the use of new funding sources and new partnerships to achieve system integration while also protecting transportation funds for transportation purposes.

Findings: The TSP update includes a Transportation Funding Strategy which identified possible existing and potential new funding sources and a summary of improvement and program costs. While the Transportation Funding Strategy does identify possible funding mechanisms, it is non-binding and does not commit or allocate funds towards transportation projects. The proposed TSP update and Comprehensive Plan amendments address the public funding aspects of all modes and reinforce plan strategies, and include provisions for flexibility in the use of new funding sources and new partnerships to achieve system integration.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 6.1. Policy 6.2 – Achievement of State and Local Goals. It is the policy of the State of Oregon to plan and manage the transportation finance structure to

contribute to the accomplishment of state and local environmental, land use and economic goals and objectives.

Findings: The TSP funding strategy supports the accomplishment of the transportation projects and programs identified by providing a funding strategy, which will help to contribute to the accomplishment of the state and local environmental, land use and economic goals and objectives as discussed in detail above. While the strategy does identify possible funding mechanisms, it is non-binding and does not commit or allocate funds towards transportation projects.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 6.2. Policy 6.3 – Public Acceptability and Understanding. It is the policy of the State of Oregon to use finance mechanisms that have broad public acceptance and are understandable to transportation system users.

Findings: The TSP update includes funding strategies, which provides direction about how projects and programs identified in the TSP may be funded. While the Transportation Funding Strategy does identify possible funding mechanisms, it is nonbinding and does not commit to the use of any specific finance mechanisms. The TSP update, including the Transportation Funding Strategy, underwent a public participation process to engage the public and seek acceptance for the plan update and that the possible finance mechanisms identified in the plan are understandable to transportation system users.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 6.3. Policy 6.4 – Beneficiary Responsibilities. It is the policy of the State of Oregon to examine mechanisms to expand the beneficiary pay concept to reflect the costs and benefits of uses of the transportation system and reinforce the relationship between benefiting from transportation facilities and paying for their benefit, but to retain essential fairness including cost responsibility. This policy recognizes some modes will continue to need subsidies to achieve overall transportation system goals and provide essential services.

Findings: The TSP update includes a funding strategy, including existing and potential new funding sources and a summary of improvement and program costs. While it does identify possible funding mechanisms, it does not require specific funding mechanisms to be used. Consistent with OTP Policy 6.4, the Transportation Funding Strategy examined mechanisms to expand the beneficiary pay concept to reflect the costs and benefits of uses of the transportation system and reinforce the relationship between benefiting from transportation facilities and paying for their benefit while retaining essential fairness, including cost responsibility.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 6.4. Policy 6.5 – Triage in the Event of Insufficient Revenue. It is the policy of the State of Oregon to resolve revenue shortfalls by means that maximize public

acceptance and that minimize undesirable long-term consequences to the overall transportation system in urban and rural areas.

Findings: The Transportation Funding Strategy finds that the projects and programs outlined in the TSP are reasonably likely to be funded and therefore this policy is met.

Policy 7.1 – A Coordinated Transportation System. It is the policy of the State of Oregon to work collaboratively with other jurisdictions and agencies with the objective of removing barriers so the transportation system can function as one system.

Findings: The Project Management Team (PMT), Project Advisory Committee (PAC), Technical Advisory Committee (TAC), and Redmond Urban Area Planning Commission, representatives of Deschutes County, ODOT, REDI, Chamber of Commerce, Department of Land Conservation and Development, City of Redmond, Cascades East Transit, Redmond School District, OSU Cascades, Central Oregon Community College, Redmond Bicycle and Pedestrian Advisory Committee and 27 members of the public appointed as committee members were part of the TSP development for all required coordination. The private freight industry and Redmond Fire/EMS services were also consulted during TSP preparation.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 7.1. Policy 7.2 – Public/Private Partnerships. It is the policy of the State of Oregon to maintain, expand and provide tools to encourage partnerships to improve efficiency in the delivery of transportation facilities and services benefiting the state transportation system and the state's citizens. Partners include transportation providers, public agencies and private businesses at all levels across jurisdictions and ownerships.

Findings: The TSP update process included participation and input from a large number of partners and stakeholders with the intent of improving the efficiency in transportation facilities implementation and benefiting the public. Public and partner engagement tools included: The Project Management Team (PMT), Project Advisory Committee (PAC), Technical Advisory Committee (TAC), and Redmond Urban Area Planning Commission, representatives of Deschutes County, ODOT, CEC, COIC, Department of Land Conservation and Development, City of Redmond, Cascades East Transit, Redmond School District, OSU Cascades, REDI, Chamber of Commerce, Central Oregon Community College, Redmond Bicycle and Pedestrian Advisory Committee and 27 members of the public appointed as committee members were part of the TSP development for all required coordination. The private freight industry and Redmond Fire/EMS services were also consulted during TSP preparation.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 7.2. Policy 7.3 – Public Involvement and Consultation. It is the policy of the State of Oregon to involve Oregonians to the fullest practical extent in transportation planning and implementation in order to deliver a transportation system that meets the diverse needs of the state.

Findings: The City followed its adopted citizen involvement program to ensure citizens had the opportunity to be involved in all phases of the planning process for the TSP update and Comprehensive Plan amendments. The Citizen Involvement Program states the City will use variety of methods for involving citizens in land use decisions, including updates to the Comprehensive Plan. These methods include those the City used for involving citizens in the TSP process: public advisory committee meetings through which public input was solicited, technical advisory committee, open houses, neighborhood meetings, releasing materials through the City's website, and notifying stakeholders and interested citizens through media notices and direct electronic mail communications.

The TSP update process involved multiple steps to gain an understanding of existing and future conditions and community needs, evaluate alternatives and projects to meet those needs, and refine recommendations. City staff, decision-makers, stakeholders, and volunteer members of the community were enlisted to assist in the project as noted above. All meetings were noticed and open to the public, with opportunities to comment included in the agenda.

The City received both written and oral testimony at each meeting. Written comments were included in the minutes of each meeting. All meetings were noticed and open to the public with opportunities to comment included in the agenda. The City received both written and oral testimony at each meeting. A website was updated regularly throughout the process, with interactive maps and a link for public comment.

The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 7.3. Policy 7.4 – Environmental Justice. It is the policy of the State of Oregon to provide all Oregonians, regardless of race, culture or income, equal access to transportation decision-making.

Findings: The updated TSP includes policies addressing choice and equity, and providing expanded means for equal access to participation in transportation decision making. The proposed Comprehensive Plan amendments and TSP update are consistent with OTP Policy 7.4.

COMPLIANCE WITH THE OREGON HIGHWAY PLAN

The 1999 Oregon Highway Plan, including amendments (OHP), establishes policies and investment strategies for Oregon's Statewide Highway System over a 20-year period and refines the goals and policies found in the OTP. Policies in the OHP emphasize the efficient management of the highway system to increase safety and to extend highway capacity, partnerships with other agencies and local governments, and the use of new techniques to improve road safety and capacity. These policies also link land use and transportation, set standards for highway performance and access

management, and emphasize the relationship between state highways and local road, bicycle, pedestrian, transit, rail, and air systems.

The Redmond TSP update meets the state's policies in the OHP as follows: Policy 1A: State Highway Classification System. It is the policy of the State of Oregon to develop and apply the state highway classification system to guide ODOT priorities for system investment and management.

Findings: The TSP update includes policies to preserve and protect the functional classification of state facilities, and support ODOT's proprieties for system investment and management. Besides the policies and Functional Classification Map the proposed Comprehensive Plan amendments and TSP update are consistent with OHP Policy 1A.

Policy 1B: Land Use and Transportation This policy recognizes the need for coordination between state and local jurisdictions.

Findings: The Project Management Team (PMT), Project Advisory Committee (PAC), Technical Advisory Committee (TAC), and Redmond Urban Area Planning Commission, representatives of Deschutes County, ODOT, CEC, COIC, Department of Land Conservation and Development, City of Redmond, Cascades East Transit, Redmond School District, OSU Cascades, REDI, Chamber of Commerce, Central Oregon Community College, Redmond Bicycle and Pedestrian Advisory Committee and 27 members of the public appointed as committee members were part of the TSP development for all required coordination. The private freight industry and Redmond Fire/EMS services were also consulted during TSP preparation. The TSP was also closely coordinated with the Cascades East Transit Master Plan.

The proposed Comprehensive Plan amendments and TSP update are consistent with OHP Policy 1B. Policy 1C: State Highway Freight System. It is the policy of the State of Oregon to balance the need for movement of goods with other uses of the highway system, and to recognize the importance of maintaining efficient through movement on major truck freight routes.

Findings: The TSP update plans for an integrated system of transportation facilities that meet the needs of people who live, work, and travel in and to the Redmond area. Close coordination with ODOT and the South Highway Corridor Plan seeks to enhance efficiency on freight routes.

The proposed Comprehensive Plan amendments and TSP update are consistent with OHP Policy 1C. Policy 1D: Scenic Byways. It is the policy of the State of Oregon to preserve and enhance designated Scenic Byways, and to consider aesthetic and design elements along with safety and performance considerations on designated Byways.

Findings: There are no designated Scenic Byways located within the Redmond UGB therefore OHP Policy 1D is not applicable to the proposed Comprehensive Plan amendments and TSP update.

**COMPLIANCE WITH THE TRANSPORTATION PLANNING RULE (TPR)
OAR 660-012-0015; Preparation and Coordination of Transportation System Plans**

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(3) Cities and counties shall prepare, adopt and amend local TSPs for lands within their planning jurisdiction in compliance with this division: (a) Local TSPs shall establish a system of transportation facilities and services adequate to meet identified local transportation needs and shall be consistent with regional TSPs and adopted elements of the state TSP;

Findings: The TSP documents the existing conditions and analysis needed to support compliance with the TPR. The TSP data outlines all of the identified needs associated with today's conditions for each mode as well as those intersections and streets not meeting applicable operating standards. The TSP documents the baseline ("no build") analysis, outlining all of the identified year 2040 needs assuming no additional infrastructure beyond that currently funded is added. Each mode's needs as well as intersection and streets not meeting applicable standards are noted. The proposed TSP update and Comprehensive Plan amendments demonstrate that the proposed system of transportation facilities and services are adequate to meet the City and regional needs to 2040.

(b) Where the regional TSP or elements of the state TSP have not been adopted, the city or county shall coordinate the preparation of the local TSP with the regional transportation planning body and ODOT to assure that regional and state transportation needs are accommodated.

Findings: The City coordinated with ODOT on all aspects given that ODOT funded over ½ of the study and TSP update. The Redmond model is carefully developed with coordination between Redmond/Bend MPO model, as well as the Cascades East Transit Master Plan. The proposed TSP update and Comprehensive Plan amendments demonstrate coordination with State and Regional planning processes to assure that regional and state transportation needs are met.

(4) Cities and counties shall adopt regional and local TSPs required by this division as part of their comprehensive plans. Transportation financing programs required by OAR 660-012-0040 may be adopted as a supporting document to the comprehensive plan.

Findings: The TSP, including supporting Appendices, will be adopted as part of the Redmond Comprehensive Plan. The TSP contains all the required components of the - 0040(2) finance plan, which include a list of planned transportation facilities and major improvements, general estimate of the timing for planned transportation facilities and major improvements, a determination of rough cost estimates for the transportation

facilities and major improvements identified in the TSP. The proposed TSP update and Comprehensive Plan amendments meet the requirements of this section of the TPR.

(5) The preparations of TSPs shall be coordinated with affected state and federal agencies, local governments, special districts and private providers of transportation services.

Findings: As noted above, the City of Redmond created numerous coordination efforts with many agencies and groups. The proposed TSP update and Comprehensive Plan amendments meet the requirements of this section of the TPR.

OAR 660-012-0016 Coordination with Federally-Required Regional Transportation Plans in Metropolitan Areas (1) In metropolitan areas, local governments shall prepare, adopt, amend, and update transportation system plans required by this division in coordination with regional transportation plans (RTPs) prepared by MPOs required by federal law.

Findings: Redmond is not within a MPO. This criterion does not apply.

OAR 660-012-0020 Elements of TSPs (1) A TSP shall establish a coordinated network of transportation facilities adequate to serve state, regional and local transportation needs.

Findings: The Redmond TSP describes a coordinated network of facilities to serve all modes throughout the City. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(2) The TSP shall include the following elements:

(a) Determination of transportation needs as provided in OAR 660-012-0030

Findings: The TSP and Appendix document the Existing Conditions Inventory and Analysis. These outline all of the identified needs associated with today's conditions for each mode as well as the No Build analysis. These outline all of the identified year 2040 needs assuming no additional infrastructure beyond that currently funded is added. Each mode's needs as are noted. The proposed TSP update and Comprehensive Plan amendments provide an adequate provision of transportation needs through 2040.

(b) A road plan for a system of arterials and collectors and standards for the layout of local streets and other important non-collector street connections. Functional classifications of roads in regional and local TSP's shall be consistent with functional classifications of roads in state and regional TSP's and shall provide for continuity between adjacent jurisdictions. The standards for the layout of local streets shall provide for safe and convenient bike and pedestrian circulation necessary to carry out OAR 660- 012-0045(3)(b). New connections to arterials and state highways shall be consistent with designated access management categories. The intent of this

requirement is to provide guidance on the spacing of future extensions and connections along existing and future streets which are needed to provide reasonably direct routes for bicycle and pedestrian travel. The standards for the layout of local streets shall address: (A) Extensions of existing streets; (B) Connections to existing or planned streets, including arterials and collectors; and (C) Connections to neighborhood destinations.

Findings: The TSP includes a functional classification plan and roadway standards to address this requirement. The street design standards are contained in the City's Standards and Specifications, which will be revised subsequent to the adoption of this TSP.

The Comprehensive Plan and other implementing ordinances address extensions of existing streets; connections to existing or planned streets, including arterials and collectors, as well as connections to neighborhood destinations. The pedestrian and bicycle projects listed in the TSP provide direct routes for walking and bicycling travel, including connections to neighborhood destinations such as schools, parks, shopping, and employment. The TSP includes the planned roadway facilities and associated costs. The identified roadway facility projects and roadway plan are consistent with state and regional transportation plans. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(c) A public transportation system plan which: (A) Describes public transportation services for the transportation disadvantaged and identifies service inadequacies; (B) Describes intercity bus and passenger rail service and identifies the location of terminals; (C) For areas within an urban growth boundary which have public transit service, identifies existing and planned transit trunk routes, exclusive transit ways, terminals and major transfer stations, major transit stops, and park-and-ride stations. Designation of stop or station locations may allow for minor adjustments in the location of stops to provide for efficient transit or traffic operation or to provide convenient pedestrian access to adjacent or nearby uses. (D) For areas within an urban area containing a population greater than 25,000 persons, not currently served by transit, evaluates the feasibility of developing a public transit system at buildout. Where a transit system is determined to be feasible, the plan shall meet the requirements of paragraph (2)(c)(C) of this rule.

Findings: The TSP and the Appendix describe the existing public transportation services. The TSP presents planned City-related transit improvements and strategies, developed in coordination with CET. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(d) A bicycle and pedestrian plan for a network of bicycle and pedestrian routes throughout the planning area. The network and list of facility improvements shall be consistent with the requirements of ORS 366.514.

Findings: The City of Redmond currently complies with ORS 366.514 by requiring sidewalks and bike lanes on all collectors and arterials. The Appendix documents the Existing Conditions Inventory and Analysis. The TSP includes plans for improved bicycle and pedestrian projects and programs and associated costs. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(e) An air, rail, water and pipeline transportation plan.

Findings: The TSP and the Appendix outline the identified needs associated with today's conditions for air (including an Update Airport Master Plan for the Regional Airport), rail, water and pipelines, and the location of these facilities. The TSP does not find the need for or anticipate any fundamental changes to these facilities. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(f) Plan for transportation management and demand management.

Findings: The TSP identifies policies to expand Transportation Demand Management (TDM) plans. The proposed TSP update and Comprehensive Plan amendment are in compliance with this section of the TPR.

(g) Parking plan as provided in OAR 660-012-0045(5)(c).

Findings: The City is not within a MPO and this criterion does not apply to Redmond.

(h) Policies and land use regulations for implementing the TSP as provided in OAR 660-012-0045.

Findings: Policies and potential actions for implementing the TSP are contained in Chapter 2. Additional work for amending the Redmond Codes will be undertaken following adoption of the TSP. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

Transportation financing program as provided in OAR 660-012-0040.

Findings: The TSP includes the transportation financing plan, including existing and potential new funding sources and a summary of improvement and program costs. The TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(3) Each element identified in subsections (2)(b) – (d) of this rule shall contain: An inventory and general assessment of existing and committed transportation facilities and services by function, type, capacity and condition. (A) The transportation capacity analysis shall include information on: (i) The capacities of existing and committed facilities; (ii) The degree to which those capacities have been reached or surpassed on

existing facilities; and (iii) The assumptions upon which these capacities are based. (B) For state and regional facilities, the transportation capacity analysis shall be consistent with standards of facility performance considered acceptable by the affected state or regional transportation agency; (C) The transportation facility condition analysis shall describe the general physical and operational condition of each transportation facility (e.g., very good, good, fair, poor, very poor). A system of planned transportation facilities, services and major improvements. The system shall include a description of the type or functional classification of planned facilities and services and their planned capacities and performance standards.

Findings: The TSP and Appendix document the Existing Conditions Inventory and Analysis and describe the existing and planned facilities and services by function, type and condition for each mode, including a capacity analysis for each mode as described in the rule. These outline the identified needs associated with today's conditions for each mode as well as those intersections and streets not meeting applicable operating standards, including the No Build analysis. These outline all of the identified year 2040 needs assuming no additional infrastructure beyond that currently funded is added.

These present a transportation capacity analysis of the existing and committed roadway system, including streets and intersections consistent with existing city, county, and state standards; in some instances state adoption of alternative mobility standards will be requested in the future through an OHP amendment for Veterans Way Intersection. This operational analysis describes the degree to which those capacities have been reached or surpassed on existing facilities, and the assumptions upon which these capacities are based. The TSP summarizes the proposed system of existing and planned transportation facilities, services and major improvements by functional classification. The City maintains a separate inventory of street physical conditions. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

OAR 660-012-0025 Complying with Goals in Preparing TSPs (1) Adoption of a TSP shall constitute a land use decision regarding the need for transportation facilities, services and major improvements and their function, mode and general location. (2) Findings of compliance with applicable statewide planning goals and acknowledged comprehensive plan policies and land use regulations shall be developed in conjunction with the adoption of the TSP.

Findings: The TSP update is being adopted as a legislative land use decision, consistent with the Redmond Development Code and this rule. These findings of compliance accompany that decision. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR. (

3) The City may defer decisions regarding function, general location and mode of a refinement plan if findings are adopted that: (a) Identify the transportation need for which decisions regarding function, general location or mode are being deferred. (b) Demonstrate why information required to make final determination cannot be made

available within time for TSP preparation. (c) Explain how deferral does not invalidate the assumptions upon which the TSP is based or preclude implementation of the remainder of the TSP. (d) Describe the nature of the findings which will be needed to resolve issues deferred to a refinement plan; and, (e) Set a deadline for adoption of a refinement plan prior to initiation of the periodic review following adoption of the TSP.

Findings: The TSP does not identify refinement plans at this time. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

OAR 660-012-0030 Determination of Transportation Needs (1) The TSP shall identify transportation needs relevant to the planning area and the scale of the transportation network being planned including: (a) State, regional and local transportation needs (b) Needs of the transportation disadvantaged (c) Needs for movement of goods and services to support industrial and commercial development planned for, pursuant to Goal 9.

Findings: The TSP and the Appendix document the Existing Conditions Inventory and Analysis. These outline all of the identified needs associated with today's conditions for each mode as well as those intersections and streets not meeting applicable operating standards. The TSP and the Appendix document the No Build analysis.

These outline all of the identified year 2040 needs assuming no additional infrastructure beyond that currently funded is added. Each mode's needs as well as intersection and streets not meeting applicable standards are noted. The Appendix documents the transportation needs, by mode, related to state, regional and local transportation needs, needs of transportation disadvantaged, and needs for goods movement to support industrial and commercial development. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(2) Local governments preparing local TSPs shall rely on the analyses of state and regional transportation needs in adopted elements of the state TSP and adopted regional TSPs.

Findings: The TSP has been coordinated with the analyses included in applicable state plans and the Bend/Redmond MPO model data. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(3) Within UGBs, the determination of local and regional transportation needs shall be based upon: (a) Population and employment forecasts and distributions that are consistent with acknowledged comp plan. Forecasts and distributions shall be for 20 years and, if desired, for longer periods;

Findings: The TSP has been coordinated with the population and employment forecasts consistent with the Redmond Comprehensive Plan, which used forecasts through 2028, updated to 2040, and adjusted to include the most recent Portland State

University estimates, as required by rule. The Appendix documents the assumptions for the 20-year housing and employment forecasts. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(b) Measures adopted pursuant to OAR 660-012-0045 to encourage reduced reliance on the automobile.

Findings: Many of the goals, policies, and implementing actions contained in the TSP will help reduce reliance on the automobile and increase the safety and convenience of using other modes. The pedestrian, bicycle, and transit improvement projects contained in the TSP are intended to increase mode choice and reduce reliance on the automobile. The proposed TSP update is in compliance with this section of the TPR.

(4) In MPO areas, calculation of local and regional transportation needs also shall be based on accomplishment of the requirement in OAR 660-012-0035(4) to reduce reliance on the automobile.

Findings: The City of Redmond is not within a MPO. This criterion does not apply.

OAR 660-012-0035 Evaluation and Selection of Transportation System Alternatives (1) The TSP shall be based on evaluation of potential impacts of system alternatives that can reasonably be expected to meet the identified transportation needs in a safe manner and at a reasonable cost with available technology. The following shall be evaluated as components of system alternatives. (a) Improvements to existing facilities or services.

Findings: The multimodal system improvements were assessed against the goals and policies in the TSP to ensure that needs are met with a safe and reasonable manner with available technology. Improvements to existing facilities and services are the fundamental basis and highest priority of the TSP goals, policies and project lists. As iterated within the goals and policies, the City's priority is to improve system efficiency, safety and management and re-purpose existing rights-of-way to include high-quality facilities for non-auto users before widening streets to expand capacity for motorized vehicles.

Per the analysis documented in the Appendix, improvements to the existing facilities and services were examined through the existing conditions study, needs analysis with a "No Build" scenario, and a scenario that explored improvements and additions to the existing system. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(b) New facilities and services, including different modes or combinations of modes that could reasonably meet identified transportation needs.

Findings: All new facilities identified will be designed and built to City Standards to accommodate all modes to increase transportation choices, reduce reliance on the

automobile, and improve safety. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(c) Transportation system management measures;

Findings: The TSP policies as a whole, focuses on increasing the efficiency of the existing transportation system, supporting the economy and encouraging a reduction in vehicle miles traveled. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(d) Demand management measures;

Findings: Transportation Demand Management is a tool Redmond continues to explore and expand within its implementation codes.

(e) A no-build system alternative required by the NEPA or other laws.

Findings: The TSP and the Appendix document the No Build system alternative and associated transportation needs in the year 2040. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(3) The following standards shall be used to evaluate and select alternatives: The transportation system shall support urban and rural development by providing types and levels of transportation facilities and services appropriate to serve the land uses identified in the acknowledged comprehensive plan;

Findings: The TSP and the Appendix document the anticipated land uses and the TSP projects (types and levels of service) needed to support those land uses. The TSP and Volume 2 (Alternatives Evaluation Process) document the alternatives evaluation and selection process. The TSP supports urban growth as planned for the Redmond UGB area in the acknowledged comprehensive plan and regional travel and restricts facility extension that might encourage inappropriate growth on rural lands. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(b) The transportation system shall be consistent with state and federal standards for protection of air, land and water quality; (c) The transportation system shall minimize adverse economic, social, environmental and energy consequences;

Findings: The City is in compliance with State and Federal environmental guidelines while supporting the critical economic and social needs for access to jobs and housing. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

d) The transportation system shall minimize conflicts and facilitate connections between modes of transportation;

Findings: The goals and policies included in the TSP are focused on creating a safe, complete, connected transportation system that meets the needs and safety of travelers of all ages, abilities, races, ethnicities and incomes. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(e) The transportation system shall avoid principal reliance on any one mode of transportation by increasing transportation choices to reduce principal reliance on the automobile. Select transportation alternatives that meet the requirements in section (4) of the rule.

Findings: The alternatives analysis summarized in TSP and the Appendix documents is fundamentally based on the need to decrease reliance on the automobile. The goals and policies emphasize the importance of increasing transportation choices, and the list of needed programs and improvements support the goals and policies for increasing transportation choices. Analysis of the proposed transportation system demonstrates a significant increase in the use of other modes and a reduction in VMT per capita. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

4) Local TSPs shall be designed to achieve adopted standards for increasing transportation choices and reducing reliance on the automobile. Adopted standards are intended as means of measuring progress of metropolitan areas towards developing and implementing transportation systems and land use plans that increase transportation choices and reduce reliance on the automobile. It is anticipated that metropolitan areas will accomplish reduced reliance by changing land use patterns and transportation systems so that walking, cycling, and use of transit are highly convenient and so that, on balance, people need to and are likely to drive less than they do today.

Findings: The TSP implements the Redmond Comprehensive Plan, and the reliance on master planning in order to reduce reliance on the single occupancy vehicle (SOV) as well as VMT for those who do chose to drive. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR.

(2) A transportation financing program shall include the items listed in (a)-(d): (a) A list of planned transportation facilities and major improvements; (b) A general estimate of the timing for planned transportation facilities and major improvements; (c) A determination of rough cost estimates for the transportation facilities and major improvements identified in the TSP;

Findings: The TSP lists the planned transportation facilities and programs, along with a general time estimate. Each project or program is assigned a planning level cost estimate and matched to potential funding. The proposed TSP update and Comprehensive Plan amendments are in compliance with this section of the TPR planning process.

Conclusion

The TSP includes goals, policies, map amendments, and projects and programs needed to implement the community's desired transportation system plan, including requiring analysis by proposed development of the adequacy of the transportation system to serve new development, and requiring mitigation where necessary and appropriate.

The TSP includes policies related to funding to provide greater certainty to new development of needed transportation infrastructure. The proposed TSP supports the Redmond Comprehensive Plan intended to promote a land use pattern that encourages alternative modes of transportation such as transit, walking, and bicycling and to reduce trips and vehicle miles travelled.

The TSP is based on recommendations developed through a robust planning process that used advisory committees. The proposed TSP update implements the Comprehensive Plan by providing a complete transportation network to serve the City, emphasizing the need to provide full access to existing and planned jobs and housing for employees, customers, emergency services, and freight.



City of

REDMOND

Transportation System Plan



DRAFT

June 2020

Acknowledgments

Table of Contents

1 Introduction	5
2 Goals & Policies	15
3 Needs Assessment & Evaluation.....	23
4 Creating Multimodal Systems.....	33
5 Transportation Priorities & Project Categories.....	47
6 Transportation Funding & Implementation.....	71

1

Introduction

In This Chapter

- Why did the Transportation System Plan need to be updated?
- What principles guided the update?
- Who participated in the update's development?

1

Introduction

Welcome to the Redmond Transportation System Plan (TSP). This document establishes a system of transportation facilities and programs to serve the City over the next 20 years. The TSP is the transportation element of Redmond's Comprehensive Plan and updates the TSP adopted in 2008.

The City's transportation system supports how people and goods move from one place to another and affects nearly every aspect of our lives. We import food, clothing, and building materials to our homes. A constant flow of freight supplies many aspects of our lives. We travel to work and school and move about to socialize and play. Streets, pathways, rail lines, and the Redmond Airport create the framework around which our City

is built and helps define our livability. Our personal choices about how we travel affect our daily lives and our physical and mental well-being. Transportation is the backbone that supports our city as it continues to grow and accommodate new citizens.

This TSP update articulates City policies and priorities and provides a list of construction projects and programs to ensure that the transportation system continues to support the City's needs and visions, an economically vital, healthy, and equitable community, and conforms to state and regional policies. The TSP must remain relevant and responsive and will be revisited over time.



TSP Organization

The City of Redmond's TSP is in two volumes. Volume 1 is the main document and includes the items that will be of interest to the broadest audience. Volume 2 contains the technical memoranda, data, and related transportation plans that enhance and support Volume 1.

Volume 1

Volume 1 includes the following:

- **Chapter 1:** a brief overview of the planning context for the TSP
- **Chapter 2:** goals and policies that express the City's long-range vision for the transportation system
- **Chapter 3:** the transportation system deficiencies and needs as well as the process to develop the TSP's list of planned capital improvements and transportation programs
- **Chapter 4:** an overview of the recommended projects for the multimodal system (this chapter also serves as the Transportation Element of the Comprehensive Plan)
- **Chapter 5:** a list of the multimodal projects and the costs estimated for their construction
- **Chapter 6:** a summary of transportation funding and implementation, including estimated revenue stream, cost of 20-year needs, and potential funding sources

Volume 2

Volume 2 includes the following technical documents:

- **Appendix A:** Public Involvement Plan
- **Appendix B:** Plans and Policy Review
- **Appendix C:** Analysis and Assumptions Methodology
- **Appendix D:** Existing Conditions Analysis
- **Appendix E:** Future Systems Conditions
- **Appendix F:** Alternatives Analysis
- **Appendix G:** Redmond Airport Master Plan Update
- **Appendix H:** Identification of Preferred and Cost-Constrained Alternatives
- **Appendix I:** South Corridor Recommendations
- **Appendix J:** Cost Estimates
- **Appendix K:** Quarry Avenue Analysis

While not all of Volume 2 is adopted as part of the TSP, all of the documents provide useful information regarding the basis for the decisions represented in Volume 1.

Purpose

The TSP identifies the transportation facilities and services to support the City's adopted Comprehensive Plan. This TSP provides for a long-term community approach to accommodate new growth while maintaining and improving transportation facilities for all users over the next 20 years.

The TSP also serves as a resource for future transportation and land use decision-making by providing:

- Solutions to address existing and future transportation needs for biking, walking, using transit, driving, freight, air, and rail;
- A blueprint for investments in transportation projects and programs that improve safety and access for all travelers, improve Regional and State resilience, and support City and Regional economic development priorities;
- A tool for coordination with regional and local agencies and governments;

- Information to ensure prudent land use and transportation choices;
- Order of magnitude cost estimates for transportation infrastructure investments needed to support economic development and growth, and possible sources of funding these improvements;
- Function, capacity and location of future streets, sidewalks, bikeways, pathways, transit, and other transportation facilities; and
- Potential programs to help improve opportunities to travel by walking, bicycling and transit in the future.

The TSP satisfies the state's requirements for a local transportation system plan as prescribed by Oregon Statewide Planning Goal 12: Transportation.





Guiding Principles And Context

The TSP provides a flexible, adaptable framework for making transportation decisions in an increasingly unpredictable and financially constrained future. Decisions about the City's transportation system will be guided by the goals and policies contained in Chapter 2, but ultimately the decisions will be made within the overall context of the City's land use plans, support for local and regional Economic Development, and the City's role in the Oregon Resilience Plan. These guiding plans and principles provide a foundation for the TSP's goals, policies, and potential actions.

The Oregon Revised Statutes require that the TSP be based on the Comprehensive Plan land uses and provide for a transportation system that accommodates the expected growth in population and employment.

Development of this TSP was guided by Oregon Revised Statute (ORS) 197.712 and the Department of Land Conservation and Development (DLCD) administrative rule known as the Transportation Planning Rule (TPR, OAR 660-012-0060).

Per the TPR, this TSP identifies multimodal transportation needs to serve users of all ages, abilities, and incomes. As such, solutions to address existing and future transportation needs for bicycling, walking, transit, motor vehicles, freight, and rail, and improved safety for all travelers are included. Further, one of the implementation steps of the TSP will include adoption of land use and land division ordinance amendments needed to protect transportation facilities and provide active transportation facilities between residential, commercial, and employment/institutional areas. Finally, as required by the TPR, this TSP was developed in coordination with local, regional and state transportation plans.

Regional Coordination & Community Engagement

Because traffic and mobility needs do not stop at a city's borders, the City is and remains committed to coordinating transportation plans within Central Oregon. This TSP was collaboratively developed by the City and community members, businesses, ODOT, and Deschutes County. Opportunities for engagement included:

- Project website that included web-based surveys and all technical reports, draft goals and policies, meeting summaries, a document library stocked by members of the public, and links to other planning activities in the region;
- Monthly Project Management Team Meetings attended by City, ODOT and County staff;
- Regular updates and work sessions with the Redmond Urban Area Planning Commission
- Three Public Advisory Committee Meetings;
- Two public open houses co-led with the South Corridor Project;
- One “virtual” Open House on the draft TSP;
- Targeted outreach with local community, neighborhood and social service organizations; and
- City Planning Commission, City Council, and Deschutes County Board of Commissioners work sessions and public hearings.

Through these public involvement activities, the City provided community members with a variety of forums to identify their priorities for future transportation projects, programs, and policies.









2

Goals & Policies

In This Chapter

- What goals guide the 20-year Transportation System Plan
- What policies will be set to carry out these goals?
- What is the difference between goals and policies?

2

Goals & Policies

The TSP Goals are intended to be broad statements that characterize the community's desires and vision for the future transportation system. The goals are intended to be aspirational and may not be fully attained within the 20-year planning horizon of this plan. The goals are intended to be supported by the policies as well as specific implementation items for the City to address after the TSP has been adopted.

TSP Goals

- 1** Provide a safe and efficient transportation network to complement key economic development priority areas, the comprehensive plan, recreational needs, and adopted state, regional and local plans and policies.
- 2** Advance community and statewide emergency preparedness efforts through support of the Oregon Resiliency Plan.
- 3** Provide transportation choices and address the needs and safety of all travelers, including people of all ages, abilities, ethnicities, and incomes.
- 4** Provide comfortable, convenient and safe pedestrian and bicycle facilities for all users.
- 5** Provide reliable and convenient transit service to Redmond residents, its businesses, and its connection to surrounding cities, as well as special transit options for the City's elderly and disabled residents.
- 6** Ensure efficient and effective freight transportation infrastructure is developed and maintained to support local and regional economic expansion and diversification consistent with City and Regional economic plans and policies.
- 7** Implement the plan in a timely fashion and keep it up to date with respect to local and regional priorities.

Policies

Policies are statements adopted to provide a consistent course of action and move the community toward attainment of its goals. Policies in the TSP guide the work of the City staff in formulating proposed changes to the Zoning Code and other regulatory documents, to guide other work programs and long-range planning projects, and to prepare budget and capital improvement program. These policies will not be used in determining whether the City shall approve or deny individual land use applications.

System Policies to Support Economic Development

Policy 1.1: Manage the City's street, bike, pedestrian, and transit system to facilitate economic growth of existing and future businesses in Redmond.

Policy 1.2: Consider environmental impacts of the overall transportation system and strive to mitigate negative effects and enhance positive features of the natural landscape and topography.

Policy 1.3: Provide a multi-modal transportation system to help reduce reliance on single-occupancy vehicle travel and supports mixed-use areas, employment centers, recreation, commercial, residential, and public developments.

Policy 1.4: Manage the on-street parking system to preserve adequate capacity and turnover for access to businesses in the downtown area.

Policy 1.5: Facilitate prompt emergency responses by ensuring that fire and emergence response routes remain passable by design.

Policy 1.6: Coordinate underground capital improvement projects to coincide with needed transportation project expenditures.

Oregon Resiliency Plan Policies

Policy 2.1: Prioritize transit and roadway improvements that help ensure access to local schools and other public buildings that could be used during emergencies.

Policy 2.2: Prioritize roadway improvements that can be used as alternative routes to US 97 and OR 126 in the case of emergencies

Policy 2.3: Prioritize roadway improvements that provide land-side access to the Redmond Municipal Airport and the BNSF line.



Source: Oregon Department of Transportation



Multimodal Policies

Policy 3.1: Address the mobility and safety needs of motorists, transit users, bicyclists, pedestrians, freight, and the needs of emergency vehicles when planning and constructing roadway system improvements.

Policy 3.2: Consider safety first when making transportation decisions. Strive for zero transportation-related fatalities and severe injuries through design, operations, maintenance, education and enforcement.

Policy 3.3: Foster neighborhoods where all residents can meet many of their basic daily needs without an automobile by providing streets, sidewalks, bike facilities and access to transit in an environment where people feel safe and secure.

Policy 3.4: Expand existing Transportation Demand Management (TDM) programs related to carpooling, alternate work schedules, walking, bicycling, and transit use in order to reduce peak hour congestion and reliance on SOVs.

Bicycle and Pedestrian Policies

Policy 4.1: Maintain and preserve a safe and efficient bike and pedestrian system in Redmond.

Policy 4.2: Strive to increase the percentage of bicycle and pedestrian system users by planning, designing, and managing systems to support the needs of diverse populations and types of users, including meeting Americans with Disabilities Act (ADA) needs.

Policy 4.3: Ensure that there are safe, accessible, comfortable, and direct sidewalk connections between residential areas, schools, major destinations, and transit stops.

Policy 4.4: Improve community health by designing streets and paths to encourage increased physical activity by the public.

Policy 4.5: Prioritize improvements that complement and improve access to the Dry Canyon trail system.

Policy 4.6: Coordinate with Deschutes County and other agencies to provide additional trail extensions throughout the community including connections beyond the city limits.

Transit Policies

Policy 5.1: Coordinate with Cascades East Transit to increase the transit system's accessibility and convenience for all users, including the transportation-disadvantaged population.

Policy 5.2: Prioritize improved transit service in areas with access to key employment and recreational areas.

Freight Policies

Policy 6.1: Manage traffic operation systems for efficient freight and goods movement along designated freight, truck, and rail routes in Redmond.

Policy 6.2: Facilitate efficient access for goods, employees, and customers to and from employment, commercial, and industrial lands, including freight access to the Redmond Municipal Airport.

Policy 6.3: Reduce conflicts between rail and street traffic.

Regional Coordination Policies

Policy 7.1: Coordinate the design of Redmond's transportation system with ODOT, Deschutes County, Cascades East Transit and other relevant local, regional, and state agencies.

Policy 7.2: Support development of a stable and flexible transportation finance system that provides adequate resources for transportation needs identified in the TSP.

Policy 7.3: Build and maintain public support for the TSP through open information, public participation, public discussion of the plan's effects on the community, and periodic reassessment of the plan's goals and policies.

Policy 7.4: Evaluate opportunities for providing Transportation System Management and Operations (TSMO) improvements that address safety and efficiency for all modes.

Policy 7.5: Coordinate with ODOT on the implementation of the South Corridor Plan, including local roadway connections and circulation.







3

Needs Assessment & Evaluation

In This Chapter

- What is Redmond's transportation system like now?
- What types of projects will likely best meet current and future needs?

3

Needs Assessment & Evaluation

The TSP goals, policies, projects, and potential implementing actions are based on analysis by, and input received from, the community, City of Redmond staff, partner agency staff, and City policy-makers. Their review included analysis of existing transportation conditions for all modes of travel, forecast deficiencies in the transportation system, and an evaluation of possible system improvements that can meet the transportation needs for all users (including the transportation disadvantaged) and address the need for movement of goods

and services to support local and regional economic development priorities. The list of recommended projects and programs was identified based on an analysis of the City's transportation needs, potential system alternatives, and a detailed review of relevant state, regional, and local plans, policies, and funding opportunities. The following sections outline the key findings from the existing and future needs analyses that helped shape the recommendations.

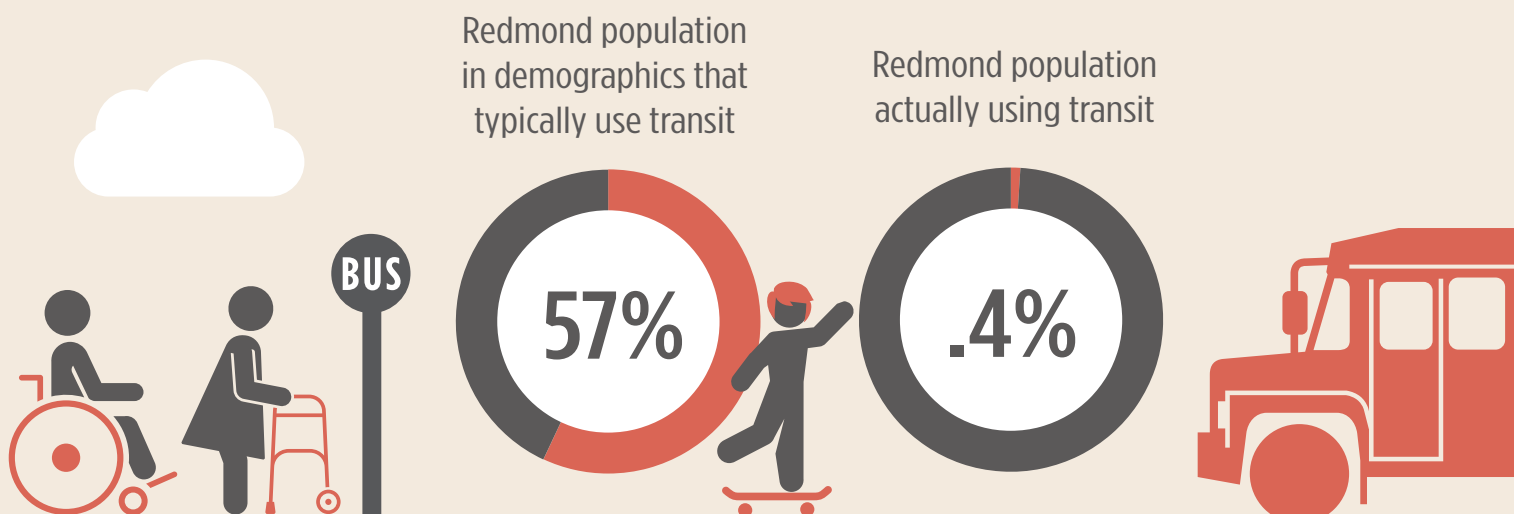


Existing Transportation System Conditions

Existing transportation needs, opportunities, and constraints reflect an inventory of the multimodal transportation system characteristics conducted in 2017. This inventory included all major transportation-related facilities and services within the Urban Growth Boundary (UGB) at that time. Key roadway features, traffic conditions, safety performance, bicycle and pedestrian facilities, and transit service, among other topics, were analyzed. Detailed findings of the technical analysis are summarized in Volume 2, Appendix D: Existing Conditions Analysis. Key findings of this review are outlined below.

Key Findings

- Approximately 57% of Redmond's population consists of demographic groups related to age, disabilities and income that typically rely on public transportation in other communities; however, less than one percent of the population (0.4%) utilizes public transportation.
- Citywide, sidewalks are frequently missing on one or both sides of the street, there is a lack of consistent street lighting, and there are long distances between protected pedestrian crossings. Walking can be improved by filling gaps in the sidewalk network, improving buffers from traffic, and providing improved crossings and other safety measures.
- A number of arterial roadway corridors and key intersections could benefit from strategic capital improvements to the existing system to provide better connectivity, improved safety measures and an improved walking and cycling effort.
- An increase in low-stress bicycle facilities is needed citywide.
- Freight access, particularly on the east side of town, is a critical component of the Redmond economy.



Basis Of Need Assessment

The TSP addresses the projects, programs, and policies needed to support growth in population and jobs within the Redmond UGB as well as the travel associated with regional and state economic growth between now and the year 2040. Over time, the City, Deschutes County, and ODOT will monitor the multimodal transportation needs and will periodically update the TSP to respond to changing conditions.

The needs assessment and resulting projects (set forth in Chapter 4) intended to meet the identified transportation needs are based upon the land use designations established by the City's Adopted Comprehensive Plan. The TSP reflects Redmond policy makers' and community members' priorities to maintain existing facilities and reduce congestion, save money, and provide health benefits for the entire community by providing alternatives to single occupancy vehicle travel and by making existing streets safer and more efficient without costly increases to automobile-oriented infrastructure.

2040 Population and Employment Forecasts

Table 1 shows the household and job growth forecasts within the City's UGB. The City of Redmond, in coordination with ODOT, allocated this growth to developable areas within the UGB consistent with the land use designations shown in the adopted Comprehensive Plan at the time the TSP was prepared.

Traffic Volume Development

Based on the geographic allocations of future job and household growth within the UGB, ODOT's Transportation Planning and Analysis Unit (TPAU) developed traffic volume forecasts for the City's collector and arterial street system using the Bend-Redmond regional travel demand model, which is a tool that is used to forecast future street volumes based on projected increases in jobs and housing as well as changing travel preferences. This model is calibrated to existing traffic volumes measured on streets and highways within the City. In addition to land use and street network inputs, the model also relies on information about existing traveler behavior and trip-making characteristics derived from surveys, and from research that forecasts how people might use the transportation system in the future.

The travel demand forecasts and measured traffic counts at 45 intersections within the City were used to calculate year 2040 intersection and roadway volumes for use in the analyses of future system deficiencies. The future volume calculations were performed using the procedures outlined in ODOT's Analysis and Procedures Manual (APM).

Table 1: City of Redmond Land Use Estimates

	Year 2010	Year 2040	Growth
Households	10,061	22,433	12,372 (123%)
Employees	10,134	28,550	18,416 (181%)

Baseline Streets and Intersections Analyses

Previously adopted plans and policies for the City, Deschutes County and ODOT all identified a variety of street, pedestrian, bicycle, and transit projects that could be implemented in the future. The Baseline Analysis assumes the 2040 population and employment forecast and the existing transportation system will not change by 2040 except for the construction of transportation improvements that have already been started or for which funding is already allocated. At the time the TSP was prepared, there were no guaranteed funding sources for any major projects that will materially affect traveler behaviors and traffic volumes on the City's street network in the future. This analysis informs the development of the project list reflected in Chapter 4.



Source: Oregon Department of Transportation

Multimodal circulation and capacity improvements are needed to support continued economic growth and vitality.



Identified Transportation Needs

The results of the year 2040 Analyses are summarized in Volume 2, Appendix E: Future Systems Conditions.

Key Findings

- Several primary street corridors are anticipated to experience increased congestion in the future. Notable examples include OR 126 within the UGB, Maple Avenue between US 97 and Northwest Way, Yew Avenue between Airport Way and S 27th Street and US 97 south of SW Glacier Avenue. Multimodal circulation and capacity improvements are needed to support continued economic growth and vitality within the city and to offer a variety of route and mode choices to help alleviate this congestion.
- Many of the arterial and collector intersections are anticipated to need geometric and/or traffic control modifications in the next twenty years to maintain a desired quality of service for future users.
- Several of the streets within the City lack sidewalks, especially in the neighborhoods to the west of US 97. The City should consider prioritization of new sidewalks and pathways that connect neighborhoods to schools, commercial areas, and other key destinations.
- Cyclists are required to “share the road” on most streets within Redmond or ride on busier collector and arterial bike lanes, which are classified as “high-stress” under existing and year 2040 baseline conditions and are not suitable for riders of all ages and abilities. When bike lanes are provided, the facilities are often non-buffered and located on higher volume/higher speed roads, which typically offset the “stress reducing” attributes of the bike lane. Additional low stress bike facilities to support commuting, recreational and personal travel are needed.
- The bicycle trail system should be expanded to encourage greater access, including inter-agency coordination.
- Increased transit options are needed to facilitate travel throughout the City.

Evaluation Of Transportation System Alternatives To Address Identified Needs

The Project Advisory Committee (PAC), Project Management Team (PMT), and participants at open houses and other community forums identified transportation system alternatives that had the potential to address existing and future transportation needs. These alternatives address all modes of travel and include programs that would reduce vehicular travel demand. Further, these potential system alternatives avoid principal reliance on any one mode of transportation and increase transportation choices for all users. The PMT developed these ideas into a potential project list that was screened by agency staff against the TSP's evaluation criteria and ultimately identified for the 20-year list of projects reflected in Chapter 5. This multistep process is described below.

The potential alternatives were first screened against a set of key questions, including:

- Does the project address an identified transportation problem or opportunity?
- Is the project within the City's Urban Growth Boundary? Is it within the City's control, or the control of its partnering agencies, to implement?
- Is it technically feasible to construct and/or implement?
- Could the project be reasonably funded within the next twenty years?

If the answer to any question was "no," the project idea was not further considered. The remaining ideas were evaluated by the PMT against the criteria that are intended to help differentiate between alternatives. The criteria considered included:

- Balances impacts to developable parcels with system and community needs;
- Minimizes impacts to Goal 5 resources;
- Supports or enhances the ability to implement the Oregon Resiliency Plan and/or other key state or regional projects;
- Leverages future transportation investments to reduce access, economic, safety and health disparities between neighborhoods, particularly those with greater populations

of low income, minority, youth and/or elderly population than the City as a whole.

- Addresses key connectivity needs on the collector and arterial street system;
- Addresses known safety issues;
- Supports enhanced multimodal access to major activity centers and/or economic development priority areas within the City as well as the region;
- Provides pedestrian and bicycle connectivity to key transit corridors;
- Provides pedestrian and bicycle connectivity to key routes to school;
- Addresses key gaps in the bicycle system;
- Addresses key gaps in the pedestrian system;
- Improves freight mobility on designated freight, truck, rail and air routes;
- Improves mobility for through traffic on state highways; and,
- Leverages public and private investments.

The resultant 20-year project list is intended to address the identified transportation needs, meet the TSP goals and reflect the criteria included in ORS 660-012-0035. The recommended multimodal transportation projects are organized into the following categories for implementation based on complexity, likely availability of funding and assessment of need:

- Strategic Street Capacity Investment Corridors,
- New Planned Streets,
- Intersection Capacity Improvements,
- Grade-Separated Intersection Improvements,
- Key Multi-Use Pathways,
- Key Bicycle Corridors, and
- Key Pedestrian Improvements.

The draft project lists and a map of the project locations were posted to the City's website prior to adoption. The project lists are provided in Chapter 5.



Source: Wikimedia Commons, by Ian Poellet - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=7327699>





4

Creating Multimodal Systems

In This Chapter

- What types of facilities are needed to support people using different modes of transportation?
- What features characterize Redmond's pedestrian, motor vehicle, bicycle, freight, rail, air, pipeline, and waterway facilities?

4

Creating Multimodal Systems

The TSP is a coordinated set of multimodal policies, programs, and projects that address the transportation needs within Redmond's UGB over the next 20 years. This chapter provides an overview of these programs and projects; the detailed project list and associated cost estimates are shown in Chapter 5.

Planning for a network of "Complete Streets" that can serve the City's identified transportation needs is an integral part of the TSP. Although automobiles will continue to be a primary mode of travel, and preservation and improvement of the existing street system

remains important, the projects, policies, and programs highlight improvements that are designed to increase transportation choices, reduce reliance on the automobile by better accommodating and encouraging travel by foot and bike for short trips, improve safety for all street users, and provide for improved transit service. The TSP, in partnership with the City's adopted land use plans and regulations will ultimately result in land use patterns and transportation systems that make walking, cycling, and use of transit highly convenient so that, on balance, people need to and are likely to drive less than they do today.

Vehicular Needs

The preliminary screening evaluation identified arterial and collector streets that experience or are projected to experience traffic congestion and delay and/or are lacking pedestrian and bicycle facilities that comfortably serve a broad range of users. To meet the identified street system needs, the TSP focuses strategies that improve connections between existing neighborhoods, employment, and commercial areas; provide connections to newly developed areas; improve safety for all travelers; and increase the efficiency of the existing system.

Functional Classification of Streets

The City's street functional classification system organizes the roadway network as a balanced hierarchy of mobility and access to, through, and between different types of land uses. Some factors that are considered in setting a roadway's functional classification are average daily traffic (ADT) volumes, street connectivity, spacing of streets, and the mix and amounts of different travel modes on a typical segment (e.g., bikes and cars). As the community continues to grow and mature, the City will revisit functional classifications periodically to ensure that particular street classifications are still appropriate. The functional classification of the roadway system in Redmond is shown in Figure 1.

The functional classification system is intended to provide more certainty for both private development investment expectations as well as for City construction process. This system categorizes streets in the city as:

Standard Local Residential
Industrial Street
Minor Collector
Major Collector
Minor Arterial

Street Design Standards

Street design standards provide information on how streets within each of the functional classifications "look and feel." The City's Street Design Standards identify how existing streets can be modified and new streets can be constructed to accommodate the needs of people with disabilities, riding bicycles, using transit, walking, driving automobiles, and moving freight. In the past, most street design standards were primarily oriented toward moving vehicular traffic, providing rudimentary bike lanes and sidewalks for pedestrians. The TSP reflects design standards intended to ensure streets provide comprehensive and integrated transportation networks that serve all modes of transportation and create quality facilities that invite people of all ages and abilities to pursue active transportation.

Redmond Engineering Standards maintain more specific design elements for each of these sections, including applicable variances and pavement design requirements. The typical sections included in the TSP are intended to provide general guidance on right-of-way width requirements, number and type of lanes, pedestrian facilities and bicycle facilities by functional classification type. In some cases, additional features may be added on a case-by-case basis and per the direction of the City Engineer, such as wider sidewalks, multi-use paths, protected bicycle facilities, protected parking bays, or medians.

The typical sections are illustrated in Figure 2 through Figure 6.

Figure 2: Standard Local Residential Typical Section

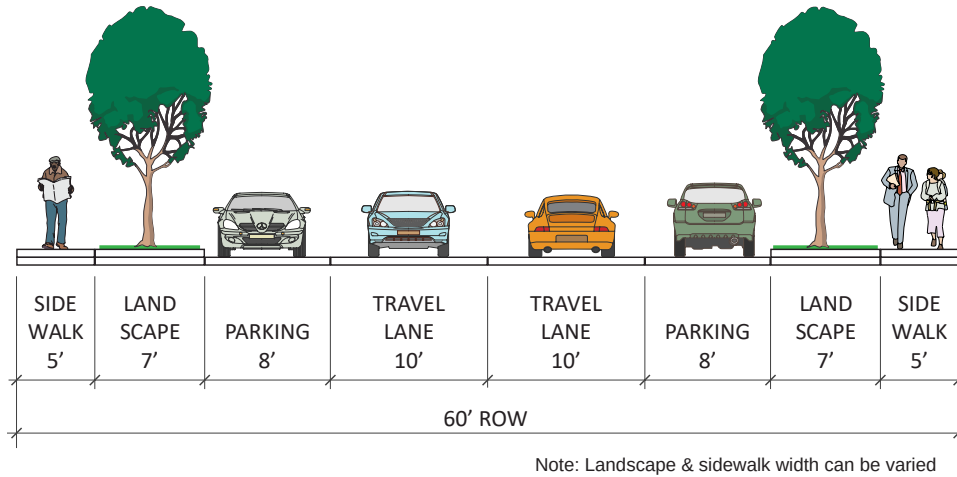


Figure 3: Industrial Street Typical Section

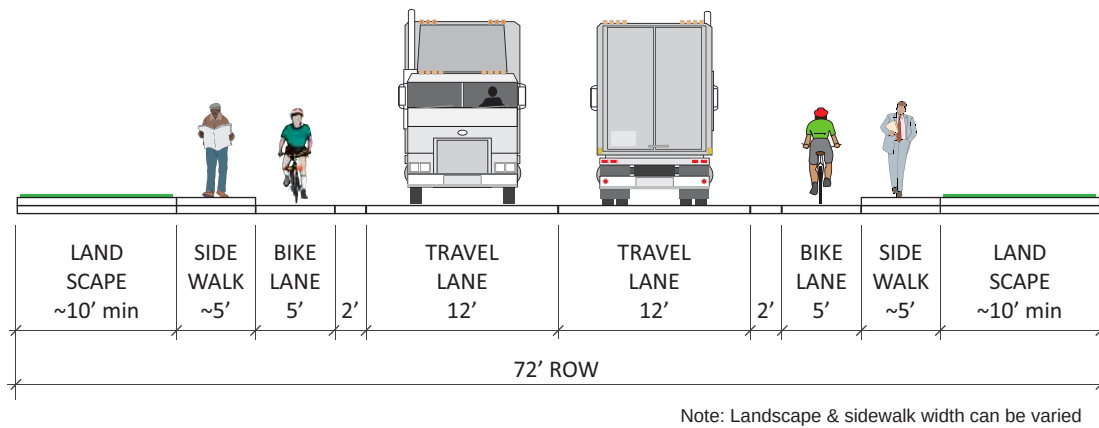


Figure 4: Minor Collector Typical Section

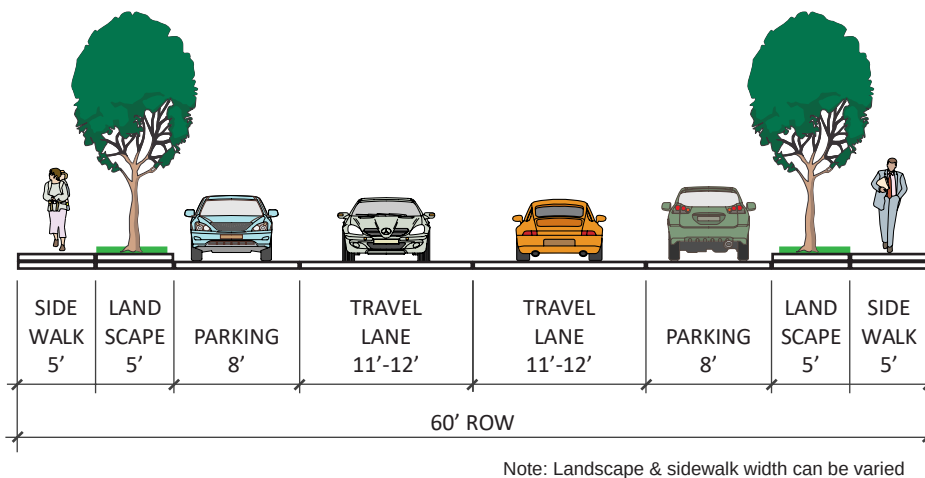


Figure 5: Major Collector Typical Section

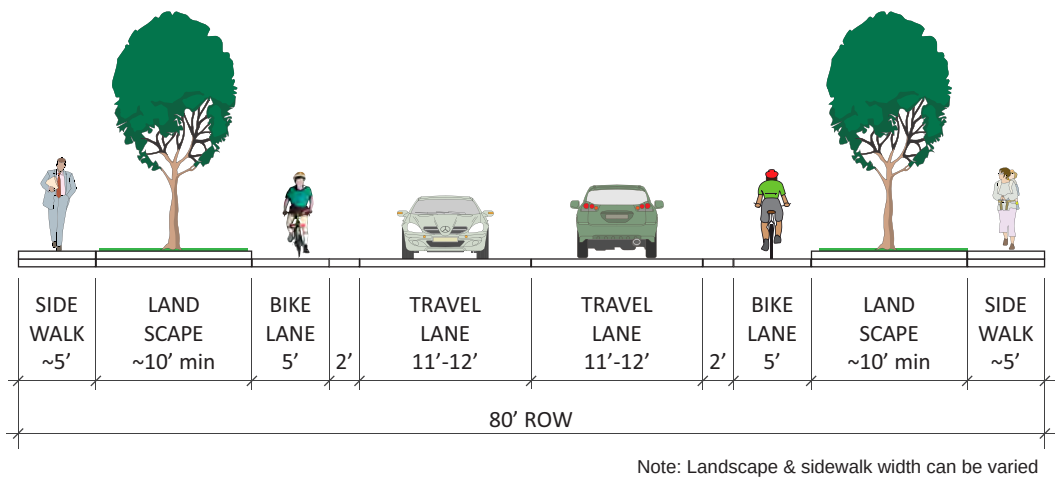
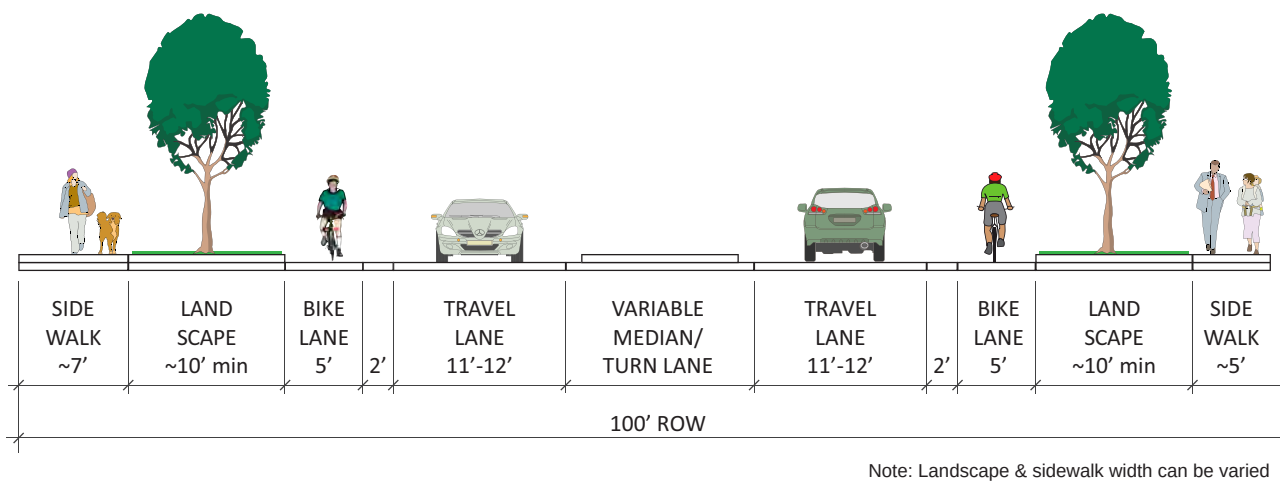


Figure 6: Minor Arterial Typical Section



Street Capacity Improvements

The needs analysis identified arterial and collector streets that experience or are projected to experience traffic congestion and delay, lack pedestrian and bicycle facilities to comfortably serve a broad range of users, and/or could hinder implementation of the provision of future reliable transit services in a cost-effective manner. Six corridors reflect the City's current strategic focus for capacity improvements, including: Pershall Way, Northwest Way, SW Helmholtz Way, OR 126 east of US 97, OR 126 west of the downtown, and SW Veteran's Way.

Roadway widening and similar improvements to these key corridors can help accommodate growth and economic development in the region and continue to shape the urban context for the City. Such improvements can improve mobility and connectivity as well as create opportunities to incorporate bicycle, pedestrian, and transit facilities where they do not exist.

New Planned Streets

A number of new streets are planned to improve connectivity between and within existing neighborhoods, employment, and commercial areas; provide connections to newly developed/developing areas; and to provide alternative travel routes for all modes to existing streets. Twenty-three streets were identified for extension and/or providing new connections.

Intersection Capacity Improvements

Intersection capacity improvements are typically related to modifications which are lower in cost than a typical street corridor project and are ones that generally do not often require significant right-of-way acquisition. The TSP is not inclusive of all

of the intersection projects that the City will pursue over the next twenty years. Rather, the projects are those that the City can pursue to strategically improve the operational efficiency of specific intersections and important roadways. These projects can enhance system operations and can be completed as opportunities arise. In all cases, the City will review the appropriate intersection control options at the time of project development and delivery.

Graded-Separated Intersection Improvements

Three intersections were identified for grade separation to eliminate conflict points and improve traffic flows whereas one location was identified for future evaluation.



Source: Oregon Department of Transportation

Key Multi-Use Pathways

Multi-use pathways are paved and separated from streets and are designed for both walking and bicycling. Where space allows, corridors with high usage may be developed with redundant paths to separate people walking from people biking. The paths for people walking or running may be unpaved depending on the intended use. The multiuse pathway system improves continuity for bicyclists and pedestrians to move freely throughout the transportation network and helps to eliminate north-south barriers for east-west access, particularly through the Dry Canyon and across US 97. Twenty-one new multi-use pathways were identified for inclusion into the TSP.

Key Bicycle Corridors

In addition to the multiuse pathways, new bike lanes, quiet streets and protected bike lanes will serve the cyclists of Redmond in the future. A brief description of each is provided below.

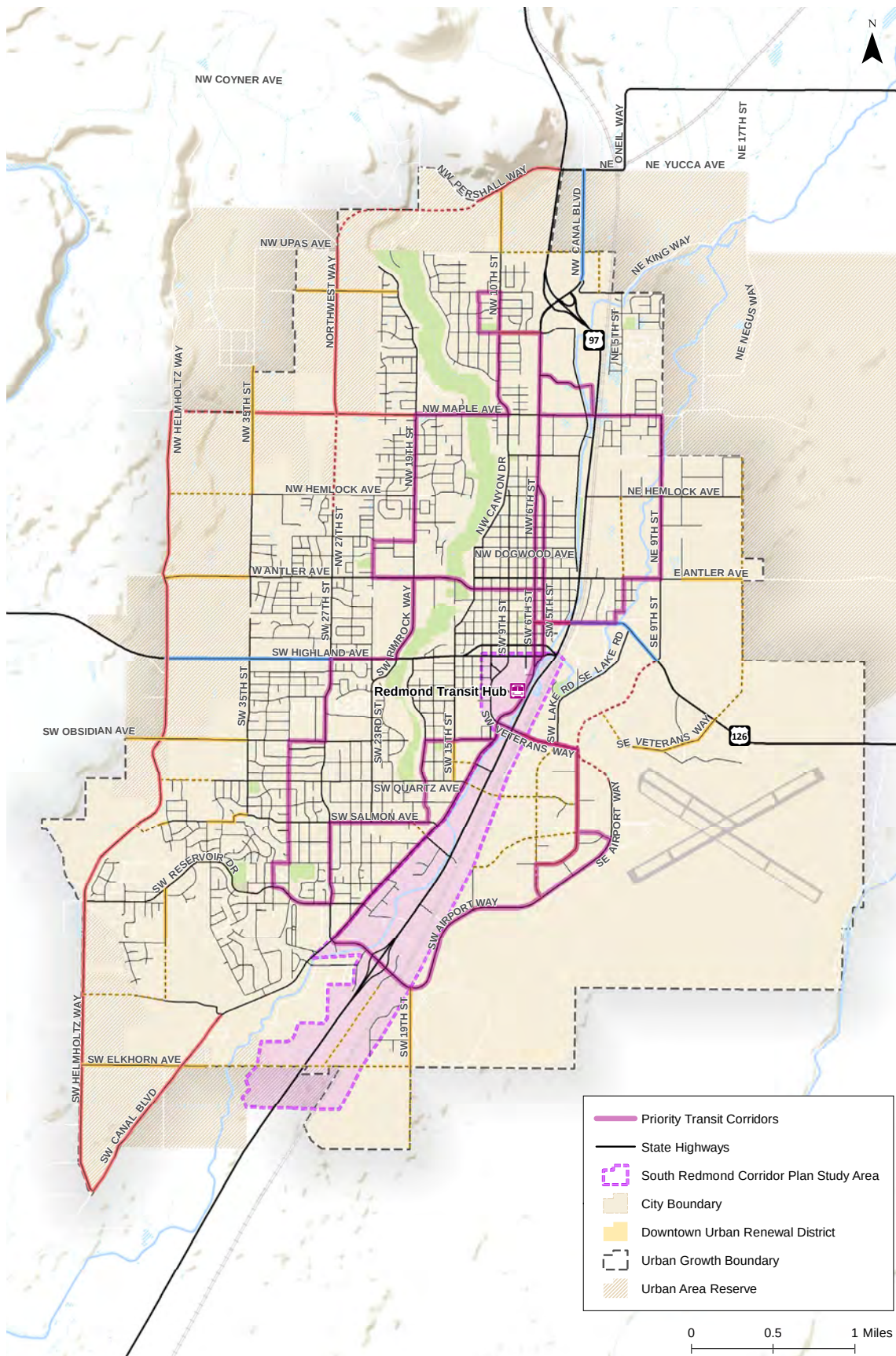
- A quiet street is a bike route on a low-volume, low-speed street that has been optimized for bicycle travel. These streets contain different features depending on adjacent land uses; however, they are all intended to contain wayfinding signs, pavement markings, and intersection treatments. Some may also feature diversion to reduce automobile volumes and traffic calming to slow motor vehicle speeds.
- A bike lane is a marked space along a length of roadway that is designated for use by people bicycling. Wheelchair users and some motorized scooters are allowed in bike lanes.
- Buffered bike lanes feature a buffer strip to provide space between the bike lane and the auto lane or parked cars.
- A protected bike lane, sometimes called a “cycle track”, is an exclusive bicycle facility adjacent to, but separated from, the roadway. Separation is generally achieved using planters, parked cars, curbs, or posts to separate people biking from people driving. They are best on roads with few cross streets and driveways, particularly on roadways with high auto volumes and speeds. A protected bike lane provides a logical extension of a shared use path because it provides the sensation of riding on a path due to the separation from motorized traffic.

Fifty-two bicycle corridors were identified for inclusion into the TSP.

Crossing improvements, though not specifically identified in the TSP, may be provided when bicycle facilities are constructed that cross major roads. The need for and type of crossing treatment will be evaluated at the time of project development and design.

The City of Redmond will consider upgrades to existing bicycle facilities (such as including a marked buffer) on a case-by-case basis. Such upgrades typically occur in conjunction with scheduled maintenance operations.

Figure 7: Future Transit Corridors



Key Pedestrian Improvements

Sidewalks are paved walkways adjacent to streets. Sidewalks are particularly important for providing basic mobility for people with disabilities. Setback sidewalks (featuring a planted barrier between the sidewalk and travel way) can create more comfort and safety for people walking. All streets within the City are anticipated to have sidewalks over time. The identified TSP pedestrian improvements are intended to prioritize sidewalk facilities along ADA routes, as defined by the City of Redmond.

Crossing improvements, though not specifically identified, may be provided when pedestrian facilities are constructed that cross major roads. The need for and type of crossing treatment will be evaluated at the time of project development and design.

Key Transit Corridors

The provision of high-quality, available, and reliable transit service fundamentally supports the environment, economic development, and equity for all travelers. The TSP includes, as shown in Figure 7, both key north-south and east-west transit within all quadrants of the City's UGB between the downtown urban core, residential neighborhoods, existing and planned pedestrian and bicycle corridors, and places of interest. These corridors correlate with the Redmond Transit Hub located at the corner of SW Kalama Avenue and SW Canal Blvd. Multimodal infrastructure along these corridors will be pursued by the City to enhance the accessibility of future transit service.

The City and Cascades East Transit (CET) will continue to work to refine these transit corridors and identify a program to implement more robust transit service within Redmond. Specifically, the City intends to explore various service options in partnership with CET to

better serve the community, including the potential for implementing fixed-route service.

Key Freight Routes

Both the TSP and the many state policies and plans recognize the important role that an efficient and reliable transportation system plays in supporting the region's economy, growth, and quality of life. Within the City, highways, city streets, airports, pipelines, and railways provide freight mobility. Trucks, rail, and air service must function together to ensure the efficient and timely movement of freight to, within, and through the community.

As part of the needs analysis, changes to the existing freight and truck routes were identified to ensure consistency with state and federal designations and guidance and in reflection of ongoing planning efforts. In particular, the TSP includes freight routes that provide alternative access points to the industrial lands east of US 97 both to the north and south of OR 126. These routes utilize SW Airport Way, SE 9th Street, and NE Hemlock Avenue.

Redmond Municipal Airport

The City of Redmond owns and operates Redmond Municipal Airport/Roberts Field for the tri-county area. It is located two miles southeast of downtown Redmond and provides passenger and commercial service, air cargo and general aviation. The airport has two asphalt paved runways – 7,040 by 150 feet and 7,006 by 100 feet. The facility is designated as Category I (Commercial Service Airport) according to the Oregon Aviation Plan and the Redmond Municipal Airport Master Plan. The Oregon Aviation Plan defines Category I airports as airports that “support some level of scheduled commercial airline service in addition to a full range of general aviation aircraft.” The flight destinations can be domestic and international.

Airport development is governed by its own Master Plan, which is included in Volume 2, Appendix G. The recently updated Master Plan includes recommendations to extend the runway, provide additional parking, and evaluate potential development opportunities on lands surrounding the airport. The City, County, ODOT and the Airport will continue to coordinate on future transportation system improvements that support ongoing upgrades to the Airport as well as provide support for the Oregon Resilience Plan.

Rail System

The needs analysis identified rail as an important, energy efficient mode of freight transportation. The TSP supports the continued use of freight rail tracks and service provided in the City by the BNSF Railway and Union Pacific Railroad. These rail services are and will continue to be significant drivers of economic opportunity for Redmond.

The two companies share use of track through Redmond and the ability of Redmond freight shippers and receivers to use either carrier is a competitive privilege infrequently found elsewhere. The rail line interfaces with the Redmond community between US 97 and the industrial area near the airport. The TSP supports continued coordination between the rail providers, ODOT, the City and Deschutes County to ensure multimodal safety is provided in the future at the seven at-grade crossings of the railroad within the City as well as to ensure support of the Oregon Resilience Plan.

Waterways/Pipelines

Central Oregon Irrigation District (COID) maintains the Pilot Butte Canal, which runs north-south through the City of Redmond and connects to Terrebonne to the north and Bend to the south. This canal diverts water from the Deschutes River for a variety of purposes, including to provide water to the City of Redmond. The TSP supports the continued coordination with COID, the City of Bend, Deschutes County and ODOT.

Vehicular System Performance

The City uses motor vehicle level of service (LOS) standards to evaluate acceptable vehicular performance on the local, collector, and arterial streets. LOS standards are presented as grades A (free flow traffic conditions) to F (congested traffic conditions). ODOT uses mobility targets based on volume to capacity (V/C) ratios to evaluate acceptable vehicular performance on state facilities. As V/C ratios approach 1.0, traffic congestion increases.

In some cases, it may not be possible or desirable to meet the designated mobility target or LOS standard. In those cases, an alternative mix of strategies such as land use, transportation demand management, safety improvements or increased use of active modes may be applied.

The LOS and mobility targets to be applied in Redmond are listed below. ODOT mobility targets apply to state highways as well as to city streets near highway interchanges; this interchange influence area is generally defined as one-quarter mile from a ramp terminal or as the area between the ramp terminal and the first public street intersection.

- City signalized intersections: LOS E
- City unsignalized intersections: LOS E and volume-to-capacity ratio less than 0.9 for critical approach
- US 97 and OR 126: volume-to-capacity ratio of 0.8 or 0.85, depending on location. In addition, the City has adopted alternative mobility targets at the Evergreen Avenue/US 97 and Veteran's Way/OR 126 intersections.

As part of implementation of the TSP, the City and ODOT will collaborate on establishing and adopting alternative mobility targets on the state facilities, as needed to address future year traffic volumes.



Source: Wikimedia Commons, by Tequask - Own work, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=79226514>





5

Transportation Priorities & Project Categories

In This Chapter

- What are the priority projects for roadways, intersections, and bicycle and pedestrian facilities?
- What specific needs do the South Redmond and South Redmond US 97 corridor areas have?

5

Transportation Priorities & Project Categories

The TSP recommends transportation programs and infrastructure improvements to fulfill the plan's goals and policies. These are organized into the following five categories that suggest timeframes for implementation based on complexity, likely available funding (including potential funding sources), and assessment of need:

- Strategic Street Capacity Investment Corridors
- New Planned Streets
- Intersection Capacity Improvements
- Grade-Separated Intersection Improvements
- Key Multi-Use Pathways
- Key Bicycle Corridors
- Key Pedestrian Improvements

Some projects may be accelerated, and others postponed due to changing conditions, funding availability, public input, or more detailed study performed during programming and budgeting processes. Further, the projects included in the preferred TSP list represent the best estimation for appropriate design available at this time. Because the TSP is being drafted at a citywide scale, project design may change before construction commences as public input, available funding, and unique site conditions are taken into consideration. Projects identified herein may be funded through a variety of sources including federal, state, or local transportation funds, system development charges (SDCs), through partnerships with private developers, or a combination of these sources.

Project Costs

The estimated construction costs for each project are provided in the subsequent tables. These costs are order-of-magnitude (e.g., planning-level) estimates that account for right-of-way, design engineering, and construction and generally include a 30 percent contingency factor. The costs were calculated for each project using the methodology and procedures recommended by the American Association of Cost Engineers (Class 5 estimates). All costs are rounded to the nearest \$100,000 and provided in 2018 dollars. Detailed cost estimate sheets are included in Volume 2, Appendix H. The detailed costs include all estimation assumptions as well as any deviations related to unique topographic, right-of-way, or other constraints.

Costs for individual transit corridors are not provided. The City and Cascades East Transit are working to refine the transit corridors and

identify a list of capital improvements and strategic policies that can help implement more robust transit service within Redmond. These efforts are currently ongoing, and the results can be incorporated into future updates of the TSP.

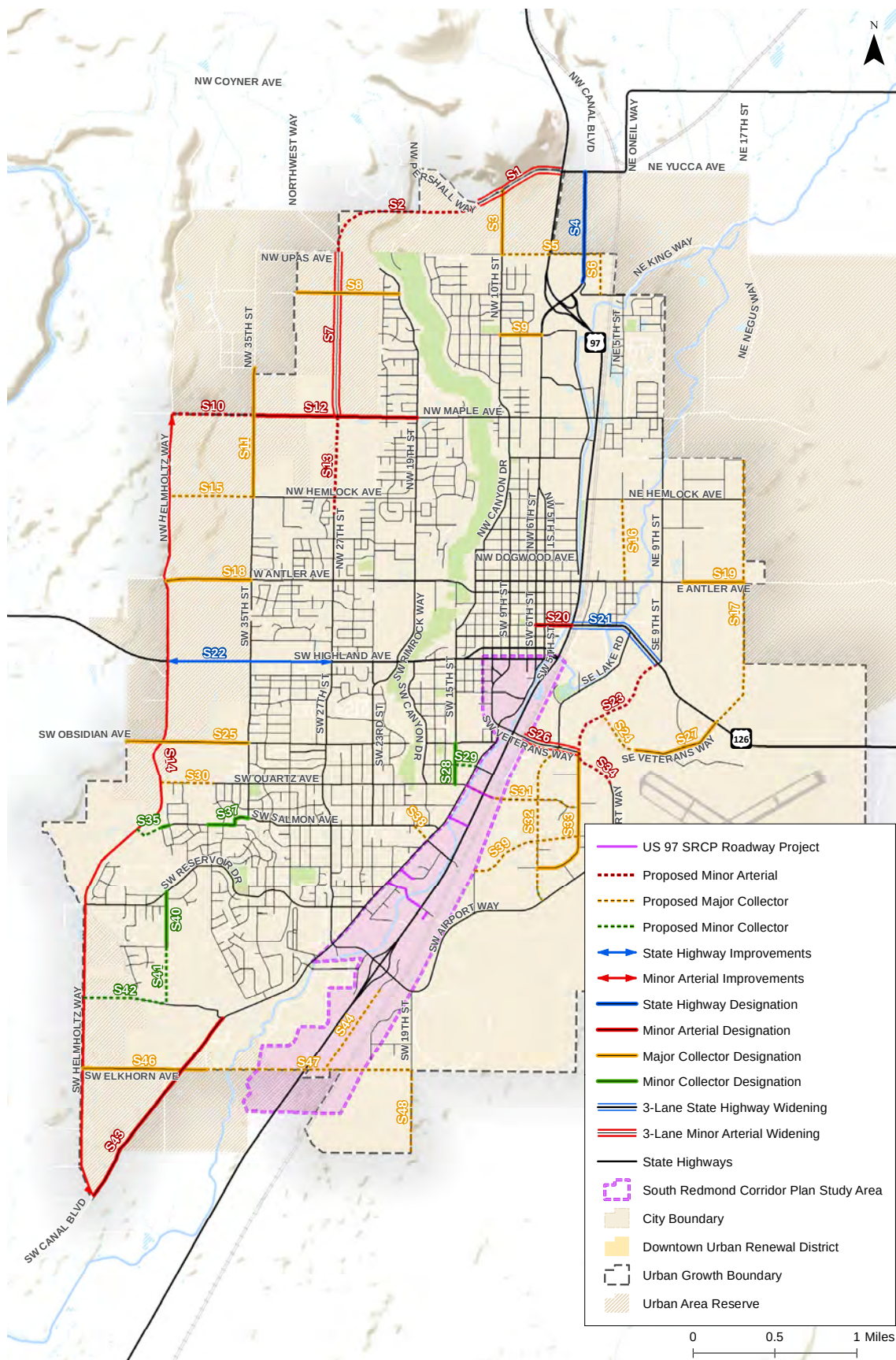
Strategic Street Capacity Investment Corridors

The projects shown in Table 2 represent the City's current priorities for street capacity investments. Improvements to these key corridors help accommodate growth and economic development in the region and continue to shape the urban context for the City. Such improvements can strengthen mobility and connectivity as well as create opportunities to incorporate bicycle, pedestrian, and transit facilities where they do not exist. These projects are illustrated in Figure 8.

Table 2: Priority Street Capacity Investments

Map ID	Corridor	S-W Limit	E-N Limit	Improvement	Length (miles)	2020 Cost Estimates
S1	Pershall Way	New Pershall Arterial	US 97	Widen to 3-Lane Arterial	0.6	\$3.2M
S7	Northwest Way	Maple Ave	NW Upas Ave	Widen to 3 Lanes	1.0	\$5.8M
S14	SW/NW Helmholtz Way	SW Canal Boulevard	NW Maple Avenue	Widen roadway to add center turn lane	5.0	\$29.0M
S21	OR 126	US 97	SE 9th St	Widen to 3 Lanes	0.6	\$5.4M
S22	OR 126	SW Helmholtz Way	SW 27th St	Provide a 3-lane cross-section with sidewalks and bicycle lanes throughout entire corridor	1.0	\$8.7M
S26	SW Veterans	Railroad	SE 1st St	Widen to 3 Lanes (turn lanes where needed)	0.4	\$2.0M
TOTAL:						\$54.1M

Figure 8: Planned Roadway Projects



New Planned Streets

The projects shown in Table 3 represent the City's current priorities for planned new streets to improve connectivity between and within existing neighborhoods, employment, and commercial areas; provide connections to newly developed or developing areas; and to provide alternative travel routes for all modes to existing streets. These projects are illustrated in Figure 8.

Table 3: Priority Planned New Streets

Map ID	Corridor	S-W Limit	E-N Limit	Improvement	Length (miles)	2020 Cost Estimates
S2	NW Pershall Way	NW Upas Way	NW Pershall Way	Proposed 3-Lane Arterial	1.0	\$8.9M
S5	NW Upas Ave	NW 10th St	East of NW Canal Blvd	Proposed Collector & Overcrossing	0.6	\$11.0M
S6	NE 3rd	King Way	UGB	Proposed Collector	0.3	\$1.5M
S10	NW Maple Ave	SW Helmholtz Way	NW 35th St	Proposed 3-Lane Arterial	0.5	\$4.3M
S13	NW 27th St	NW Greenwood Ave	NW Maple Ave	Proposed Arterial	0.6	\$5.2M
S15	NW Hemlock Ave	NW Helmholtz Way	NW 35th St	Proposed Collector	0.5	\$2.9M
S16	NE 5th St	E Antler Ave	NE Hemlock Ave	Proposed Collector	0.5	\$2.9M
S17	SE/NE 17th St	OR 126	NE Kingwood	Proposed Collector	1.7	\$9.6M
S23	SE 9th St	Veterans Way	OR 126	Proposed Arterial	0.8	\$6.8M
S24	SE Veterans Way	SE 1st St	SE Veterans Way	Proposed Collector	0.4	\$2.1M
S29	SW Pumice Ave	SW 15th St	SW Canal Blvd	Proposed Collector	0.1	\$0.7M
S30	SW Quartz Ave	SW Helmholtz Way	SW 37th St	Proposed Collector	0.3	\$1.9M
S31	SW Quartz Ave	SW Canal Blvd	S 1st St	Proposed Collector	0.7	\$7.2M
S32	SW 6th St	SE Airport Way	SE Veterans Way	Proposed Collector	1.0	\$3.7M
S34	SE Airport Way	SE Airport Way	SW Veterans Way	Proposed Arterial	0.3	\$2.3M
S35	SW 45th St	SW Salmon Ave	SW Helmholtz Way	Proposed Collector	0.1	\$0.6M
S38	SW Odem Medo	SW Canal Blvd	SW 19th St	Proposed Collector	0.1	\$0.7M
S39	SE Salmon Drive	13th Street	S 1st St	Proposed Collector	0.7	\$4.0M
S41	SW 43rd Street	SW Badger Avenue	SW Yew Street	Proposed Collector	0.4	\$2.0M
S42	SW Badger Avenue	SW Helmholtz Way	SW 43rd Street	Proposed Collector	0.5	\$2.9M
S44	SW 21st Street	SW Elkhorn Avenue	South of SW Airport Avenue	Proposed Collector	0.6	\$3.5M

Table 3: Priority Planned New Streets (continued)

Map ID	Corridor	S-W Limit	E-N Limit	Improvement	Length (miles)	2020 Cost Estimates
S47	SW Elkhorn Ave	SW 39th St	SW 19th St	Proposed Collector and Overcrossing	1.3	\$26.0M
S48	SW 19th St	UGB	SW Elkhorn Ave	Proposed Collector	0.5	\$3.4M
US 97 SRCP	North Connection (Motel 6)	SW Canal wBlvd	US 97	Proposed Roadway Connection with Canal Crossing	0.2	N/A
US 97 SRCP	SW 17th Pl	SW Canal Blvd	SW 17th Pl	Proposed Roadway Connection (Extension)	0.1	N/A
US 97 SRCP	SE Airport Way	SW Canal Blvd	US 97	Proposed Roadway Connection with Canal Crossing	0.3	N/A
US 97 SRCP	Local Access Road	Possibilities Thrift Store	SE Airport Way	Proposed Roadway Connection	0.1	N/A
TOTAL:						\$114.1M

Intersection Capacity Improvements

The projects shown in Table 4 and Table 5 represent the City's current priorities for intersection capacity improvements. The TSP is not inclusive of all of the intersection projects that the City will pursue over the next twenty years. Rather, these are those that the City can pursue to strategically improve the operational efficiency of specific intersections and important roadways. These projects can enhance system operations and can be completed as opportunities arise. In all cases, the City will review the appropriate intersection control options at the time of project development and delivery. These projects are illustrated in Figure 9.

Table 4: Priority Intersection Capacity Improvements

Map ID	N-S Street	E-W Street	Improvement	Note ¹	2020 Cost Estimates
I3	NW Canal Blvd	NE Upas Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)
I4	NW Helmholtz Way	NW Maple Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)
I5	NW 35th St	NW Maple Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)
I6	NW 27th St	NW Maple Ave	Consider traffic signal or roundabout	Roundabout Preferred	\$3.2M
I7	NW 19th St	NW Maple Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I8	NW 9th St	NW Maple Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I10	NE 5th St	NE Maple Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)
I11	NE 9th St	NE Maple Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)

¹ Intersection control preference noted where applicable. However, specific intersection control decisions will be made at the time of project development and project delivery.

Table 4: Priority Intersection Capacity Improvements (continued)

Map ID	N-S Street	E-W Street	Improvement	Note ¹	2020 Cost Estimates
I13	NW 6th St	NW Kingwood Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I14	NW 27th St	NW Hemlock Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I15	NE 9th St	NE Hemlock Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I16	NW 27th St	W Antler Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I17	NE 9th St	E Antler Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I22	SW Helmholtz Way	OR 126	Consider traffic signal or roundabout	Roundabout Preferred	\$3.2M
I23	SW 35th St	OR 126	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I25	SW 15th St	OR 126	Consider traffic signal modification or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)
I29	SE 9th St	OR 126	Consider traffic signal or roundabout	Roundabout Preferred	\$3.2M
I30	SW Helmholtz Way	SW Obsidian Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)
I31	SW 27th St	SW Obsidian Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I34	SE 9th St	SW Veterans Way	Consider traffic signal or roundabout	Roundabout Preferred	\$3.2M
I36	SE Veterans Way	OR 126	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)
I37	SW Canal Blvd	SW Pumice	Consider traffic signal or roundabout	Disconnect SW Obsidian Ave	\$0.5M (signal) or \$3.2M (roundabout)
I38	SW Canal Blvd	SW Quartz Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I39	SW Helmholtz Way	SW Salmon Ave	Consider traffic signal or roundabout		\$0.5M (signal) or \$3.2M (roundabout)
I40	SW 27th St	SW Salmon Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I41	SW Helmholtz Way	SW Wickiup Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M

¹ Intersection control preference noted where applicable. However, specific intersection control decisions will be made at the time of project development and project delivery.

Table 4: Priority Intersection Capacity Improvements (continued)

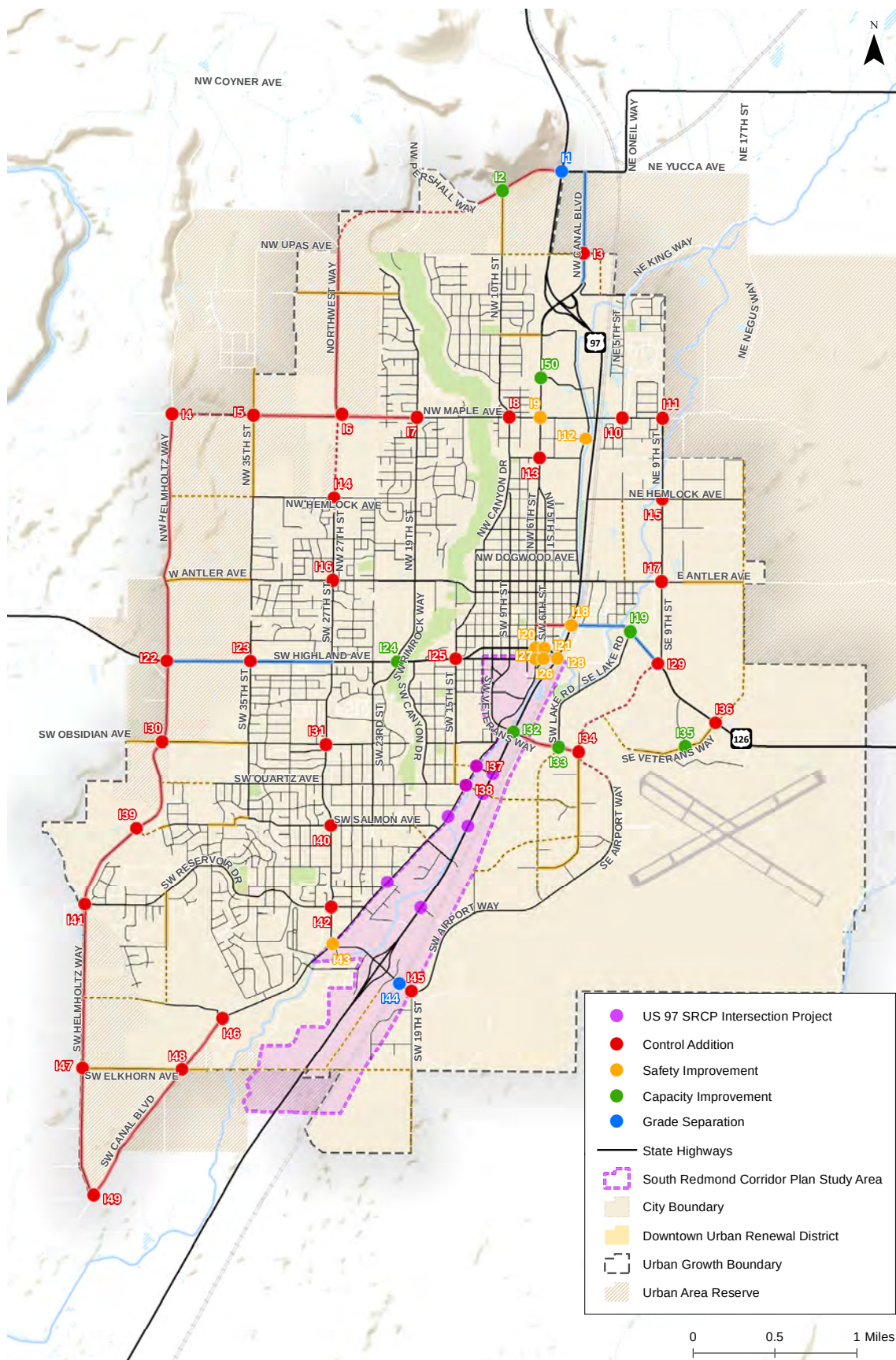
Map ID	N-S Street	E-W Street	Improvement	Note ¹	2020 Cost Estimates
I42	SW 27th St	SW Wickiup Ave	Consider traffic signal or roundabout	Roundabout Preferred	\$3.2M
I45	SW 19th St	SW Airport Way	Consider traffic signal or roundabout	Roundabout Preferred	\$3.2M
I46	SW Canal Blvd	SW Badger Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)
I47	SW Helmholtz Way	SW Elkhorn Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)
I48	SW Canal Blvd	SW Elkhorn Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.2M (roundabout)
I49	SW Helmholtz Way	SW Canal Blvd	Consider traffic signal or roundabout	Roundabout Preferred	\$3.2M
I50	NW 6th St	NW Oak Ave	Traffic Signal Modification	-	\$0.5M
US 97 SRCP	SW Canal Blvd	SE Pumice Ave	Roundabout	-	Included in SRCP
US 97 SRCP	US 97	SE Pumice Ave	Traffic Signal	-	Included in SRCP
US 97 SRCP	SW Canal Blvd	SW Quartz Ave	Roundabout	-	Included in SRCP
US 97 SRCP	US 97	SW Quartz Ave	Traffic Signal	-	Included in SRCP
US 97 SRCP	SW Canal Blvd	New Northern Roadway Connection (Motel 6)	Roundabout	-	Included in SRCP
US 97 SRCP	US 97	New Northern Roadway Connection (Motel 6)	Traffic Signal	-	Included in SRCP
US 97 SRCP	SW Canal Blvd	SE Airport Way	Roundabout	-	Included in SRCP
US 97 SRCP	US 97	SE Airport Way	Traffic Signal	-	Included in SRCP
TOTAL INTERSECTION CAPACITY IMPROVEMENTS:					\$35.4M to \$70.5M depending on control type selected

¹ Intersection control preference noted where applicable. However, specific intersection control decisions will be made at the time of project development and project delivery.

Table 5: Other Priority Intersection Capacity Improvements

Map ID	N-S Street	E-W Street	Improvement	Note ¹	2020 Cost Estimates
I2	NW 10th St	NW Pershall Way	Consider Additional Lanes	Add Eastbound Right-Turn	\$0.3M
I19	SE Lake Rd	OR 126	Consider Access Management	Create Right-In/Right-Out in Conjunction with 9th Street Project	\$0.1M
I24	SW Rimrock Way	OR 126	Consider Capacity Improvement	Intersection improvement should consider westbound lane drop	\$0.7M
I32	US 97	Veterans Way	City of Redmond to Pursue Alternative Mobility Standard		-
I33	SW Lake Rd	SW Veterans Way	Consider Access Management	Create Right-In/Right-Out in Conjunction with 9th Street Project	\$0.1M
I35	SE 10th St	SE Veterans Way	Consider Intersection Control Change	Remove Stop Signs on Veterans in Conjunction with 9th Street Project	\$0.5M (signal) or \$3.2M (roundabout)
Total for Other Intersection Capacity Improvements:					\$1.7M to \$4.4M depending on intersection control type selected

Figure 9: Planned Intersection Projects



Grade-Separated Intersection Improvements

Three intersections were identified for grade separation to eliminate conflict points and improve traffic flows. One intersection was identified for future evaluation. These are identified in Table 6 and shown in Figure 8 and Figure 9. A brief description of each is included below:

- **US 97/O'Neil Highway:** The Interchange Area Management Plan (IAMP) for this location identified the need to provide a grade-separated overcrossing of US 97 that would connect O'Neil Highway to Pershall Way. An interim option is to restrict the US 97/O'Neil Highway intersection to right-in, right-out.
- **Airport Way Rail Crossing:** Airport Way connects US 97 to the Redmond Airport. US 97 and the Redmond Airport are both critical statewide infrastructure as identified in the Oregon Resilience Plan. The planned grade-separation would eliminate the at-grade rail crossing between the highway and airport.
- **US 97/Elkhorn Avenue:** Construct overcrossing of US 97 as part of the Elkhorn Avenue extension from Canal Boulevard to SW 19th Street.
- **US 97/Hemlock Avenue:** Conduct a study to evaluate a possible grade-separated crossing of US 97.

Table 6: Identified Grade-Separated Intersection Improvements

Map ID	N-S Street	E-W Street	Improvement	Description	2020 Cost Estimates
I1	US 97	O'Neil Hwy	North Interchange IAMP Project	Interim project would modify US 97/O'Neil Hwy intersection to right-in/right-out; eventual project would result in grade-separation	\$0.1M
I44	Railroad	SW Airport Way	Grade Separated Crossing	Remove Existing At-Grade Rail Crossing	\$16.8M
S47	US 97	Elkhorn Avenue	Grade Separated Crossing	Construct US 97 overcrossing at part of roadway extension.	\$26.0M
Total Grade-Separated Intersection Improvements					\$42.9M

Key Multi-Use Pathways

The projects shown in Table 7 represent the City's current priorities for multi-use pathways. The multiuse pathway system is intended to improve continuity for bicyclists and pedestrians to move freely throughout the

transportation network and help to eliminate north-south barriers for east-west access, particularly through the Dry Canyon and across US 97. These projects are shown in Figure 8. Table 7 identifies the associated costs.

Table 7: Priority Multi-Use Pathways

Map ID	Corridor	S-W Limit	E-N Limit	Length (miles)	2020 Cost Estimates
B1	SW/NW Helmholtz Way	SW Canal Blvd	NW Canal Blvd	8.0	Costs included in S14
B2	NW Pershall Way	Dry Canyon Trail	B1	0.3	\$1.0M
B5	NW Spruce Ave	NW Helmholtz Way	NW 19th St	1.2	\$4.6M
B11	NW Maple Ave	NW Helmholtz Way	west of NW 22nd St	1.2	\$4.7M
B12	NW 35th St	NW Dogwood Ave	NW Upas Way	1.8	\$6.7M
B13	NW 27th St	NW Greenwood Ave	NW Upas Way	1.7	\$6.6M
B17	SW 39th St	SW Quartz Ave	NW Maple Ave	2.4	\$9.2M
B18	NW Hemlock Ave	NW Helmholtz Way	NW 19th St	1.4	\$5.5M
B19	NW 29th St	NW Hemlock Ave	UGB	0.9	\$3.5M
B28	Lateral E Pilot Butte Canal	OR 126	NE Kingwood Ave	1.2	\$4.8M
B46	OR 126	SE Jackson St	UGB	1.8	\$7.0M
B47	SW 35th St	SW Quartz Ave	W Antler Ave	1.2	\$4.7M
B52	SW Quartz Ave	SW Helmholtz Way	SW 35th St	0.5	\$2.1M
B55	SW Quartz Ave	SW Canal Blvd	SE Airport Way	1.0	\$7.5M
B56	SE Airport Way/SE 9th St	Railroad	OR 126	3.0	\$11.4M
B61	SW 19th St	SW Canal Blvd	SW Reindeer Ave	0.3	\$1.0M
B62	SW Canal Blvd/Pilot Butte Canal	SW 27th St	NE King Way	2.4	\$9.1M
B67	SW Helmholtz Way	SW Canal Blvd	SW Reservoir Dr	2.5	\$9.8M
B69	Pilot Butte Canal	SW Elkhorn Ave	SW Canal Blvd	0.5	\$2.0M
B71	SW Canal Blvd	SW Helmholtz Way	SW Elkhorn Ave	0.9	\$3.5M
US 97 SRCP	SW Canal Blvd/US 97	SW Yew Ave	New Northern Roadway Connection (Motel 6)	1.3	Included in SRCP
Total Multi-Use Pathways					\$104.7M

58



Key Bicycle Corridors

More than forty bicycle corridors were identified as the City's current priorities for inclusion into the TSP. Crossing improvements, though not specifically identified in the TSP, may be provided when bicycle facilities are constructed that cross major roads. The need for and type of crossing treatments will be evaluated at the time of project development and design. Further, the City of Redmond will consider upgrades to existing bicycle facilities (such as including a marked buffer) on a case-by-case basis. Such upgrades typically occur in conjunction with scheduled maintenance operations.

These projects are shown in Figure 10. Table 8 identifies the associated costs.

Table 8: Current Bicycle Corridor Priorities

Map ID	Corridor	S-W Limit	E-N Limit	Improvement	Length (miles)	2020 Cost Estimates
B3	NW 10th St	NW Maple Ave	NW Pershall Way	Bike Lanes	1.0	\$0.2M
B6	NW Canyon Dr/NW Spruce Ave	NW 10th St	US 97	Quiet Street	1.4	\$0.4M
B7	NE King Way	NW Canal Blvd	NE 5th St	Bike Lanes	0.3	\$0.5M
B8	NW Quince Ave	UGB	NW 19th St	Quiet Street	0.7	\$0.2M
B9	NW Quince Ave	NW Canyon Dr	NW 6th St	Bike Lanes	0.3	\$0.5M
B10	NE 5th St	NE Negus Way	NE King Way	Bike Lanes	0.7	\$1.1M
B15	NW 10th St/NW Larch/NW Rockcrest Ct	Dry Canyon Trail	NW 9th St	Quiet Street	0.2	\$0.1M
B16	NE 5th St	NE Hemlock Ave	NE Maple Ave	Quiet Street	0.5	\$0.1M
B20	NW 19th St	NW Maple Ave.	Northwest Way	Bike Lanes	0.7	\$0.5M
B21	NW Ivy Ave	NW 19th St	NW Rimrock Ct	Quiet Street	0.3	\$0.1M
B22	NW 17th St/NW Rimrock Ct	W Antler Ave	NW Maple Ave	Quiet Street	1.2	\$0.4M
B23	NW Canyon Dr	SW Deschutes Ave	NW Maple Ave	Quiet Street	1.2	\$0.4M
B24	NW Dogwood Ave	NW Canyon Dr	NW Canal Blvd	Quiet Street	0.5	\$0.2M
B25	SW 8th St	SW Evergreen Ave	NW Kingwood Ave	Quiet Street	1.0	\$0.3M
B26	NW Kingwood Ave	NW Canyon Dr	NW Canal Blvd	Quiet Street	0.4	\$0.1M
B27	NE Hemlock Ave	NW Canal Blvd	NE 9th St	Bike Lanes/ Crossing	0.5	\$0.7M
B29	NE Hemlock Ave	west of NE 15th St	NE 17th St	Bike Lanes	0.2	\$0.1M
B32	W Antler Ave	NW 32nd Ct	SW 31st St	Bike Lanes	0.1	\$0.1M
B33	W Antler Ave	NW 29th St	SW 27th St	Bike Lanes	0.2	\$0.3M

Table 8: Current Bicycle Corridor Priorities (continued)

Map ID	Corridor	S-W Limit	E-N Limit	Improvement	Length (miles)	2020 Cost Estimates
B35	E Antler Ave	SW 7th St	NE 17th St	Bike Lanes/ Crossing	0.8	\$1.1M
B36	SE Jackson St	OR 126	E Antler Ave	Quiet Street	0.3	\$0.1M
B37	SE 9th St	OR 126	NE Hemlock Ave	Bike Lanes	1.0	\$1.4M
B38	E Antler Ave	SE 9th St	NE 17th St	Bike Lanes	0.1	\$0.2M
B39	SW 23rd St	SW Highland Ave	W Antler Ave	Bike Lanes	0.5	\$0.1M
B40	SW 15th St	SW Highland Ave	SW Deschutes Ave	Quiet Street	0.3	\$0.1M
B44	SW Lake Rd	SW Veterans Way	OR 126	Quiet Street	0.9	\$0.3M
B45	SW Juniper Ave	Dry Canyon Trail	SW 15th St	Quiet Street	0.3	\$0.1M
B48	SW 31st St	SW Canal Blvd	SW Highland Ave	Quiet Street	2.0	\$1.0M
B49	SW Obsidian Ave	SW Helmholtz Way	SW Canal Blvd	Bike Lanes	1.4	\$0.3M
B50	SW Canyon Dr	SW Quartz Ave	SW Highland Ave	Quiet Street	0.8	\$0.2M
B51	SW 15th St	SW Obsidian Ave	SW Highland Ave	Bike Lanes	0.5	\$0.7M
B53	SW Quartz Ave	SW 35th St	SW Canal Blvd	Bike Lanes	1.3	\$0.3M
B54	SW Canal Blvd	SW Salmon Ave	SW Obsidian Ave	Bike Lanes	0.6	\$0.9M
B57	SW Salmon Ave/SW Valleyview Dr/SW 32nd Ct	SW Helmholtz Way	SW 31st St	Quiet Street	0.9	\$0.3M
B58	SW 35th St/SW Salmon Ave	SW Quartz Ave	SW 27th St	Quiet Street	0.7	\$0.2M
B59	SW 25th St/SW Reindeer Ave	SW Canal Blvd	Dry Canyon Trail/ SW 19th St	Quiet Street	1.1	\$0.3M
B60	SW 23rd St	SW Canal Blvd	SW Salmon Ave	Bike Lanes	0.4	\$0.6M
B63	SW Reservoir Dr	SW Helmholtz Way	SW 39th St	Bike Lanes	0.8	\$1.2M
B64	Volcano Avenue	27th Street	SW Canal Boulevard	Bike Lanes	0.3	\$0.2M
B66	SW Cascade Vista Dr/SW Antelope Ave	SW Canal Blvd	SW Quartz Ave	Quiet Street	1.5	\$1.3M
B73	SW 4th St/SW Forest/SW 5th	SW Highland	SW Dogwood Ave	Quiet Street	0.6	\$0.2M
Total Bicycle Corridors						\$17.4M

Key Pedestrian Improvements

Key priority sidewalk investment areas are intended to prioritize new sidewalk facilities along ADA routes and provide key missing connections in the pedestrian system. Pedestrian crossing improvements at intersections, though not specifically identified, may be provided when pedestrian facilities are constructed that cross major roads. The need for and type of crossing treatments will be evaluated at the time of project development and design.

These projects are shown in Figure 11. Table 9 and Table 10 identify the associated costs.

Table 9: Priority New Sidewalk Facilities Along ADA Routes

Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note	Length (miles)	2020 Cost Estimates
P4	NW 10th St	NW 9th St	NW Quince Ave	West	Add Sidewalk or Ramps	0.4	\$0.4M
P8	NW 9th St	NW Hemlock Ave	NW Maple Ave	Both	Add Sidewalk or Ramps	0.9	\$0.9M
P9	NW 6th St	North of NW Larch Ave	NW Maple Ave	Both	Add Sidewalk or Ramps	0.2	\$0.2M
P11	NW 6th St	NW Jackpine Ave	NW Larch Ave	East	Add Sidewalk or Ramps	0.1	\$0.1M
P12	NW 6th St	South of NW Kingwood Ave	South of Larch Ave	West	Add Sidewalk or Ramps	0.1	\$0.1M
P13	NW Larch Ave	NW 6th St	NW 4th St	Both	Add Sidewalk or Ramps	0.1	\$0.1M
P14	NW Larch Ave	NW 4th St	West of NW Canal Blvd	South	Add Sidewalk or Ramps	0.1	\$0.1M
P16	NW Kingwood Ave	NW 6th St	NW Canal Blvd	Both	Add Sidewalk or Ramps	0.4	\$0.4M
P18	NW 6th St	North of NW Jackpine Ave	South of NW Kingwood Ave	West	Add Sidewalk or Ramps	0.04	<\$0.1M
P19	NW 6th St	NW Jackpine Ave	NW Kingwood Ave	East	Add Sidewalk or Ramps	0.1	\$0.1M
P20	NW Canal Blvd	NW Elm Ave	NW Larch Ave	West	Add Sidewalk or Ramps	0.4	\$0.4M
P21	NW Hemlock Ave	NW Canyon Dr	NW 9th St	Both	Add Sidewalk or Ramps	0.03	<\$0.1M
P23	NW 9th St	W Antler Ave	NW Greenwood Ave	Both	Add Sidewalk or Ramps	0.5	\$0.5M
P24	NW Dogwood Ave	NW Canyon Dr	NW 10th St	South	Add Sidewalk or Ramps	0.1	\$0.1M
P37	SW Highland Ave	SW Indian Cir	SW 27th St	South	Add Sidewalk or Ramps	0.1	\$0.1M
P57	SW Canal Blvd	North of SW Salmon Ave	South of SW Obsidian Ave	West	Add Sidewalk or Ramps	0.4	\$0.4M
P59	SW Salmon Ave	SW 31st St	SW 29th St	South	Add Sidewalk or Ramps	0.1	\$0.1M
P66	SW Xero Ln	West of SW 34th St	SW 31st St	Both	Add Sidewalk or Ramps	0.3	\$0.3M
P67	SW 31st St	SW 33rd St	SW Savannah Ct	West	Add Sidewalk or Ramps	0.03	<\$0.1M
P69	SW 31st St	SW Timber Ct	SW 33rd St	East	Add Sidewalk or Ramps	0.1	\$0.1M

Table 9: Priority New Sidewalk Facilities Along ADA Routes (continued)

P70	SW 31st St	SW Xero Ln	SW Volcano Way	Both	Add Sidewalk or Ramps	0.5	\$0.5M
P71	SW Canal Blvd	SW 27th St	SW Timber Ave	East	Add Sidewalk or Ramps	0.8	\$0.7M
Total New Sidewalk Facilities							\$5.5M

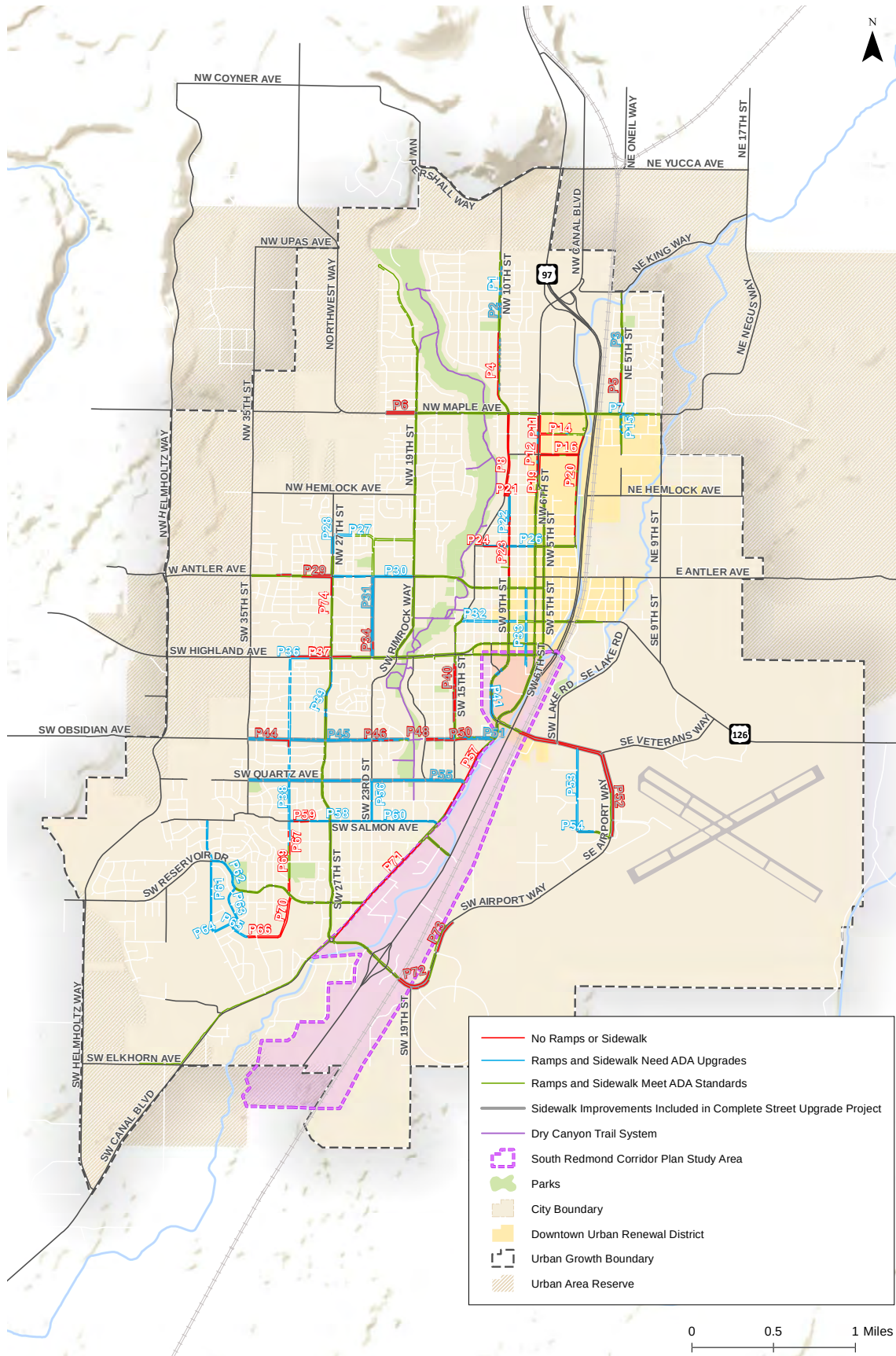
Table 10: Priority New Sidewalk Facilities Along ADA Routes

Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note	Length (miles)	2020 Cost Estimates
P1	NW 10th St	NW Redwood Ave	NW Teak Ave	West	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P7	NE Negus Way	NE 5th St	NE 7th St	Both	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P10	NW 6th St	North of NW Kingwood Ave	North of NW Larch Ave	West	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P15	NE 5th St	NE Larch Ave	NE Negus Way	Both	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P17	NW 6th St	NW Jackpine Ave	NW Kingwood Ave	West	Upgrade Sidewalk or Ramps	0.03	<\$0.1M
P22	NW 9th St	NW Fir Ave	NW Hemlock Ave	Both	Upgrade Sidewalk or Ramps	0.3	\$0.3M
P25	NW Dogwood Ave	NW Canyon Dr	NW 10th St	North	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P26	NW Dogwood Ave	NW 10th St	NW 6th St	Both	Upgrade Sidewalk or Ramps	0.3	\$0.3M
P27	NW Elm Ave	NW 27th St	NW 25th St	Both	Upgrade Sidewalk or Ramps	0.2	\$0.2M
P28	NW 27th St	NW Cedar Ave	NW Elm Ave	Both	Upgrade Sidewalk or Ramps	0.2	\$0.2M
P30	W Antler Ave	SW 27th St	SW Rimrock Way	Both	Upgrade Sidewalk or Ramps	0.8	\$0.8M
P32	W Evergreen Ave	SW Canyon Dr	SW 8th St	Both	Upgrade Sidewalk or Ramps	0.6	\$0.5M
P33	SW 7th St	SW Indian Ave	SW Black Butte Blvd	Both	Upgrade Sidewalk or Ramps	0.7	\$0.7M
P36	SW Highland Ave	SW 31st St	SW Indian Cir	South	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P38	SW 31st St	SW Savanna Ct	SW Highland Ave	Both	Upgrade Sidewalk or Ramps	1.6	\$1.6M
P39	SW 27th St	SW Metolius Ave	SW Highland Ave	East	Upgrade Sidewalk or Ramps	0.3	\$0.3M
P41	SW Veterans Way	SW Canal Blvd	SW Indian Ave	Both	Upgrade Sidewalk or Ramps	0.4	\$0.4M
P53	S 1st St	SE Salmon Dr	SW Veterans Way	Both	Upgrade Sidewalk or Ramps	0.9	\$0.9M
P54	SE Salmon Dr	S 1st St	West of Timber Ave	Both	Upgrade Sidewalk or Ramps	0.2	\$0.2M
P56	SW 23rd St	SW Salmon Ave	SW Quartz Ave	Both	Upgrade Sidewalk or Ramps	0.5	\$0.4M
P58	SW Salmon Ave	SW 31st St	SW Canal Blvd	North	Upgrade Sidewalk or Ramps	0.8	\$0.7M

Table 10: Priority New Sidewalk Facilities Along ADA Routes (continued)

P60	SW Salmon Ave	SW 29th St	SW Canal Blvd	South	Upgrade Sidewalk or Ramps	0.7	\$0.6M
P61	SW 39th St	SW 35th St	SW Salmon Ave	Both	Upgrade Sidewalk or Ramps	1.2	\$1.2M
P62	SW Reservoir Dr	SW 39th St	SW 36th St	Both	Upgrade Sidewalk or Ramps	0.5	\$0.5M
P63	SW 36th St	SW 35th St	SW Reservoir Dr	Both	Upgrade Sidewalk or Ramps	0.4	\$0.4M
P64	SW 35th St	SW Cascade Vista Dr	SW 36th St	Both	Upgrade Sidewalk or Ramps	0.2	\$0.2M
P65	SW Xero Ln	SW 35th St	West of SW 34th St	Both	Upgrade Sidewalk or Ramps	0.2	\$0.2M
Total Sidewalk and ADA Ramp Upgrades							\$11.3M

Figure 11: Priority Pedestrian Routes and Projects



South Redmond Transportation Needs

The Oregon Department of State Lands (DSL), in partnership with the City, Deschutes County, and the Oregon Military Department, pursued an amendment to the City's UGB to allow annexation of 949 acres for expansion of the Deschutes County Fairgrounds, potential National Guard and military maintenance facilities, and 789 acres of future large lot industrial uses. To support development of these lands, the following transportation improvements were identified for implementation within the TSP:

- SW 19th Street/Airport Way – installation of a roundabout; this improvement is included in the list of prioritized intersection improvements identified in the above section of priority improvements.
- OR 126/Veterans Way – installation of a traffic signal or roundabout; this improvement is included in the list of prioritized intersection improvements identified in the above section of priority improvements.
- SE 9th Street Extension
- Airport Way extended north to connect with OR 126/SE 9th Street; this improvement is included in the above section of priority projects.
- Veterans Way/Airport Way/SE 9th Street – installation of a roundabout; this improvement is included in the improvement is included in the above section of priority projects.
- OR 126/SE 9th Street – installation of a traffic signal; this improvement is included in the list of prioritized intersection improvements.
- A future northbound connection at OR 126/Veterans Way to provide access to industrial lands; this improvement is included in the list of prioritized new street improvements identified above.
- SW 21st Avenue/SE Airport Way – construction of a raised median to limit movements SW 21st Street to right-in-right-out; the construction of a median at this location will need to consider how local properties are provided access and the timing of roundabout construction at SW 19th Avenue/SE Airport Way.
- Canal Boulevard/Yew Avenue – potential expansion of this roundabout; the operational benefits of an improvement should be balanced against the cost and potential impacts to adjacent properties.

US 97 South Redmond Corridor Facility Plan

The City, ODOT and Deschutes County adopted the US 97 South Redmond Corridor Facility Plan to address traffic congestion, safety, local access needs, and noted pedestrian and bicycle needs adjacent to US 97 between Yew Avenue and Highland Avenue. The City of Redmond adopted the plan in 2019. The adopted plan concept is included in Appendix I and includes the improvements outlined below.

- New roadway connections that cross the COID canal and connect US 97 with neighborhoods to the west via Quartz Avenue, a new roadway south of Reindeer Avenue, and Volcano Avenue.
- New access roadways and alleys to provide alternative access to parcels adjacent to US 97.
- A center median with new signals along US 97 to facilitate protected left-turn movements and U-turns at existing signalized intersections to support the new connections.
- Pedestrian refuge islands on US 97.
- New sidewalks and cycle tracks along US 97 and the east-west streets connecting to the highway

- A new multi-use path along Canal Boulevard and the COID canal.
- Roundabouts at Quartz Avenue/Canal Boulevard, the new roadway south of Reindeer Avenue/Canal Boulevard, Volcano Avenue/Canal Boulevard.
- Gateway and streetscape treatments to improve the aesthetics and the comfort and convenience of pedestrians and cyclists along the corridor.

The Facility Plan recommended concept is estimated to cost \$55 million–\$60 million. Current estimates are based on the adopted conceptual plan. The conceptual plan is a generalized look at possible improvement needs and will be refined before final design. The refinement of the plan, including additional citizen outreach on the details of the final plan will occur before the right of way needs, easements, detailed design, and associated cost estimates are approved by the City engineer and/or City Council. Subsequent to the adoption of the TSP, ODOT anticipates forwarding the Facility Plan to the OTC for state adoption.



Source: US Bureau of Land Management

US 97/QUARRY AVENUE INTERCHANGE

To serve the urbanization of lands in the south part of the existing Urban Growth Boundary (UGB) and to alleviate travel demands at the Yew Avenue/US 97 interchange, the City, County and ODOT have explored the need to replace the existing at-grade SW Quarry Avenue/US 97 intersection with a new interchange. SW Canal Boulevard and the extension of SW 19th Street could connect this new interchange with the existing UGB.

The new interchange and the north-south connections into the UGB can help:

- Serve future development areas, especially the large lot industrial lands located near the Fairgrounds;
- Provide alternative grade-separated access to US 97, especially for travelers between Redmond and Bend and other destinations to the south; and
- Increase access to the Airport and provide alternative travel routes to US 97 in accordance with TSP Policy 2.2 and the Oregon Resilience Plan.

Providing an interchange at SW Quarry Avenue and extending SW 19th Street to the south would occur outside of the UGB; because these roadways would serve land uses within the City, Oregon's Transportation Planning Rule (TPR) Section 660-012-0070 requires approval of an "Exception for Transportation Improvements on Rural Lands." Accordingly, the City, County and ODOT will monitor the need for planning, designing and constructing a SW Quarry Avenue as part of TSP implementation. This interchange is not part of the 20-year list of projects considered to be reasonably likely to be funded within the TSP.

To assist with future monitoring efforts, the potential for a US 97/Quarry Avenue interchange and the associated roadway extensions/upgrades was evaluated as part of the update of this TSP. The key findings from that analysis are included in Appendix K and revealed a new interchange:

- Will not measurably reduce traffic volumes anticipated on the arterial and collector streets in the south part of the City or at the US 97/Yew Avenue Interchange;
- Can provide an alternative connection to US 97 for the large lot industrial lands near the Fairgrounds; however, the majority of the traffic anticipated from these lands over the next 20 years is anticipated to use the Yew Avenue Interchange; and
- The SW Quarry Avenue Interchange is not needed to meet the identified transportation needs within the TSP and would therefore be considered part of a "illustrative list" of potential projects for the City to consider at a future date.

Based on these findings, it does not appear that the requirements of a "Goal Exception" per the TPR is warranted at this time nor should the SW Quarry Avenue/US 97 Interchange be included in the list of reasonably funded TSP projects.



6

Transportation Funding & Implementation

In This Chapter

- What resources are available to fund Redmond's transportation projects?

6

Transportation Funding & Implementation

The TSP includes projects under the jurisdiction and ownership of ODOT, Deschutes County, the City of Redmond, and Cascade East Transit (CET), as well as projects that will be implemented by private developers. Individual TSP projects will be funded through a different combination of federal, state, City, county, SDC revenue, and or private sources. This chapter discusses current and possible new funding mechanisms that may be available to implement projects during the life of the TSP. A complete list of the multimodal projects and planning level cost estimates is provided in Chapter 5.

Today's fiscal environment is beset by uncertainty about future federal, state, and local funding for transportation projects. This uncertainty provides challenges to accurately forecast the amount of funding available for transportation investments and what projects or programs will receive funding. In this context, the TSP provides a prudent and conservative list of capital construction projects, an emphasis on lower cost methods of improving personal mobility within the City, and an increased reliance on technologies that can improve the efficiencies of our streets.

Further, the City policies and priorities seek to include strategic investments that support

mixed-use, pedestrian-friendly neighborhoods, increase use of active modes of transportation, and reduce reliance on travel by single-occupant automobile. These priorities include improved convenience and safety for walking and biking, and continued support for the economic health and prosperity of the region.

The highest priority projects for strategic investments are those that (1) protect the existing system and (2) improve the efficiency and safety of existing multimodal facilities. These projects are to be implemented first unless a lower priority measure is demonstrated to be more cost-effective or is one that better supports safety, growth management, or other livability and economic considerations. Further, the list of projects identified above are intended to make streets safer for all users as well as more efficient with use of emerging technologies.

The timing of project implementation will depend on future policy direction and funding availability at the federal, state, or local level; changes in local development priorities; or the formation of public-private or public-public partnerships.

Transportation Revenue

Revenue forecasts from the City provided a basis for extrapolating an estimate of revenues that might be available for transportation projects over the next twenty years. Table 11 summarizes the potential revenue forecast and sources for the identified list of strategic priorities.

Table 11: Forecast Revenue Sources

Revenue Source	Average Annual Income	20-Year Revenue Forecast
SDC Improvement Sub-Fund	\$1.02M	\$20.35M
SDC Reimbursement Sub-Fund	\$0.12M	\$2.35M
Capital Projects Sub-Fund	\$0.85M	\$17.07M
Total Revenue	\$1.99M	\$39.77M

Summary Of Transportation System Costs

Table 12 summarizes the total cost by category of recommended multimodal transportation projects.

Table 12: Project Costs

Revenue Source	Average Annual Income
Strategic Street Capacity Investment Corridors	\$54.1M
New Planned Streets	\$114.1M
Intersection Capacity Improvements	\$35.4M to \$70.5M depending on intersection control type selected
Other Priority Intersection Capacity Improvements	\$1.7M to \$4.4M depending on intersection control type selected
Grade-Separated Intersection Improvements	\$42.9M
Key Multi-Use Pathways	\$104.7M
Key Bicycle Corridors	\$17.4M
New Sidewalk Facilities along ADA Routes	\$5.5M
Sidewalk and ADA Ramp Upgrades	\$11.3M
US 97 South Redmond Concept Facility Plan	\$55 - \$60M
Total Cost	\$442.1M to \$484.9M depending on intersection control type selected

Funding Gap

Comparing Tables 11 and 12 demonstrate that City funding alone is insufficient to address the TSP needs. As such, the City will need to partner with other agencies, the private development community and pursue alternative funding sources to address the 20-year list of prioritized projects.

Potential Funding Sources

While highway user taxes and fees, including Oregon State fuel taxes, licensing, and registration fees, as well as local fuel taxes, are available to fund transportation-related projects in the City, per local policy these sources have increasingly been devoted to operations, maintenance, and preservation. This practice diverts funds away from capacity development or expansion projects. The City will need to develop a strategy to fund the improvements identified in the TSP. Possible elements of this strategy are outlined below.

Local Funding Mechanisms

Table 13 outlines potential funding sources at the local level that either can currently be used to fund future projects or that the City Council may want to consider adopting as a new funding source. The City has used some of these funding mechanisms in the past; others would be new. Inclusion of this table in the TSP does not create a new funding source but rather is intended to the various funding sources that local governments throughout Oregon utilized. In general, local funding sources are more flexible than funding obtained from state or federal grant sources.

Table 13: Potential Local Funding Mechanisms

Funding Source	Description	Potential Application
Street Utility Fees (also called road maintenance fees)	A fee based on the number of automobile trips a particular land use generates; usually collected through a regular utility bill. Fees can also be tied to the annual registration of a vehicle to pay for improvements, expansion, and maintenance of the street system.	System-wide transportation facilities including streets, sidewalks, bike lanes, and shared use paths.
Transportation Systems Development Charge (SDC)	SDCs are impact fees assessed to development for the capacity demand it creates on public infrastructure systems. SDCs may be an improvement fee, a reimbursement fee, or a combination thereof. Reimbursement fee revenues are dedicated to capital projects that increase capacity to meet the needs of growth. SDC credits are provided to developers for public improvements they construct which add capacity to the system beyond that required to serve their development. SDC credits may also be given for development provisions that reduce vehicular capacity demand on the transportation system, such as providing end-of-trip bike facilities within the new development.	The City currently has an SDC program. They may update the SDC to reflect the adoption of projects included in the updated TSP after adoption.
Stormwater SDCs, grants, and loans	SDCs, grants, loans, and stormwater improvement fees can be obtained for improving stormwater management facilities constructed as part of transportation system improvements.	SDCs may only be used for that portion of transportation improvements which generate additional stormwater management capacity related to growth.
Local gas tax	A local tax can be assessed on the purchase of gas within the City. This tax is added to the cost of gasoline at the pump, along with the state and federal gas taxes.	System-wide transportation facilities including streets, sidewalks, and bike lanes.

Table 13: Potential Local Funding Mechanisms (continued)

Parking in-lieu fees	Parking in-lieu fees are developer fees paid if they cannot or do not want to provide on-site parking for the development. The idea behind these fees is to decrease the amount of off-street, private parking and consolidating parking supplies on-street or in parking garages as a way to decrease parking demand on the development site. In-lieu fees may benefit developers by reducing costs and allowing more intensive development on a site.	System-wide transportation facilities including streets, sidewalks, bike lanes, shared use paths, and transit.
Incentives	The City provides enticements such as bonus densities and flexibility in design in exchange for a public benefit. Examples might include a commute trip reduction (CTR) program or transit facilities in exchange for bonus densities. Incentives may be used with SDC methods to reduce transportation impacts from new development.	System-wide transportation facilities including streets, sidewalks, bike lanes, shared use paths, and transit.
Public/private partnerships	Public/private partnerships have been used around the country to provide public transportation amenities within the public right-of-way in exchange for operational revenue from the facilities. These partnerships could be used to provide services such as vehicle charging stations, public parking lots, bicycle lockers, or car share facilities.	System-wide transportation facilities including streets, sidewalks, bike lanes, shared use paths, and transit.
Tax Increment Financing (TIF)	TIF is a tool that cities may use to create special districts (tax increment areas) where public improvements are made to generate private-sector development. During a defined period, the City freezes the tax base at the pre-development level. Property taxes for that period can be waived or paid, but taxes derived from increases in assessed values (the tax increment) resulting from new development can go into a special fund created to retire bonds issued to originate the development or leverage future improvements. A number of small-to-medium sized communities in Oregon have implemented, or are considering implementing, urban renewal districts that will result in a TIF revenue stream.	System-wide transportation facilities including streets, sidewalks, bike lanes, shared use paths, and transit.
Streets District	Oregon state law (Oregon Revised Statute [ORS] 371) allows for the formation of special streets taxing districts for purposes of constructing and maintaining streets within the taxing district boundaries. A Streets District would be a separate entity from the City of Redmond, with its own property tax levy rate and an elected board of commissioners. Those within the potential district boundaries must vote on the creation of a Streets District.	Roadway improvement projects.
Revenue and general obligation bonds	Bonding allows municipal and county government to finance construction projects by borrowing money and paying it back over time, with interest. Financing requires smaller regular payments over time compared to paying the full cost at once, but financing increases the total cost of the project by adding interest. General obligation bonds are often used to pay for construction of large capital improvements and must be approved by a public vote. These bonds add the cost of the improvement to property taxes over time.	Construction of major capital improvement projects within the city, street maintenance and incidental improvements.
Reimbursement Districts	Also called Zones of Benefit or Advance Financed Districts, a city determines the boundary of the district. Property owners of new development or large redevelopment permits pay a fee for the installation of public improvements. They then recover some portion of the cost over a period of years (often 15).	Construction of major capital improvement projects within the city (possibly in Study Areas).

State and Federal Grants

In addition to local funding sources, the City can seek to leverage opportunities for funding from grants at the state and federal levels for specific projects. Table 14 outlines state and federal sources and their potential applications.

Potential state funding sources are extremely limited, with some having significant competition. Any future improvements that rely on state funding may require City and regional consensus that these improvements are more important than transportation needs elsewhere in the region and the state. It will likely be necessary to combine multiple funding sources to pay for a single improvement project (e.g., combining state, regional, or City bicycle and pedestrian funds to pay for new bike lanes and sidewalks).

Table 14: Potential State and Federal Grants

Funding Source	Description	Potential Application
Statewide Transportation Improvement Program (STIP)	STIP is the State of Oregon's four-year transportation capital improvement program. ODOT's system for distributing these funds has varied over recent years. Generally, local agencies apply in advance for projects to be funded in each four-year cycle.	Projects on any facility that meet the benefit categories of the STIP.
Statewide Transportation Improvement Program-Urban (STIP-U)	STIP-U is the State of Oregon's four-year transportation capital improvement program for urban areas. ODOT's system for distributing these funds has varied over recent years. Generally, local agencies apply in advance for projects to be funded in each four-year cycle.	Projects on any facility that meet the benefit categories of the STIP-U.
Transportation and Growth Management (TGM) Grants	TGM Grants are planning grants administered by ODOT and awarded on an annual basis. The TGM grants are generally awarded to projects that will lead to more livable, economically vital, transportation efficient, sustainable, and pedestrian-friendly communities. The grants are awarded in two categories: transportation system planning and integrated land use/transportation planning.	Refinement of any identified study projects.
Transportation Alternatives Program (TAP)	TAP is a federal program that provides funding for pedestrian and bicycle facilities, projects for improving public transit access, safe routes to schools, and recreational trails. Local governments, regional transportation authorities, transit agencies, school districts or schools, natural resource or public land agencies, and tribal governments are all eligible to receive TAP funds.	Bicycle and pedestrian facilities, shared use paths.
All Roads Transportation Safety Program (ARTS)	The federal Highway Safety Improvement Program is administered as ARTS in Oregon. ARTS provides funding to infrastructure and non-infrastructure projects that improve safety on all public roads. ARTS requires a data-driven approach and prioritizes projects in demonstrated problem areas.	Areas of safety concerns within the city, consistent with Oregon's Transportation Safety Action Plan.
Immediate Opportunity Fund (IOF)	This fund is discretionary and provides funding for transportation projects essential for supporting site-specific economic development projects. These funds are distributed on a case-by-case basis in cooperation with the Oregon Economic and Community Development Department. These funds can only be used when other sources of financial support are insufficient or unavailable. These funds are reserved for projects where a documented transportation problem exists or where private firm location decisions hinge on the immediate commitment of road construction. A minimum 50 percent match is required from project applications.	Any identified projects that would improve economic development in the city and where there are documented transportation problems.

Table 14: Potential State and Federal Grants (continued)

Connect Oregon	Lottery-backed bonds distributed to air, marine, rail, transit, and pedestrian and bicycle projects statewide. No less than 10 percent of Connect Oregon IV funds must be distributed to each of the five regions of the state, if there are qualified projects in the region. The objective is to improve the connections between the highway system and other modes of transportation.	System-wide transportation facilities.
Oregon Parks and Recreation Local Government Grants	Oregon Parks and Recreation Department administers this program using Oregon Lottery revenues. These grants can fund acquisition, development, and major rehabilitation of public outdoor parks and recreation facilities. A match of at least 20 percent is required.	Trails and other recreational facility development or rehabilitation.
Oregon Transportation Infrastructure Bank (OTIB)	A statewide revolving loan fund is available to local governments for many transportation infrastructure improvements, including highway, transit, and non-motorized projects. Most funds made available through this program are federal; streets must be functionally classified as a major collector or higher to be eligible for loan funding.	Infrastructure improvements to major collectors or higher classified roads for vehicle, transit, and non-motorized travel.
State highway gas tax increase or user fee	ODOT is currently researching a state user fee for drivers to address steady or declining state gas tax revenues. An increase in the state gas tax or a user fee would need to pass through state legislation and would increase the state's transportation funds.	System-wide transportation facilities including streets, sidewalks, bike lanes, and transit.
Oregon Statewide Transportation Improvement Fund (STIF)	HB 2017 established a new dedicated source of funding for improving or expanding public transportation service in Oregon. New revenue from this source is allocated across four programs, three of which apply to public transportation service in Redmond; Formula program, Discretionary program, and Intercommunity Discretionary program.	Public transportation facilities and services.

2040 Transportation System Plan

Volume 2 – Table of Contents

September 1, 2020

Appendix A (page 2)	Public Involvement Plan
Appendix B (page 11)	Plans & Policy Review
Appendix C (page 32)	Methodology Memorandum
Appendix D (page 47)	Existing Conditions Analysis
Appendix E (page 401)	Future Conditions Analysis
Appendix F (page 493)	Alternatives Analysis
Appendix G (page 685)	Redmond Airport Master Plan (by reference)
Appendix H (page 687)	Preferred Alternative Analysis
Appendix I (page 881)	South Redmond Corridor Plan (by reference)
Appendix K (page 883)	Quarry Avenue Interchange Evaluation

Page of PDF noted in parentheses

Appendix A Public Involvement Plan



REDMOND

Transportation System Plan

Date: December 11, 2017

To: Project Management Team

From: Anne George, Facilitation, Mediation + Public Involvement
Matt Kittelson & Julia Kuhn, Kittelson & Associates, Inc.

Subject: Final Public Involvement Plan

INTRODUCTION

The current City of Redmond Transportation System Plan (TSP) was adopted in 2008. This project will update the current TSP to reflect changes that have occurred since 2008 and provide a transportation plan to meet the needs of the City for the next 20 years.

The focus on this TSP update will be to achieve the following outcomes:

- Adopt an updated TSP that provides for a safe, efficient, multi-modal transportation network, based on the needs of existing and future land uses;
- Provide a data driven safety plan that focuses on reducing or eliminating fatal and serious injury crashes;
- Improve circulation and connectivity through the City for all modes;
- Provide parallel routes to support the long-term function of highways and major roadways, particularly in the South Redmond corridor;
- Identify short and long-term transportation solutions that support economic development and redevelopment including Transportation System Management and Operations (TSMO);
- Evaluate the potential transportation needs to support economic development including industrial, mixed use and business districts, and identify solutions that will support the development of these sites;
- Determine the appropriate means for managing the state highways and major arterials to meet both local access and through traffic needs as well as improving safety and mobility for all users (auto, transit, bicyclists, pedestrians and motor carriers);
- Evaluate intermodal safety and access for all types of users;

- Consider the needs of disadvantaged travelers in assessing both transportation needs and solutions;
- Review recent changes to the Transportation Planning Rule (TPR) and Oregon Administrative Rules (OAR) related to access management and alternative mobility standards to identify potential opportunities to employ the use of alternative/local standards;
- Integrate concurrent, parallel planning efforts related to the US 97 Redmond South Corridor and the Downtown Transportation Plan into the TSP; and
- Develop TSP implementation policies which support a safe, convenient, and economical transportation system.

COORDINATION ACROSS TRANSPORTATION PROJECT TEAMS

Community engagement will be an essential component the TSP Update's success. The City of Redmond is currently conducting a number of transportation and livability projects that will help to shape the future vision and economic prosperity of the community. To better serve the community and increase the value of the input provided, the City, ODOT and the consultant teams working on the various planning efforts will work in partnership on the various community engagement efforts and share information received on individual projects. To this end, we recommend that:

- the City maximize public engagement efforts by centralizing information about each project on a City of Redmond planning projects web page and;
- the individual project teams encourage community input on all of the projects underway, work together on public engagement efforts, and share such input across project teams.

KEY PUBLIC ENGAGEMENT MESSAGES

The TSP Update is an important project for the community of Redmond. As the project team engages the community, consistent messaging will be important for community comprehension and the success of the project. Key messages include:

- The TSP Update will plot a course for the transportation system needed to support continued economic prosperity in the community for the **next 20 years**.
- Transportation planning **focuses on the safety and mobility of all users** from community members' ability to easily access schools, shopping, parks, and medical facilities to the needs of commercial and industrial users to safely and efficiently transporting goods to and from Redmond.

- The **last TSP Update was completed in 2008**. Since that time Redmond and the surrounding area has changed and grown substantially and a TSP Update is needed to support these changes.
- A **number of transportation and livability projects are underway** to enhance and improve the community of Redmond. The City and its project teams will collaborate to share information about how the TSP Update complement and relies upon other efforts. Examples of these efforts include the Redmond Neighborhood Revitalization Project, Airport Master Plan Update, and the US 97 South Corridor Project. Community members are invited to share their input with any of the project teams who will in turn work to share such input across project teams.
- The community will have a **number of opportunities to share their experiences, ideas, and concerns** as well as weigh in on project alternatives. Public input is invited via the project website, attendance at advisory committee meetings, participation in public open houses, and direct communication with the project team.

PUBLIC ENGAGEMENT GOALS

The City of Redmond seeks a community-supported TSP Update that meets the needs of its residents and supports continued economic growth. Stakeholder engagement will be central to understanding local needs and expectations. The goals of the public involvement plan include the following:

- Inform the community about the project and foster the exchange of ideas;
- Document community interests, ideas, and concerns;
- Involve affected or interested stakeholders in the development and evaluation of alternatives considered;
- Maximize public engagement effectiveness by sharing public input received in this project with other transportation projects underway in the City and, when feasible, coordinate with other project teams on public engagement events; and
- Develop a community-supported Transportation System Plan that will enhance the vitality of Redmond and the surrounding area.

KEY AUDIENCES

City of Redmond

The Consultant Team will be directed by selected **City staff, working in collaboration with ODOT and Deschutes County staff**. The **Redmond City Council** has ultimate decision-making authority on the adoption of a TSP Update for the City.

Project Management Team

The PMT will provide the day-to-day guidance for the consultant team. The PMT includes two City staff members, one ODOT staff, and one Deschutes County staff. Each member of the PMT is responsible for engaging other staff from his/her agency at appropriate times throughout the project to solicit input/review on deliverables, technical analyses and feasibility of solutions being considered.

Oregon Department of Transportation (ODOT) and Deschutes County

ODOT and Deschutes County will be key partners in the project. The project team will plan and incorporate ODOT and Deschutes County feedback and needs into the effort and work with these agencies on the findings and outcomes of the TSP Update process. Re

Technical and Public Advisory Committee (TAC and PAC)

Public engagement will be an important component of the success of the project. The technical and public advisory committee will comprise a cross section of stakeholders, appointed by the City Council, and tasked with advising the project team. This group will be relied on to represent the public interest in the analyses of community needs and the development and identification of preferred alternatives. In general, the technical advisory committee is comprised of representative agency stakeholders while the public advisory committee is comprised of representative community members.

Redmond Community

The project team seeks engagement from stakeholders and interested parties in meaningful ways throughout the project. With an eye on engaging communities affected by the outcomes of the project, the project will specifically target the following groups for their participation:

- **Community members** and the general public across the project area.
- **Community organizations** including non-profit organizations, youth organizations, and organizations representing older adults and people with disabilities, as well as culturally-specific organizations.
- **Economic development partners** such as the Redmond Chamber of Commerce, Economic Development for Central Oregon, Redmond Economic Development, Inc., and the local business community.
- **Property owners and renters** in the City and surrounding area.
- **Local representatives and other government partners** including the Redmond City Council, Redmond Planning Commission, fire department, local law enforcement, Department of State Lanes, Deschutes County representatives, and Central Oregon Intergovernmental Council.

- **Transportation partners** including Cascades East Transit, bicycle and pedestrian advocates (Deschutes Count Bicycle and Pedestrian Committee, and regional freight industry representatives).
- **Educational, recreational, and health partners** including the Redmond School District, Central Oregon Community College, Redmond Area Park & Recreation District, St. Charles Health System, and Deschutes County Health Services.
- **Local news** media outlets.

Equity

Appendix A presents an overview of Redmond’s demographics and identifies concentrations of low-income, minority, and limited-English proficient residents. The analysis of demographics will be used to refine the public involvement program (PI program) as needed. However, regardless of concentration, members of all of these groups will be invited to participate in the planning process and accommodations will be made (e.g. translation services as provided by the City of Redmond) to encourage their participation. The project will also compile a Title VI report at the end of the project. This report will compile all Title VI activities, document project process and outreach for all low income, race, gender, and age groups.

To engage these traditionally underrepresented communities, the project team will employ the following strategies:

- **Advisory Committee meetings:** The advisory committee includes interested citizens, property and business owners and groups. The PAC also includes groups that advocate for, or serve as networking places for, these traditionally under-served communities. All PAC meetings are open to the public.
- **Community workshops and events:** As possible, the team will identify partner organizations that can co-host or promote open house events to traditionally underserved communities. Demographic information (anonymously) will be collected at all public events to be added to the final report and for City’s use for Title VI reporting requirements.
- **Articles in local papers:** The City will distribute short media releases or articles will be written at key milestones and sent to local media outlets. City staff will also conduct interviews with media outlets to increase the likelihood of an article running in the paper or on the radio. These outlets reach a wide audience.
- **Translation, special accommodations, and graphics:** translation services and other special accommodations will be provided at all meetings upon request (provided through City or partner agencies). All public materials will be presented in “easy to understand” language with “jargon” words removed or fully explained. Graphics will also be used to convey information, as a way to reduce the need to translate materials and to accommodate multiple learning styles.

DECISION MAKING

As noted, the Redmond City Council holds ultimate decision-making authority on the adoption of an updated TSP. The Council will work with the Redmond Planning Commission, the Oregon Department of Transportation, the community, and other partners throughout this process.

PUBLIC INVOLVEMENT PROCESS

Coordination with Other Transportation and Livability Projects

As noted, the City has a number of transportation and livability projects underway. Coordinating the public involvement efforts of these various projects will contribute to effective community engagement. For community members, it may be helpful for the project team, and other transportation project teams working in Redmond currently, to adopt a “one-stop shopping” approach when interacting with the public. In other words, community members should feel welcome to share their input with the TSP Update project team about any transportation-related project underway in Redmond and feel confident that information will be shared with the appropriate project team.

Where possible, it will be valuable to plan public involvement meetings that incorporate the findings and analysis of other projects from the US 97 South Corridor Project, the Redmond Neighborhood Revitalization Project, the Downtown Transportation Plan, and any other relevant projects.

The city will provide a central location on its website for quick access to all transportation projects’ web pages.

Website

The consultant team will develop and maintain a project website that will serve to provide a project overview, key input opportunities for the community, project materials and meeting notes, community meetings information, and an on-line mapping tool that allows the public to provide input and pinpoint issues, ideas, and comments directly on a map of the Project Area.

The project team will include links to other transportation projects underway, as well as websites of the City and ODOT, and updates on other ongoing projects at the TSP Update project website.

Stakeholder Interviews

The project team will work with the City of Redmond to identify key stakeholders to interview in the early stages of the TSP update. These interviews are intended to help the TSP update process understand and learn about key transportation issues and opportunities from the perspective of different groups, sectors, and communities. City and consultant staff will conduct the interviews.

Community Open Houses

While the larger community will be encouraged to be involved throughout the process, two community open houses will serve to solicit important direct community input early in the process and then again when alternatives are developed.

Open House #1: Existing and Future Transportation Needs

The first Community Open House will take place in late fall/early winter 2017 to provide the community with information about the project, including existing and future transportation conditions data. Emphasis will be placed on why and how transportation planning impacts the daily lives of community members. Community members will be asked to share their experiences living and working in Redmond, as they pertain to their transportation needs in Redmond and the surrounding area. Community input will help to shape the process as it moves forward.

During this Open House, the US 97 South Corridor Project and Redmond Neighborhood Revitalization Project teams may be asked to present information about those projects, including how they relate to the TSP Update. US 97 South Corridor Project team leads may also be asked to have a table or display at the event to inform community members about that project and ways for the community to become involved. The TSP Update team will also come prepared to answer basic questions about these other projects and how community members can contribute.

Open House #2: TSP Alternatives

The second Community Open House will take place in early 2018 and will focus on sharing project alternatives from the TSP Update. The project team may elect to conduct a shared open house event with the US 97 South Corridor Project, which may also be ready to share project alternatives at this date. Such partnerships are likely to garner increased community participation, as well as enhanced community understanding of the various transportation projects underway and how they are interconnected and vital to the continued success of Redmond.

Group Presentations (City staff to conduct as needed)

Community engagement is enhanced when project leaders seek out involved and affected parties. Agency staff is encouraged to seek out community groups, especially those who do not traditionally engage in community projects or public meetings on their transportation needs. Informal presentations and discussions with community groups are likely to be effective in gathering community input. In addition, many of the groups listed below can help inform the project team on the best ways to engage their membership, perhaps by attending an already existing meeting, providing articles or data for a group's newsletter or website, or meeting specifically with members to update them and solicit input.

The following groups, while not exhaustive, are recommended for direct engagement:

- Redmond Chamber of Commerce
- Economic Development for Central Oregon (EDCO)
- Redmond Economic Development, Inc. (REDI)
- St. Charles Redmond
- Redmond School District (and Parent Teacher Associations)
- Redmond neighborhood groups and homeowners' associations
- Bicycle-Pedestrian Advisory Committee (BPAC)
- Latino Community Association of Central Oregon
- Central Oregon Council on Aging (COCOA)
- Central Oregon Veterans Outreach
- Central Oregon Visitors Association (COVA)
- Redmond Library
- Freight and rail trade groups

OUTREACH

The City of Redmond is adept at community outreach. In addition to soliciting input from the groups named above for their advice on reaching their membership, the project team will share information with media outlets, community newsletters, and an interested parties list at key milestones and before community events. In addition, a social media campaign that involves regular updates and information sharing via the City's social media platforms, as well as those of the members of the advisory committees, will contribute to community awareness and participation in the project.

PUBLIC INVOLVEMENT TIMELINE

A public open house to discuss existing conditions and future needs will be held in early February 2018. This open house will be a joint effort with the South Redmond Corridor Study. A second open house to discuss the Draft Transportation System Plan will be held in late Summer 2018.

ONGOING PUBLIC INVOLVEMENT EVALUATION

The PMT will regularly discuss and debrief ongoing community involvement efforts and seek feedback from City staff, advisory committee members, and the community-at-large. Responses from questionnaires or surveys from participants at in-person and online will be compiled and utilized to refine public engagement.

Appendix B Plans and Policy Review



REDMOND

Transportation System Plan

Date: February 21, 2018

Project #: 17720

ODOT PA #27456

To: Redmond TSP Project Management Team (PMT)

Subject: Plans and Policy Review (Task 2.2)

This memorandum provides a review of current transportation related plans, standards, rules, regulations and policies in place by the state, county, and local jurisdictions that pertain to the update of the Redmond Transportation System Plan (TSP). This summary serves as a reference for the Project Management Team (PMT) and the Project Advisory Committee (PAC) and identifies key issues for consideration as part of the TSP Update.

Some documents reviewed herein document existing transportation-related standards, targets, and guidelines with which the TSP shall coordinate and be consistent; others documents contain identified transportation improvements to include in the year 2040 analyses of potential projects. Some City policy and regulatory documents described in this review may require amendments following the adoption of the TSP to ensure implementation of the identified TSP policies and projects as well as compliance with Oregon's Transportation Planning Rule (TPR). These amendments will be identified as part of Task 6.2. Table 1 provides a summary of the documents reviewed and summarized as part of this memorandum.

Table 1. Summary of Documents Reviewed and Relevance to TSP

Document/Policy	Relevance to TSP	Page
Statewide Planning Documents		
OAR Chapter 734 Division 051	Projects, policies, and regulations identified as part of TSP Update will reflect the policies of the statewide modal plans and policies and will comply with or move in the direction of meeting the standards and targets established in the OHP and ODM related to safety, access, and mobility.	3
Oregon Highway Plan (as amended)		4
Oregon Freight Plan		7
Oregon Public Transportation Plan		7
Oregon Rail Plan		8
Oregon Aviation Plan		8
Oregon Bicycle/Pedestrian Plan		9
Oregon Transportation Safety Action Plan		10
ODOT Highway Design Manual		11
Oregon Roadway Departure Safety Implementation Plan		12
Transit in Small Cities: A Primer for Planning, Siting and Designing Transit Facilities in Oregon		14
Oregon Intersection Safety Implementation Plan		13
Oregon Bicycle and Pedestrian Safety Implementation Plan		13
ODOT Region 4 Active Transportation Needs Inventory		14

Table 1. Summary of Documents Reviewed and Relevance to TSP (continued)

Document/Policy	Relevance to TSP	Page
Statewide Planning Documents		
Statewide Planning Goals (OAR chapter 660 division 012, known as the Transportation Planning Rule or TPR)		11
Statewide Transportation Improvement Program	This TSP update will incorporate projects programmed in the STIP. An expected implementation task for this TSP is to recommend updates to STIP, as appropriate.	12
Oregon Resilience Plan	Projects, policies, and regulations identified as part of this TSP Update will incorporate applicable transportation system elements included in the Resilience Plan. An expected implementation task for this TSP is to maintain key inter-agency coordination on Resilience Plan and make periodic updates to TSP, as appropriate.	13
Regional and Local Planning Documents		
Deschutes County 2012 TSP	Projects, policies, and regulations identified as part of this TSP Update will reflect the policies and projects in the County's TSP.	15
North Redmond Interchange Area Management Plan	The TSP Update will integrate the findings and recommendations of the IAMP into the policy direction and prioritization of future projects.	15
City of Redmond Transit Master Plan (July 2009 Draft Final Plan)	The TSP update will integrate the City's previously identified transit improvements as well as regional transit and transportation demand management strategies.	16
Redmond Service Alternatives (April 23, 2013 revised draft)		16
Redmond Comprehensive Plan	The TSP update will be adopted as an element of the Comprehensive Plan and replace the 2008 TSP. More specific policy direction and detailed system planning and project prioritization will be included in Update	17
Redmond 2008 TSP		18
Ongoing amendments or updates to 2008 TSP project lists and costs		18
Redmond Airport Master Plan	The TSP update will consider how to preserve and enhance access to airport infrastructure. Coordination between ongoing Airport Master Plan efforts and TSP will be maintained throughout update process.	18
Redmond Development Code	Amendments to RDC provisions related to transportation improvements and policies may be recommended as part implementation tasks of TSP update to ensure consistency between Development Code and TSP, and to strengthen compliance with the TPR.	
City Buildable Lands Inventory	The TSP update will integrate economic development policies and priorities into transportation policies and project prioritization.	19



Table 1. Summary of Documents Reviewed and Relevance to TSP (continued)

Document/Policy	Relevance to TSP	Page
Statewide Planning Documents		
City's current and past budget for transportation	The TSP Update consider the City's current revenue levels, planned expenditures, and potential future revenue sources to develop a funding plan.	20
City's current and historic funding and sources		
City Parks and Recreation District Master Plan	The TSP Update will integrate the findings and recommendations of the Park Master Plan into the policy direction and prioritization of future projects.	20

STATEWIDE PLANS AND POLICIES

OAR Chapter 734 Division 051

Commonly referred to as Division 51, ODOT adopted OAR 734-051 to establish procedures and criteria to govern highway approaches, access control, spacing standards, medians and restriction of turning movements. The application of these criteria to changes to the state highway are intended to comply with statewide planning goals, acknowledged comprehensive plans, state law, and the Oregon Transportation Plan (OTP).

The 2008 TSP outlines the guiding principles used in the adoption of new access management standards consistent with OAR 734-051 and the Oregon Highway Plan (OHP). The TSP Update will incorporate the amendments to OAR 734-051 through the adoption of Senate Bill 264 when establishing revised street design guidelines.

Within Redmond, three state facilities connect the city's residents, employees, and visitors with other areas in Central Oregon as well as through the state. These highways also provide connections between areas within the city and at the same time, can present a barrier to walking and cycling. In addition, per the Oregon Resilience Plan, US 97 is a Tier I, Phase I Lifeline Route that would serve as a critical statewide route in the event of a catastrophic emergency, such as a Cascadia Subduction Zone earthquake. A summary of the three facilities and the applicable standards are shown in Table 2.



Table 2. ODOT Access Management Spacing Standards

Route Name	Facility Extents	Facility Designation	2015 ADT	Posted Speed Limit (mph)	Access Spacing Standard (feet)
OR 126	Entire Section within City Limits	Statewide Highway	>5,000	25/35/45/50	350/500/800/1320
US 97	Entire Section within City Limits	Statewide Highway	>5,000	40/50/55	800/1100/1320
O'Neil Highway	Entire Section within City Limits	District Highway	<5,000	35	250/360/425/650 (30/40/50/55)

Oregon Highway Plan (OHP)

The OHP is the modal plan of the Oregon Transportation Plan (OTP) to guide ODOT in the planning, operations, and financing of its highway system. Policies in the OHP emphasize the efficient management of the highway system to increase safety, partner with local and regional jurisdictions, and employ new techniques to improve the capacity of the existing system before expanding capacity. The OHP's policies provide an essential link between land use and transportation, provide standards and targets for highway performance, design, and access management, and emphasize the multimodal relationship between state highways, local and regional streets, bicycle, pedestrian, transit, rail, and air systems.

The following are examples of OHP policies that are relevant to Redmond's TSP update.

Policy 1A: State Highway Classification

ODOT classifies its highways into four levels of importance: Interstate, Statewide, Regional, and District. This classification system guides ODOT's management of and decisions regarding the investment in the highway system as well as the development of facility plans and the agency's review of local plan and zoning amendments and facility management decisions, such as road approach permits.

As noted above, there are three ODOT highways within Redmond City limits, including US 97, OR 126, and the O'Neil Highway. The purpose and management objectives of these highways are provided in Policy 1A, as summarized below.

- *Statewide highways* (US 126 and US 97) are intended to provide inter-urban and inter-regional mobility and to connect larger urban areas, ports, and major recreation areas that are not directly served by Interstate Highways. A secondary function is to connect regional



trips. ODOT's management objective of these highways is to provide safe and efficient operations with minimal interruptions to flow within urban areas.

- *District highways* (O'Neil Highway) typically function as county and city arterials and collectors. These facilities link urban and rural areas within a region. ODOT's management objective of these highways is to provide for safe and efficient operations in an environment that reflects the urban character and multimodal modes of the highway.

Within the City Limits, US 97 has both an expressway and non-expressway designation. Both US 97 and OR 126 have a freight route designation.

Policy 1B: Land Use and Transportation

Policy 1B provides clarification on ODOT will work with other agencies to establish the linkage between land use and transportation in transportation plans, facility and corridor plans, plan amendments, access permitting and project development. Policy 1B also recognizes that state highways can serve as the main street in some communities, and as such, this policy provides for a balance between serving a local community's needs and through traffic.

Policy 1C: State Highway Freight System

To support the continued vitality of local and state economies, the designated state's freight system facilitates efficient and reliable interstate, intrastate, and regional truck movement. This freight system includes routes that carry significant tonnage by truck and serve as the primary interstate and intrastate highway connections to ports, intermodal terminals, and urban areas. Highways included in this designation have higher highway mobility standards than other statewide highways. Within the city, both US 97 and US 126 are designated freight routes.

Policy 1F: Highway Mobility Policy

This policy establishes mobility targets that implement the objectives of the OTP and other OHP policies. The policy, as revised, offers the flexibility to the state and local jurisdictions to collaboratively implement mobility targets that support and reflect land use, transportation and economic development priorities.

The mobility targets are a measure of state highway performance based on a volume to capacity (v/c) ratio. The targets are intended to make initial assessment of measures needed to maintain acceptable and reliable mobility but also to recognize that alternative mobility targets (including measures that are not v/c-based) can be effective in identifying solutions that "better balance state and local community needs and objectives."

Within Redmond, the following targets are applicable:

- Statewide Expressway outside of a MPO area (US 97 and OR 126): 0.85 if the speeds are less than or equal to 35 miles per hour and 0.80 for speeds greater than 35 miles per hour.



- District Highway outside of a MPO area (O'Neill Highway): 0.95 if the speeds are less than or equal to 35 miles per hour and 0.90 for speeds greater than 35 miles per hour.

As part of the passage of Senate Bill 1544, ODOT and the City adopted alternative mobility targets for the US 97/Evergreen, US 97/Highland, and US 97/Veteran's Way intersections.

Policy 1G: Major Improvements

This policy establishes a three-tier process related to evaluating major improvements to the state highway system. The first priority is to improve the safety and management of the existing system prior to adding roadway capacity. Transportation system management (TSM) and transportation demand management (TDM) measures (including land use changes) can be used to evaluate to determine ways to better manage the efficiency of the existing system. The second priority is to make minor improvements to the state highway system and/or improvements to the local street network. The third priority is to add lanes to increase capacity or make other major improvements. The City will work with ODOT to determine TSP improvement projects and policies that support this policy.

Policy 2B: Off-System Improvements

This policy allows ODOT to make financial contributions to local street improvements that support the state highway system and are consistent with Policy 1G. As part of the Redmond TSP, the City, ODOT and other affected stakeholders will collaboratively identify projects that support this policy and are consistent with local policies and priorities.

Policy 2F: Traffic Safety

This policy prioritizes improvements to enhance the safety of all users of the highway system. Action 2F.4 provides for the implementation of the Safety Management System to allocate resources to areas with the most significant safety issues.

Policy 3A: Classification and Spacing Standards

As discussed above, ODOT manages location, spacing, and intersections along state highways to ensure the safe and efficient operations for the traveling public. These management tools recognize the intended function and classification of the highways (as discussed in Action 3A.2). The applicable access management spacing standards, as established in the OHP, for the City are implemented by access management rules in OAR 734, Division 51 and highlighted in the above section.

Policy 4A: Efficiency of Freight Movement

The City is bisected by two important statewide freight routes: US 97 and US 126. Policy 4A recognizes the need to maintain and improve the efficiency of freight movement on the state system. The City and ODOT will work together to identify needed improvements to each highway, consistent with this policy.



Policy 4B: Alternative Passenger Modes

This policy supports the development and enhancement of “alternative passenger services and systems” that help preserve the performance and function of the state highway system. As part of the TSP, ODOT, the City and the Central Oregon Intergovernmental Council (COIC) will work together to identify potential improvements to support the Cascades East Transit (CET) service within the City.

Oregon Freight Plan (2011)

The OPF is the modal plan of the OTP that supports the movement of goods and commodities in the state. Per this policy, it is the state’s intent “to improve freight connections to local, Native American, state, regional, national and global markets in order to increase trade-related jobs and income for workers and businesses.” This plan prioritizes strategic investments in existing freight facilities (including rail, marine, air, and pipeline infrastructure).

Within the City, US 97 and OR 126 are part of the state’s freight network. The following policies in the Freight Plan can help shape the projects evaluated as part of the TSP.

- Strategy 1.2: Strive to support freight access to the Strategic Freight System. This includes proactively protecting and preserving corridors designated as strategic.
- Action 1.2.1. Preserve freight facilities included as part of the Strategic Freight System from changes that would significantly reduce the ability of these facilities to operate as efficient components of the freight system unless alternate facilities are identified or a safety-related need arises.
- Strategy 2.4: Coordinate freight improvements and system management plans on corridors comprising the Strategic Freight System with the intent to improve supply chain performance.

In addition, the City has established the following goal as part of the TSP update related to freight movement:

- *TSP Goal 6.* Ensure that efficient and effective freight transportation infrastructure is developed and maintained to support local and regional economic expansion and diversification consistent with City and Regional economic plans and policies.

Oregon Public Transportation Plan

The OPTP provides guidance to the development and maintenance of public transportation systems. The vision that guides this element of the OTP is summarized below.

- *“A comprehensive, interconnected and dependable public transportation system, with stable funding, that provides access and mobility in and between communities of Oregon in a convenient, reliable, and safe manner that encourages people to ride.*



- *A public transportation system that provides appropriate service in each area of the state, including service in urban areas that is an attractive alternative to the single-occupant vehicle, and high-quality, dependable service in suburban, rural, and frontier (remote) areas.*
- *A system that enables those who do not drive to meet their daily needs.*
- *A public transportation system that plays a critical role in improving the livability and economic prosperity for Oregonians.”*

For Redmond, the OPTP Implementation Plan would encourage the collaboration between ODOT, CET and the City to enhance the city and regional transit service. The OPTP is currently being updated.

In addition, the City has established the following goal as part of the TSP update related to public transit:

- *TSP Goal 5. Provide reliable and convenient transit service to Redmond residents and businesses as well as special transit options for the City’s elderly and disabled residents.*

Oregon State Rail Plan (2014)

This modal plan addresses long-term freight and passenger rail planning in the state and includes policies and planning processes to maintain and enhance rail service, integrate freight and passenger elements into the land use and transportation planning processes (like the TSP), and provide for collaboration between state, regional and local jurisdictions.

The BNSF Railway in Redmond is a significant driver of economic opportunity for the community. This system interfaces with the community between US 97 and the industrial area near the airport. Within the city, BNSF carries a wide variety of commodities. Today, there are seven at-grade crossings of the railroad within the city. The TSP will include policies and projects to improve rail safety and mobility within the City. In addition, the Project Advisory Committee (PAC) includes ODOT representatives that will advise on rail and freight interests.

Oregon Aviation Plan (OAP, 2007)

The OAP provides strategies and policies for investment in the maintenance and enhancement of the state public aviation system. The plan provides for collaboration between the Oregon Department of Aviation, other state and local agencies (like the City) and the Federal Aviation Administration (FAA).

The Redmond Municipal Airport is a Category I – Commercial Service Airport. This categorization applies to airports that provide scheduled commercial passenger service in addition to general aviation aircraft. The Airport serves as the primary facility for commercial aviation passenger travel in the region. The Airport, in collaboration with the City, County and ODOT, is currently updating its Master Plan. The TSP will incorporate the findings of that update, including offsite transportation improvements necessary to support future growth at the airport.



Oregon Bicycle and Pedestrian Plan (OBPP, 2016)

The vision of the OBPP is that *“In Oregon, people of all ages, incomes, and abilities can access destinations in urban and rural areas on comfortable, safe, well connected biking and walking routes. People can enjoy Oregon’s scenic beauty by walking and biking on a transportation system that respects the needs of its users and their sense of safety. Bicycle and pedestrian networks are recognized as integral, interconnected elements of the Oregon transportation system that contribute to our diverse and vibrant communities and the health and quality of life enjoyed by Oregonians.”*

The Plan recognizes that walking and biking support economic growth, health, environmental quality, and mobility. The Plan outlines the following goals that are applicable to Redmond:

Goal 1: Safety. Eliminate pedestrian and bicyclist fatalities and serious injuries and improve the overall sense of safety of those who bike or walk.

Goal 2: Accessibility and Connectivity. Provide a complete bicycling and pedestrian network that reliably and easily connects to destinations and other transportation modes.

Goal 3: Mobility and Efficiency. Improve the mobility and efficiency of the entire transportation system by providing high quality walking and biking options for trips of short and moderate distances. Support the ability of people who bike, walk or use mobility devices to move easily on the system.

Goal 4: Community and Economic Vitality. Enhance community and economic vitality through walking and biking networks that improve people’s ability to access jobs, businesses, and other destinations, and to attract visitors and tourists, new residents, and new business to the state, opening new opportunities for Oregonians.

Goal 5: Equity. Provide opportunities and choices for people of all ages, abilities, races, ethnicities, and incomes in urban, suburban, and rural areas across the state to bike or walk to reach their destinations and to access transportation options, assuring transportation disadvantaged communities are served and included in decision making.

Goal 6: Health. Provide Oregonians opportunities to become more active and healthy by walking and biking to meet their daily needs.

Goal 7: Sustainability. Help to meet federal, state, and local sustainability and environmental goals by providing zero emission transportation options like walking and biking.

Goal 8: Strategic Investment. Recognize Oregon’s strategic investments in walking and biking as crucial components of the transportation system that provide essential options for travel, and can help reduce system costs, and achieve other important benefits.



Goal 9: Coordination, Cooperation, and Collaboration. Work actively and collaboratively with federal, state, regional, local, and private partners to provide consistent and seamless walking and biking networks that are integral to the transportation system.

The City and ODOT will work together to identify policies and projects in support of these goals. Further, the City has established the following-related goals for the TSP update:

- *Redmond TSP Goal 3.* Provide transportation choices and address the needs and safety of all travelers, including people of all ages, abilities, ethnicities, and incomes.
- *Redmond TSP Goal 4.* Provide comfortable, convenient and safe pedestrian and bicycle facilities for all users.

Finally, the ODOT Bicycle and Pedestrian Design Guide supports the OBPP and the Highway Design Manual and guides the design and management of bicycle and pedestrian facilities on state-owned facilities.

Oregon Transportation Safety Action Plan (TSAP, 2016)

The TSAP establishes goals to achieve the vision that there will be “no deaths or life-changing injuries on Oregon’s transportation system by 2035.” These goals foster a safety culture, provide infrastructure to enhance safety, support healthy communities, leverage technology, and coordinate agencies and stakeholders to work together. The TSAP prioritizes improvements related to four areas:

- Risky behaviors, such as impaired driving, distracted driving, unbelted driving, speeding.
- Infrastructure such as intersection improvements.
- Protections for vulnerable users, such as pedestrians, bicyclists, and older road users.
- Improved facility management, including data collection, training, enforcement, licensing and emergency response.

The TSAP identifies several actions in support of these priorities. Some of these action items that are relevant to Redmond include:

- Action 6.3.2: Continue work between ODOT, cities, and counties to consider and revise, as appropriate, regulations and programs for establishing speed limits to achieve safety goals, improve balance among multimodal interests, and support community objectives.
- Action 6.3.6: Focus facility design and redesign to achieve operating speeds consistent with safety goals, context, users, and land use.
- Action 6.5.1: Implement design treatments to achieve appropriate speeds and manage sight distance consistent with context, users, and community goals.



- Action 6.5.3: Support multimodal safety considerations during local Transportation System Plan development, and other planning efforts (e.g., local Transportation Safety Action Plans) to guide project planning, operations and maintenance for safer transportation facilities.
- Action 6.6.1: Implement low-cost systemic safety improvements at intersections.
- Action 6.8.1: Evaluate the safety performance of innovative pedestrian facilities. Continue implementing the most effective.
- Action 6.8.2: Provide safe facilities and crossings in areas where pedestrians are present or access is needed. Prioritize transit corridors, school areas, multilane streets and highways and other high risk areas and facilities.
- Action 6.10.1: Evaluate the safety impacts of innovative bicycle facilities. Continue implementing the most effective.

The City has established the following goal related to safety as part of the TSP update:

- *TSP Goal 1.* Provide a safe and efficient transportation network that complements key economic development priority areas, the comprehensive plan, and adopted state, regional and local plans and policies.

ODOT Highway Design Manual (HDM)

The HDM establishes design standards and procedures for the state highway system. The HDM has been coordinated with the American Association of State Highway and Transportation Officials' (AASHTO) policies. The HDM provides guidance on the location and design of new construction, major reconstruction, and resurfacing, restoration or rehabilitation (3R) projects. The standards in the HDM are specified by functional classification. Therefore, the standards relevant to US 97 and OR 126 (statewide freight facilities) are different than for the O'Neill Highway (a district highway).

Transportation Planning Rule (OAR 660-012)

Oregon defines 19 statewide planning goals; of which Goal 12 is *Transportation*. The Transportation Planning Rule (TPR), OAR Division 12, defines how to implement this goal and requires, amongst other areas, that counties and cities work with ODOT to prepare local TSPs that are consistent with the OTP.

The TPR recognizes the role that a safe, convenient, and economical transportation system plays in supporting local and state economic vitality. It also requires the integration of comprehensive land use planning with transportation needs and the promotion of multi-modal systems that make it more convenient for people to walk, bicycle, use transit and drive less.



In compliance with the TPR, Redmond will need to adopt and/or amend land use regulations consistent with state and federal requirements "to protect transportation facilities, corridors and sites for their identified functions (OAR 660-012-0045(2))." These may include:

- Standards to protect future operations of roads;
- A process for coordinated review of future land use decisions affecting transportation facilities, corridors or sites;
- A process to apply conditions to development proposals to minimize impacts and protect transportation facilities, corridors or sites;
- Regulations to provide notice to ODOT of land use applications that require public hearings, involve land divisions, or affect private access to roads; and,
- Regulations assuring that amendments to land use designations, densities and design standards are consistent with the functions, capacities and performance standards of facilities identified in the TSP. (See OAR 660-012-0060.)

The TPR, as amended, allows local governments to exempt a zone change from the "significant effect" determination if the proposed zoning is consistent with the comprehensive plan map designation and the TSP as well as a "balancing test" to weigh land use amendments that will create industrial or traded-sector jobs and/or provide other benefits.

The Redmond TSP includes goals that are consistent with and support the TPR. Further, the development of the TSP will follow the TPR provisions summarized in OAR 660-012.

Statewide Transportation Improvement Program (STIP, 2018 – 2021)

The STIP serves as the state's four-year capital improvement program for multimodal projects as well as for projects in the National Parks, National Forests and Native American tribal lands. The STIP is updated every two years in accordance with federal requirements. The 2018 – 2021 STIP identifies one project in Redmond:

- Project 21166 US 97: Yew Avenue – Veteran's Way: \$1 million to develop engineering plans for grinding and overlaying the pavement

In addition, there are STIP projects that enable maintenance activities for CET but do not represent any changes to CET's service to Redmond.

Oregon Roadway Departure Safety Implementation Plan (RDSIP)

The RDSIP was developed in conjunction with the TSAP (described in the above sections). Per the TSAP vision and priority areas, the objective of the RDSIP is to reduce statewide roadway departure fatalities by 20 percent. None of the facilities in Redmond are identified in the RDSIP as high roadway departure



crash locations. However, as described above, one of the key goals of the TSP is to provide a safe and efficient transportation system for all users.

Oregon Intersection Safety Implementation Plan (ISIP)

The ISIP was also developed in conjunction with the TSAP and provides for intersection-related safety measures to reduce fatal crashes. The ISIP requires an analysis of crash trends, cost effective countermeasures and for pairing low cost improvements with education and enforcement. As part of the TSP update, Redmond will work in collaboration with ODOT and Deschutes County to identify specific projects to enhance the safety of intersections with identified crash deficiencies.

Oregon Bicycle and Pedestrian Safety Implementation Plan (BPSIP)

The BPSIP was also developed in conjunction with the TSAP with the intent of reducing the frequency and severity of pedestrian and bicycle related crashes. Like the ISIP, the BPSIP identifies priority locations and countermeasure options. The BPSIP identifies the US 97 corridor for improved cyclist travel. As part of the TSP update, Redmond will work in collaboration with ODOT and Deschutes County to identify specific projects to enhance the safety of pedestrian and bicycle facilities with identified crash deficiencies.

Oregon Resilience Plan (ORP)

The ORP was developed in 2013 in response to a House Resolution that directed the Oregon Seismic Safety Policy Advisory Commission to prepare a plan that “reviews policy options, summarizes relevant reports and studies by state agencies and makes recommendations on policy direction to protect lives and keep commerce flowing during and after a Cascadia earthquake and tsunami”. The plan’s goal is to improve the infrastructure reliability to reduce the social and economic impact associated with these events.

Redmond plays a key role in the implementation of the ORP. The Redmond Municipal Airport is identified as the primary state FEMA emergency response airport in Central Oregon. In addition, US 97 is identified as a primary corridor for statewide connectivity during a Cascadia event. In recognition of the city’s important role, the TSP includes the following goal:

- *TSP Goal 2.* Advance community and statewide emergency preparedness efforts through support of the Oregon Resiliency Plan.



Transit in Small Cities: A Primer for Planning, Siting and Designing Transit Facilities in Oregon

This report provides guidance for implementing local transit systems. The primer outlines recommended coordination and planning activities, transit design considerations, community involvement and livability, and case studies of past successful small city transit plans.

As part of the TSP update, Redmond will collaborate with CET and ODOT to identify needed transit improvements within the city.

REGIONAL AND LOCAL PLANS AND POLICIES

ODOT Region 4 Active Transportation Needs Inventory

ODOT Region 4 working to create “safer, more walkable and bikeable networks in and between communities across Central Oregon, in alignment with the direction recently set out in ODOT’s Statewide Bicycle and Pedestrian Plan.” The Region has completed an initial phase of project to understand pedestrian and bicycle-related needs. To date, three steps have been completed including:

- Step 1. An inventory of the existing shared-use paths, bike lanes, sidewalks, and paved shoulders on ODOT highways;
- Step 2. An assessment of these existing facilities with respect to ODOT’s current design standards, to understand areas with gaps and deficiencies; and,
- Step 3. An evaluation of the gaps and deficiencies in the system using a range of evaluation criteria to help classify and prioritize the bicycle and pedestrian needs on the system.

The evaluation of the gaps and deficiencies is intended to be used in project scoping, future project selection, project design, and identifying locations most in need of dedicated pedestrian or bicycle projects. ODOT will be working on “*Volume 1: Near Term Actions of the Implementation Work Plan for the Statewide Bicycle and Pedestrian Plan*”.

As part of the TSP, Redmond will work collaboratively with ODOT to identify pedestrian and bicycle-related improvements in support of the ATNI.



Deschutes County 2012 TSP

The Deschutes County TSP identifies policies and improvements that support the County's transportation system through the year 2030. The TSP highlights the importance of providing a safe and efficient system for all users and recognizes the role of the highways that provide statewide roles in providing for regional and statewide freight movement. Key goals from the TSP include:

- Coordinating with the plans and policies established by adjacent counties and the State.
- Providing a safe and efficient network for residential and non-residential mobility.
- Enhancing the opportunity for intermodal connections and public transportation throughout the County.
- Support a safe and convenient bicycle and pedestrian system that is integrated within the transportation system.
- Maintain the existing level and intensity of freight and rail activity throughout the County and encourage the expansion of private industry.

The TSP identified the following projects within the City:

- An interchange at the US 97/O'Neil Highway intersection;
- Evaluation of a rerouting of US 97 within Redmond (this has been superseded); and
- Developing a concept for an interchange at US 97/Quarry Road including the regional connections to Quarry Road.

The City, ODOT and County are working together on the Redmond TSP development and will ensure consistency of the plans and policies.

North Redmond Interchange Area Management Plan (IAMP)

The North Redmond IAMP provides recommendations management of US 97 near the O'Neil Highway intersection. The IAMP identifies several near and long-term transportation and land use strategies to support a future interchange at this location. Some of the key recommendations from the IAMP include:

- Access management;
- Limiting the US 97/O'Neil Highway intersection to right-in-right-out movements only.
- Constructing "High-Priority" public streets according to the City's Local Connectivity Plan.
- Constructing left-turn lanes at the Kingwood Avenue/US 97 intersection and installing a traffic signal.
- Constructing left-turn lanes at the Maple Avenue/9th Street intersection and installing a traffic signal.



- Constructing left-turn lanes at the Quince Avenue/ US 97 intersection and installing a traffic signal.
- Providing grade-separated improvements at the 97/O'Neil Highway intersection.
- Providing a grade-separated crossing over BNSF through the realignment of King Way.

The City will continue to collaborate with ODOT on the implementation and/or recommended modifications to the IAMP as part of the TSP.

City of Redmond Transit Master Plan (TMP, 2009)

The TMP was developed with the goal of exploring the feasibility of a fixed-route transit system within the city and to provide a “conceptual service plan” that outlines implementation steps. The primary purposes of the TMP were to:

- *Prepare for future community growth and economic and demographic changes*
- *Anticipate the need for new transit facilities so that future development plans can integrate with these needs*
- *Promote multi-modal transportation options that help to reduce reliance on single-occupant vehicles*
- *Allow for a system that is fully accessible for persons with disabilities and that is in compliance with the Americans with Disabilities Act (ADA)*
- *Identify partner opportunities*

The TMP was intended to be integrated into the City’s TSP update. The City will work in collaboration with CET and ODOT to continue to explore the feasibility of providing fixed route transit in the future.

Redmond Service Alternatives (2013)

Recommended service alternatives were developed for Central Oregon communities as part of the 2013 COIC Regional Transit Plan update, including the City of Redmond. The City is currently served through dial-a-ride service and the Community Connector System.

The following highlights recommendations from the preferred Redmond service plan. Alternatives are categorized by Short-Term (1-3 years), Mid-Term (3-10 years), and Long-Term (beyond 10 years) options. Specific recommendations are included in the Service Plan.

- Short-Term:
 - Provide improvements and efficiencies to the Community Connector System
 - Implement a basic fixed-route service network



- Mid-Term:
 - Provide continued improvements and enhancements to the Community Connector System, including additional time of day service
 - Implement a complete fixed-route service network
- Long-term
 - Consider more expanded service for the Community Connector System, including Sunday service.
 - Implement an additional service route to the fixed-route service system.

The Service Alternative is strong in its finding that a fixed-route service would be beneficial for the City of Redmond and its residents. This TSP update will work with CET and the City of Redmond on a recommended service plan for the City of Redmond.

Redmond Comprehensive Plan

The city's Comprehensive Plan includes goals and policies that "support good jobs and affordable homes, protects natural resources, and preserves historic buildings." These goals and policies are intended to guide city decision making on programs, major capital projects and other funding decisions for the future. Chapter 12 includes goals and policies related to transportation. The four primary goals identified in this chapter include:

- Reduce through traffic, congestion, and improve circulation along Highway 97, especially along the 5th and 6th Street couplet.
- Enhance east-west circulation
- Identify roadway system needs to serve undeveloped areas so that steps can be taken to preserve rights-of-ways and maintain adequate traffic circulation.
- Increase the use of alternative travel modes through improved safety and service.

The Comprehensive Plan includes 55 policies in support of these goals as well as the 2008 Transportation System Plan map. The TSP be consistent with the overall goals of all elements of the Comprehensive Plan and will recommend changes to implementation of the Plan, including the adoption of a new Transportation Map consistent with the TSP update.

Redmond Development Code (RDC)

The Development Code is located within Chapter 8 of the Redmond City Code. It establishes the zoning standards and land use procedures for the City. The following sections, amongst others, will be reviewed as part of the TSP update for compliance with the TPR as well as to help implement the TSP:



- Sections 8.0500 – 8.0515: off-street parking and loading requirements;
- Section 8.07: variances and amendments, including zone changes.
- Section 8.1: processes for legislative procedures, development actions, land use actions, appeals, and declaratory rulings.

Redmond 2008 Transportation System Plan

The City updated its TSP in 2008 in recognition of key changes that had occurred since the 1999 TSP was adopted. The 2008's primary focus was to:

- Addressing how the new Re-Route of US 97 north of Highland Avenue will affect city street circulation and related access to growing industrial areas to the east.
- Confirm that the plan is consist with latest Statewide Plans and Policies.
- Ensure that multimodal system could adequately serve Redmond growth to nearly 60,000 people as well as additional development outside the City's limits that influence local conditions (e.g., rural lands and destination resorts).

The TSP includes a Master Plan project map and Action Plans to support the City's transportation goals and policies through the year 2030.

The updated TSP will guide future multimodal system needs and decision-making regarding priorities, policies and projects through the year 2040. As part of the evaluation of potential projects to address identified deficiencies, the updated TSP will include those projects previously recommended within the Action Plans of the 2008 TSP.

Ongoing Amendments or Updates to 2008 TSP Project Lists and Costs

The City maintains a Capital Improvement Program (CIP) that prioritizes five-year funding related to transportation system investments. The TSP will incorporate the five-year CIP projects into the "No Build" scenario evaluation.

Redmond Airport Master Plan

In 2017, the City began updating its Airport Master Plan to assess facility and service needs of the Redmond Municipal Airport ("the Airport") throughout the next 20 years. The Plan will provide strategic direction regarding the Airport's 20-year capital development plan and investment of resources related to airfield, airspace, terminal area, and landside facilities.



The key questions that the Master Plan seeks to address include:

- *How will Central Oregon's growth continue in the future, and what will the impact be on aviation activity?*
- *What role will General Aviation (GA) and United States Forest Service (USFS) activities play in the future?*
- *Is a runway extension justified, and if so, how long should it be, and in what direction?*
- *What is the viability of runway and terminal improvements previously depicted on the ALP?*
- *How can the passenger terminal and associated facilities accommodate continued passenger growth and additional carriers?*
- *What are the opportunities for increased airport revenue generation?*
- *How much property will be needed to satisfy the demand for future aviation use?*
- *What future changes in critical aircraft should the Airport plan for?*
- *Are aviation facilities adequate to meet the needs of the growing community?*

The TSP Project Management Team (PMT) also includes members of the Airport Master Planning team to ensure collaboration between the two efforts. The TSP will incorporate key recommendation for adoption related to the Airport Master Plan update.

City of Redmond Urbanization Report (2005)

To support the 2005 update to its Comprehensive Plan, the City, in collaboration with DLCD, prepared an analysis to (1) evaluate population and growth forecasts, (2) inventory how much buildable land the City has, (3) identify housing needs, (4) identify economic development strategies, and (5) determine how much land the City will need to accommodate growth between 2003 – 2025.

The report's key issues are listed below.

- 1,985 acres were recommended for inclusion into the UGB but also recommended that the city should evaluate internal efficiency measures first.
- A phased approach to UGB expansion was recommended. The first priority area was for lands in northwest Redmond to support needed housing.
- Redmond has a surplus of industrial land but should maintain the lands designated for industrial uses.
- The overall commercial land supply was adequate but several changes to zoning designations and to establish mixed use zoning and neighborhood centers within the UGB were recommended.



Consistent with the Comprehensive Plan, City staff has provided household and employment forecasts for use in the TSP.

City's Current and Past Budget for Transportation

For the fiscal year 2017/2018, the city anticipated a beginning fund balance of \$46.9 million. Of this, \$13.2 million was in the Transportation Fund. The budget notes that a number of capital improvement projects are being funded by the System Development Charge and other capital project dollars, such as the general fund and STIP program. The budget report notes that the S Canal Boulevard Reconstruction project and maintenance activities as significant priorities for transportation.

The budget includes an increase in the annual investment in road maintenance at \$850,000, particularly to support improving roadway pavement conditions. It also notes that the Airport is undertaking major runway rehabilitation for its secondary runway (11-29) to help ensure continuity and safety of air travel for Central Oregon over the next several decades.

City Parks and Recreation District Master Plan Update (2018)

The City updated its 2008 Master Plan to reflect current community choices and opportunities related to renewed economic development and downtown revitalization efforts, including the development of Centennial Park. This Master Plan creates a vision for “an innovative, inclusive and interconnected system of parks, trails and open spaces that promotes outdoor recreation, health and environmental conservation as integral elements of a thriving, livable Redmond.”

The Parks Master Plan Update provides updated inventories of park resources, demographic conditions, a needs analysis, management considerations and capital project phasing, including an implementation plan for developing, conserving and maintaining high-quality parks, trails, facilities and open spaces across the City.

The TSP will incorporate, by reference, the recommendations from the Parks Master Plan Update and integrate key recommendations into the pedestrian and bicycle modal plans.



Appendix C Analysis and Assumptions Methodology

FINAL Technical Memorandum #2

Date: September 7, 2017

Project #:17720

To: Redmond TSP PMT

From: Julia Kuhn, PE, Matt Kittelson, PE and Jacqueline Gulczynski

Project: Redmond Transportation System Plan Update

Subject: Analysis Methodology and Assumptions Methodology

This memorandum documents the methodology and key assumptions that we propose to use as part of the existing and future conditions analyses for the Redmond Transportation System Plan (TSP) Update. The methodologies included in this memorandum are based on guidance provided in the Oregon Department of Transportation (ODOT) *Transportation System Plan Guidelines (2008)* and the *Analysis Procedures Manual (APM)*, Versions 1 and 2 as they relate to the City of Redmond. This memorandum serves as the Consultant Task 2.3 Deliverable per the approved ODOT scope (PA #27456; WOC#66) for the TSP Update.

STUDY INTERSECTIONS

Figure 1 identifies the locations where four-hour traffic counts (2:00-6:00 PM) were collected in April 2017 to help guide the TSP update. The counts were collected Tuesday, April 18th and Wednesday, April 19th and include vehicle turning movements, pedestrian volumes, bicycle volumes, truck volumes and passenger car volumes.

In addition to the turning movement counts, 48-hour tube counts were collected at the following locations in June 2017 while school was still in-session:

- US 97 south of Yew Avenue
- US 97 south of Highland Avenue
- US 97 north of Canal Boulevard
- OR 126 east of 35th Street
- OR 126 west of Veterans Way
- Canal Boulevard north of Badger Avenue

The data collected includes vehicle speed, classification, and total volume. Figure 1 illustrates the location of the identified study intersections. Both the turning movement counts and the tube counts were collected consistent with Task 3.1.B.1 of the ODOT scope. A list of the study intersections is provided in Appendix A.



INTERSECTION OPERATIONAL STANDARDS

Per Task 3.1.B.2, we will present the following information for each study intersection, regardless of jurisdictional control:

- Volume-to-capacity (v/c) ratio;
- Level-of-service (LOS);
- Delay;
- 95th Percentile queuing (not-simulation based); and
- Turning movement counts.

This information will be provided in tables, figures, and/or technical appendices, but where possible will be provided in figures to give the general public a more clear and relatable understanding of the analysis results.

ODOT Mobility Targets

ODOT assess intersections operations based on established mobility targets (as defined by the volume-to-capacity (v/c) ratio). Table 6 of the *Oregon Highway Plan* (OHP) provides the mobility targets for facilities outside the Portland Metro area. The OHP targets will be used to evaluate existing and future no-build conditions. (Note that Highway Design Manual standards will be used to evaluate potential solutions in TM #7, Identification of Alternatives, unless alternative standards are established.) There are two state facilities within the City of Redmond: US 97 (The Dalles-California Highway) and OR 126 (Ochoco Highway). Both facilities are designated by the OHP as Statewide Freight Routes. US 97 is further classified as an expressway north of Veteran's Way and south of Yew Avenue. US 26 is designated as an expressway west of Helmholtz and east of the city limits.

Table 1 includes the mobility targets for expressways and statewide freight routes based on the posted speed. Both US 97 and OR 126 bisect the city center, where the posted speed is below 45 miles per hour (mph). Action 1F.1 of the OHP states that:

*For unsignalized intersections, achieving the volume to capacity ratios in Tables 6 and 7 for the state highway approaches indicates that state mobility targets are being met. In order to maintain safe operation of the intersection, **non-state highway approaches** are expected to meet or not to exceed the volume to capacity ratios for District/Local Interest Roads in Table 6.(Emphasis added)*

These ratios are identified under the "Unsignalized" column in Table 1. The OHP acknowledges the unique characteristics of an interchange opposed to an intersection directly on the state facility. The OHP states that the maximum v/c ratio for the interchange ramp termini should be designated as 0.85 unless the intersection v/c ratio target is less than 0.85. In which case, the intersection v/c ratio should be applied to the interchange.

Table 1. Volume to Capacity Ratio for State Freight Routes (US 97 and OR 126)

	Speed (Miles Per Hour)	Signalized	Unsignalized
Freight Route on a Statewide Highway	<=35mph	0.85	0.95
	40mph	0.80	0.90
	>=45mph	0.80	0.90
Statewide Expressway	>=45mph	0.85	0.80

The City of Redmond has adopted a performance standard based on Level of Service. The City requires an intersection to operate at a Level of Service E or better during the peak 15 minute period of the peak hour. For unsignalized intersections with a low minor street volume, the City may presume the intersection to operate acceptably with a v/c ratio less than 0.90 and a 95th percentile queue of less than 4 vehicles during the peak hour.

Table 2 shows the intersection control and mobility targets for the study intersections.

Table 2. Study Intersection Control and Mobility Target

Study Int. #	Intersection	Classification/ Jurisdiction	Intersection Control	Mobility Target
1	NW Canal Blvd/ US 97 NB Ramps	ODOT	Signalized	v/c<0.85
2	NW Canal Blvd/ US 97 SB Ramps	ODOT	Signalized	v/c<0.85
3	NW Maple Ave/ NW 19th St	City	Unsignalized	LOS E, v/c<0.90
4	NW Maple Ave/ NW 6th St	City	Signalized	LOS E
5	NW Larch Ave/ NW Canal Blvd	City	Unsignalized	LOS E, v/c<0.90
6	NE Hemlock Ave/ NE 9th St	City	Unsignalized	LOS E, v/c<0.90
7	W Antler Ave/ SW Helmholtz Way	City	Unsignalized	LOS E, v/c<0.90
8	W Antler Ave/ SW 27th St	City	Signalized	LOS E
9	W Antler Ave/ SW Rimrock Way	City	Signalized	LOS E
10	SW Black Butte Blvd/ SW 6th St	City	Unsignalized	LOS E, v/c<0.90
11	SW Black Butte Blvd/ SW 5th St	City	Unsignalized	LOS E, v/c<0.90
12	E Antler Ave/ NE 9th St	City	Unsignalized	LOS E, v/c<0.90
13	SW Evergreen Ave/ SW 6th St	City	Signalized	LOS E
14	SW Evergreen Ave/ SW 5th St	City	Signalized	LOS E
15	SW Evergreen Ave/ US 97	ODOT	Signalized	Alternative Mobility Standard
16	OR 126 (SW Glacier Ave)/ SW 11th St	ODOT	Signalized	v/c<0.85
17	OR 126 (SW Glacier Ave)/ SW 9th St	ODOT	Signalized	v/c<0.85
18	OR 126 (SW Glacier Ave)/ SW 6th St	ODOT	Signalized	v/c<0.85
19	OR 126 (SW Glacier Ave)/ SW 5th St	ODOT	Signalized	v/c<0.85
20	OR 126 (SW Glacier/Highland Ave)/ US 97	ODOT	Signalized	v/c<0.85
21	OR 126 (SW Highland Ave) / SW Helmholtz Way	ODOT	Unsignalized	v/c<0.80/0.90
22	OR 126 (SW Highland Ave)/ SW 27th St	ODOT	Signalized	v/c<0.80

Study Int. #	Intersection	Classification/ Jurisdiction	Intersection Control	Mobility Target
23	OR 126 (SW Highland Ave)/ SW Rimrock Way	ODOT	Signalized	v/c<0.80
24	OR 126 (SW Highland Ave)/ SW 15th St	ODOT	Signalized	v/c<0.85
25	OR 126 (SW Highland Ave)/ SW 11th St	ODOT	Signalized	v/c<0.85
26	OR 126 (SW Highland Ave)/ SW 9th St	ODOT	Signalized	v/c<0.85
27	OR 126 (SW Highland Ave)/ SW 6th St	ODOT	Signalized	v/c<0.85
28	OR 126 (SW Highland Ave)/ SW 5th St	ODOT	Signalized	v/c<0.85
29	OR 126/ SE 9th St (McCaffrey Rd)	ODOT	Unsignalized	v/c<0.80
30	SW Obsidian Ave/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
31	SW Obsidian Ave/ SW 23rd St	City	Unsignalized	LOS E, v/c<0.90
32	SW Veterans Way/ SW Canal Blvd	City	Signalized	LOS E
33	SW Veterans Way/ US 97	ODOT	Signalized	v/c<0.80
34	SW Veterans Way/ SE Airport Way	City	Unsignalized	LOS E, v/c<0.90
35	SW Veterans Way/ OR 126	ODOT	Unsignalized	Alternative Mobility Standard
36	SW Salmon Ave/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
37	SW Odem Medo Way/ SW Canal Blvd	City	Signalized	LOS E
38	SW Odem Medo Way/ US 97	ODOT	Signalized	v/c<0.80
39	SW Wickiup Ave/ SW 51st St (SW Helmholtz Way)	City	Unsignalized	LOS E, v/c<0.90
40	SW Wickiup Ave(Forked Horn Rd)/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
41	SW Canal Blvd/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
42	SW Yew Ave/ US 97 SB Ramps	ODOT	Signalized	v/c<0.80
43	SE Airport Way/ US 97 NB Ramps	ODOT	Signalized	v/c<0.80
44	SE Airport Way/ SW 19th St	City	Unsignalized	LOS E, v/c<0.90
45	S Canal Blvd / SW Helmholtz Way	City	Unsignalized	LOS E, v/c<0.90

SEASONAL ADJUSTMENT FACTOR

Per Task 3.1.B.1, we will adjust all traffic counts along the state routes to reflect 30th highest hour conditions. Version 2 of the APM identifies three methods for identifying seasonal adjustment factors for highway traffic volumes, of which the on-site Automatic Traffic Recorders (ATR) have been identified by ODOT as the most accurate method of use. There are five on-site ATR stations located within or near the Redmond city limits, as shown in Figure 2.

- ATR 09-020: Located on US 97, The Dalles-California Highway, Mile Post (MP) 124.40
- ATR 09-021: Located on OR 126, McKenzie Highway, MP 108.27
- ATR 09-022: Located on US 97, The Dalles-California Highway, MP 120.94
- ATR 09-023: Located on US 97, The Dalles-California Highway, MP 119.09
- ATR 07-002: Located on OR 126, McKenzie Highway, MP 3.23

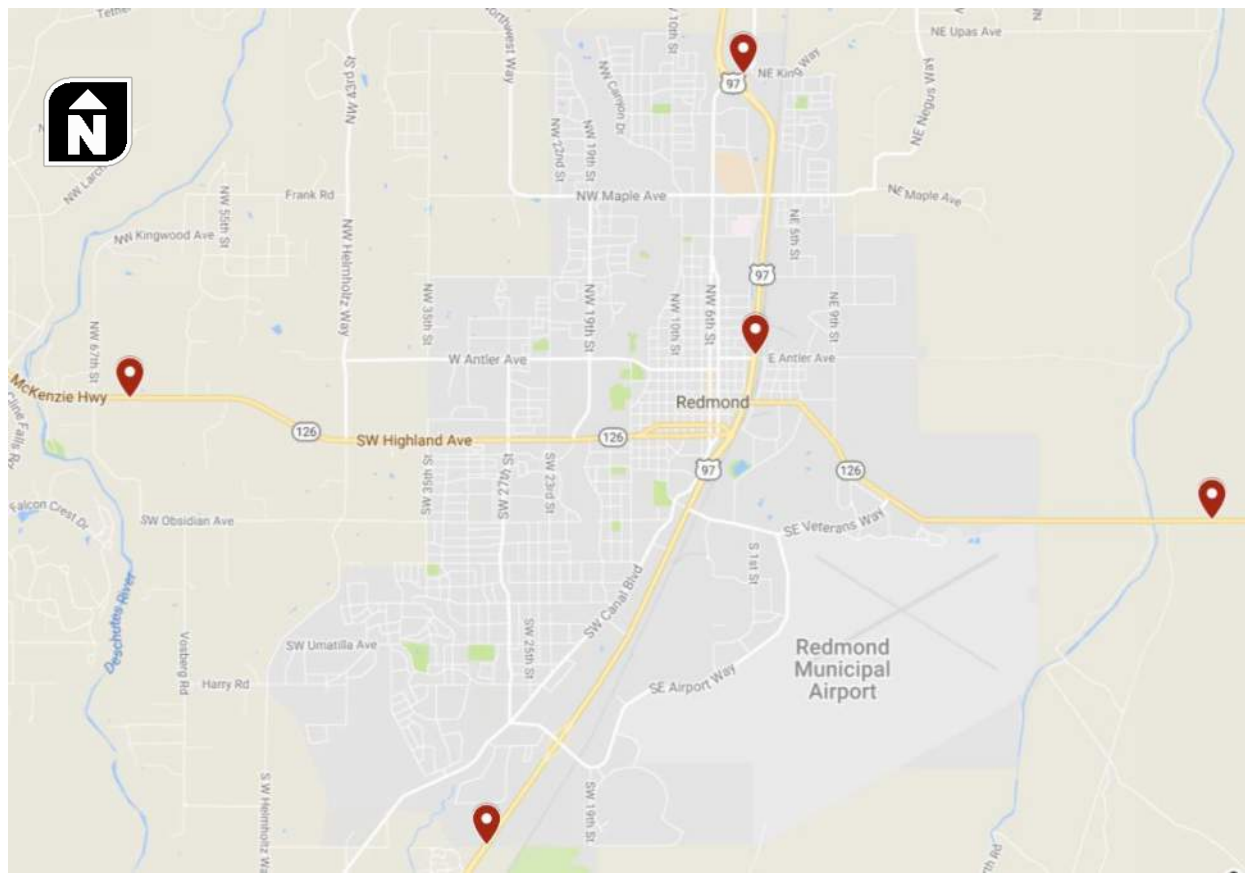


Figure 2. ATR Locations in and near City of Redmond

On-Site ATR Method

As stated within section 5.4.1 of the APM,

“The On-Site ATR Method is used when an ATR is within or near the project area. If located outside of the project area, there should be no major intersections between the ATR and the project area, and it should be within a minimal distance so that the traffic characteristics are comparable”.

Per the on-site ATR method, we calculated the applicable seasonal adjustment factors. These calculations are provided in Appendix B and summarized in Table 3.

Table 3: On-Site ATR Method Seasonal Adjustment Method

ATR Station	ATR Location	Seasonal Adjustment Factor	Applied Area
ATR 07-002	OR 126 0.35 miles west of Deschutes/Crook County line	1.10	OR 126 east of US 97
ATR 09-020	US 97 0.79 miles south of Yew Avenue	1.10	US 97 south of Highland Avenue
ATR 09-021	OR 126 1.38 miles west of SW Helmholtz Way	1.29	OR 126 west of US 97
ATR 09-022	US 97 0.04 miles north of Antler Avenue	1.13	Between Antler Avenue and Highland Avenue
ATR 09-023	US 97 0.57 miles south of O'Neil Highway	1.16	US 97 north of Antler Avenue

A significant number of study intersections in Redmond are located on state facilities. With five On-site ATR locations, seasonal adjustment factors were assigned based on proximity and roadway characteristics.

Table 4 summarizes ODOT intersections to be analyzed as part of the TSP and corresponding seasonal adjustment factors. As shown in Table 4, US 97 was used as the bisector on OR 126 to separate the seasonal adjustment factors on OR 126. Intersections on OR 126 west of US 97 apply the adjustment factor associated with ATR 09-021, and intersections east US 97 apply the seasonal adjustment factor associated with ATR 07-002. The seasonal adjustment factors at intersection along the US 97 corridor were applied based on location, average ADT, and roadway characteristics. No seasonal adjustment factors are proposed for intersections on the City of Redmond transportation system.

Table 4. Summary of Intersection Standards and Adjustment Factors

Study Int. #	Intersection	Classification/ Jurisdiction	Seasonal Adjustment Factor
1	NW Canal Blvd/ US 97 NB Ramps	ODOT	1.16
2	NW Canal Blvd/ US 97 SB Ramps	ODOT	1.16
15	SW Evergreen Ave/ US 97	ODOT	1.13
16	OR 126 (SW Glacier Ave)/ SW 11th St	ODOT	1.29
17	OR 126 (SW Glacier Ave)/ SW 9th St	ODOT	1.29
18	OR 126 (SW Glacier Ave)/ SW 6th St	ODOT	1.29
19	OR 126 (SW Glacier Ave)/ SW 5th St	ODOT	1.29
20	OR 126 (SW Glacier/Highland Ave)/ US 97	ODOT	1.29
21	OR 126 (SW Highland Ave) / SW Helmholtz Way	ODOT	1.29
22	OR 126 (SW Highland Ave)/ SW 27th St	ODOT	1.29
23	OR 126 (SW Highland Ave)/ SW Rimrock Way	ODOT	1.29
24	OR 126 (SW Highland Ave)/ SW 15th St	ODOT	1.29
25	OR 126 (SW Highland Ave)/ SW 11th St	ODOT	1.29
26	OR 126 (SW Highland Ave)/ SW 9th St	ODOT	1.29
27	OR 126 (SW Highland Ave)/ SW 6th St	ODOT	1.29
28	OR 126 (SW Highland Ave)/ SW 5th St	ODOT	1.29
29	OR 126/ SE 9th St (McCaffrey Rd)	ODOT	1.10
33	SW Veterans Way/ US 97	ODOT	1.10
35	SW Veterans Way/ OR 126	ODOT	1.10
38	SW Odem Medo Way/ US 97	ODOT	1.10
42	SW Yew Ave/ US 97 SB Ramps	ODOT	1.10
43	SE Airport Way/ US 97 NB Ramps	ODOT	1.10

ANALYSIS MODEL PARAMETERS

The bullets below identify the proposed sources of data and methodologies to be used to analyze traffic conditions in Redmond. Analyses of all state facilities will be conducted according to the most-recent version of the APM, unless otherwise agreed upon by both ODOT's Transportation Planning and Analysis Unit (TPAU) and the consultant team.

1. *Intersection/Roadway Geometry* (lane numbers and arrangements, cross-section elements, signal phasing, etc.) will be reviewed through aerial photography and confirmed through a field review. Available as-built data may also be used to verify existing roadway geometry. The analysis models will be built on scaled roadway line work from GIS or aerial photography in Synchro analysis software.
2. *Operational Data* (such as posted speeds, intersection control, parking, right-turn on red, etc.) will be field verified. Data will be reviewed during a field visit and supplemented by available GIS data, aerials, photos, and the ODOT Video Log.
3. *Peak Hour Factors* (PHF) will be calculated for each intersection and applied to the existing conditions analyses. Where applicable, corridor or regional PHFs may be developed. PHFs of 0.95 will be used for the future analysis for high-order facilities (arterials), with 0.90 applied to

medium-order facilities (collectors) and 0.85 applied to local roads. If the existing PHF is greater than these default future values, the existing PHF will be applied.

4. Traffic Operations

- a. Highway Capacity Manual (HCM) methodology shall be used for intersection analyses of the design hour conditions. Signalized intersection analysis will be based on HCM methods. The existing and future no-build analysis will utilize Synchro software for all study intersections. Level-of-service, delay, and volume-to-capacity ratios will be reported at each of the study intersections regardless of roadway jurisdiction.
- b. Queuing analysis methodology will be based on Synchro 95th percentile queue lengths as appropriate; ODOT's two-way stop-controlled intersection calculator tool will be used to estimate queue lengths for two-way stop-controlled intersections. Microsimulation is not proposed as part of the long-range planning effort.

SYNCHRO INPUT ASSUMPTIONS

Synchro software will be used for the intersection analyses. This analysis will be consistent with the HCM procedures. Table 5 lists the proposed input parameters.

Table 5. Synchro Operations Parameters/Assumptions

Arterial Intersection Parameters	Existing Conditions
Peak Hour Factor	From traffic counts
Conflicting Bikes and Pedestrian per Hour	From traffic counts, as available
Ideal Saturation Flow Rate (for all movements)	1,750 passenger cars per hour green per lane
Lane Width	12 feet unless field observations suggest otherwise
Percent Heavy Vehicles	From traffic counts by movement, as available
95th percentile vehicle queues	Synchro HCM summary output

CRASH ANALYSES

Per Task 3.1.B.4, we will review most recent five years of crash data, as provided by ODOT, at the study intersections and study segments (where tube count data was collected). Any intersections or roadway segments that are identified as a Top 5% and 10% Safety Priority Index System (SPIS) site will be included in the crash data.

Intersection crash rates at each location will be compared to the 90th percentile rates and critical crash rates, per the APM. Crash rates will also be compared to the ODOT Crash Tables II and IV severe injury and fatal crash rates. Any locations where the rates are exceeded, we will identify potential countermeasures using the ODOT All Roads Transportation Safety (ARTS) crash reduction factors.

FORECAST YEAR VOLUME DEVELOPMENT

To assist in the development of traffic volumes for the Future Scenario Conditions (per Task 4 of the scope), we will obtain 2040 Bend Redmond travel demand data from ODOT's Transportation Planning Analysis Unit (TPAU). The model output data will be post-processed using NCHRP Report 255 methodologies.

ACTIVE TRANSPORTATION ANALYSIS

Per Task 3.1.B.3, the scope of work, we will identify existing gaps in the sidewalks, bicycle network, and transit network along the city's collector and arterial roadways. The Bicycle Level of Traffic Stress (LTS) and pedestrian methodology will reference the Redmond Neighborhood Revitalization Plan as it has recently been completed as part of that project.

Quantitative and qualitative analysis of active transportation facilities be performed consistent with APM version 2 and include:

1. Qualitative (multimodal) assessment for transit modes;
2. A qualitative assessment of transit service and identification of underserved areas.
3. Gaps in intermodal connectivity.

NEXT STEPS

We look forward to your review of the assumptions and parameters to be used as part of the Redmond TSP Existing and Future conditions analyses.

Appendix A- Study Intersections

Study Intersection Locations

Study Intersection	East-West Road Name	North-South Road Name
1	NW Canal Blvd	US 97 NB Ramps
2	NW Canal Blvd	US 97 SB Ramps
3	NW Maple Ave	NW 19th St
4	NW Maple Ave	NW 6th St
5	NW Larch Ave	NW Canal Blvd
6	NE Hemlock Ave	NE 9th St
7	W Antler Ave	SW Helmholtz Way
8	W Antler Ave	SW 27th St
9	W Antler Ave	SW Rimrock Way
10	SW Black Butte Blvd	SW 6th St
11	SW Black Butte Blvd	SW 5th St
12	E Antler Ave	NE 9th St
13	SW Evergreen Ave	SW 6th St
14	SW Evergreen Ave	SW 5th St
15	SW Evergreen Ave	US 97
16	OR 126 (SW Glacier Ave)	SW 11th St
17	OR 126 (SW Glacier Ave)	SW 9th St
18	OR 126 (SW Glacier Ave)	SW 6th St
19	OR 126 (SW Glacier Ave)	SW 5th St
20	OR 126 (SW Glacier/Highland Ave)	US 97
21	OR 126 (SW Highland Ave)	SW Helmholtz Way
22	OR 126 (SW Highland Ave)	SW 27th St
23	OR 126 (SW Highland Ave)	SW Rimrock Way
24	OR 126 (SW Highland Ave)	SW 15th St
25	OR 126 (SW Highland Ave)	SW 11th St
26	OR 126 (SW Highland Ave)	SW 9th St
27	OR 126 (SW Highland Ave)	SW 6th St
28	OR 126 (SW Highland Ave)	SW 5th St
29	OR 126	SE 9th St (McCaffrey Rd)
30	SW Obsidian Ave	SW 27th St
31	SW Obsidian Ave	SW 23rd St
32	SW Veterans Way	SW Canal Blvd
33	SW Veterans Way	US 97
34	SW Veterans Way	SE Airport Way
35	SW Veterans Way	OR 126
36	SW Salmon Ave	SW 27th St
37	SW Odem Medo Way	SW Canal Blvd
38	SW Odem Medo Way	US 97
39	Harry Rd/SW Wickiup Ave	SW 51st St (SW Helmholtz Way)
40	SW Wickiup Ave/Forked Horn Rd	SW 27th St
41	SW Canal Blvd	SW 27th St
42	SW Yew Ave	US 97 SB Ramps
43	SE Airport Way	US 97 NB Ramps
44	SE Airport Way	SW 19th St
45	S Canal Blvd	SW Helmholtz Way

Appendix B – Seasonal Adjustment Factor Data

ODOT ATR 09-020, US97; MP 124.39; THE DALLES-CALIFORNIA HIGHWAY NO. 4; 0.79 mile south of Yew Avenue												
Year	15-Jan	15-Feb	15-Mar	15-Apr	15-May	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct	15-Nov	15-Dec
2015	92	98	102	108	108	115	122	116	113	113	101	102
2014	97	96	104	105	107	117	120	119	112	112	101	97
2013	92	100	102	107	108	114	115	117	111	111	104	100
2012	92	99	99	107	110	116	112	119	112	110	104	97
2011	99	99	103	107	109	113	115	117	109	108	102	101
Average	93.7	98.7	102.3	107.0	108.3	115.0	116.7	117.7	111.7	111.0	102.3	99.3
Count Adj	1.26	1.19	1.15	1.10	1.09	1.02	1.01	1.00	1.05	1.06	1.15	1.18

ODOT ATR 09-021, OR126; MP 108.27; MCKENZIE HIGHWAY NO. 15; 1.38 miles west of S.W. Helmholtz Way (S.W. 43rd Street)												
Year	15-Jan	15-Feb	15-Mar	15-Apr	15-May	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct	15-Nov	15-Dec
2015	79	83	92	97	105	118	122	116	109	103	86	86
2014	79	75	91	100	109	117	125	121	109	103	87	83
2013	81	78	84	95	104	114	123	119	113	100	92	88
2012	81	81	86	95	106	113	122	123	110	101	90	85
2011	82	81	87	95	104	114	124	122	110	103	88	86
Average	80.3	80.0	88.0	95.7	105.0	115.0	123.0	120.7	109.7	102.3	88.3	85.7
Count Adj	1.53	1.54	1.40	1.29	1.17	1.07	1.00	1.02	1.12	1.20	1.39	1.44

ODOT ATR 09-022, US97; MP 120.92; THE DALLES-CALIFORNIA HIGHWAY NO. 4; 0.04 mile north of S.W. Antler Avenue												
Year	15-Jan	15-Feb	15-Mar	15-Apr	15-May	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct	15-Nov	15-Dec
2015	88	95	99	104	107	113	118	113	109	108	94	93
2014	90	88	100	106	110	114	118	116	110	108	94	90
2013	84	92	97	105	110	113	116	115	109	107	99	93
2012	87	92	94	102	107	112	115	116	108	106	100	93
2011	92	91	97	102	107	113	116	116	108	104	97	97
Average	88.3	91.7	97.7	103.7	108.0	113.0	116.7	115.7	108.7	107.0	96.7	93.0
Count Adj	1.32	1.27	1.19	1.13	1.08	1.03	1.00	1.01	1.07	1.09	1.21	1.25

ODOT ATR 09-023, US97; MP 119.09; THE DALLES-CALIFORNIA HIGHWAY NO. 4; 0.57 mile south of O'Neil Highway No. 370												
Year	15-Jan	15-Feb	15-Mar	15-Apr	15-May	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct	15-Nov	15-Dec
2015	84	91	97	101	105	111	117	112	108	105	92	90
2014	85	84	97	103	108	113	117	115	109	105	91	87
2013	83	91	95	100	105	110	114	114	108	103	96	91
2012	84	90	92	99	105	111	115	116	109	103	96	89
2011	89	90	95	99	105	112	116	115	107	102	92	95
Average	84.3	90.3	95.7	100.0	105.0	111.3	116.0	114.7	108.3	103.7	93.3	90.0
Count Adj	1.38	1.28	1.21	1.16	1.10	1.04	1.00	1.01	1.07	1.12	1.24	1.29

ODOT ATR 07-002, OR126; MP 3.23; OCHOCO HIGHWAY NO. 41; 0.35 mile west of Deschutes-Crook County Line												
Year	15-Jan	15-Feb	15-Mar	15-Apr	15-May	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct	15-Nov	15-Dec
2015	91	96	103	105	108	114	119	113	112	113	101	101
2014	90	91	98	107	109	114	118	117	113	112	103	97
2013	92	100	102	108	110	114	115	114	110	108	99	96
2012	90	90	93	105	109	116	118	119	112	114	106	95
2011	93	97	100	106	110	114	115	115	110	107	99	98
Average	91.0	94.7	100.0	106.0	109.3	114.0	117.0	115.3	111.3	111.0	101.0	97.0
Count Adj	1.29	1.24	1.17	1.10	1.07	1.03	1.00	1.01	1.05	1.05	1.16	1.21

Peak month
Min/Max removed from average

Appendix D Existing Conditions Analysis



REDMOND

Transportation System Plan

Final Technical Memorandum #4

Date: April 12, 2018

To: Project Management Team

From: Julia Kuhn, PE, Matt Kittelson, PE, Miranda Barrus, & Jacqueline Gulczynski

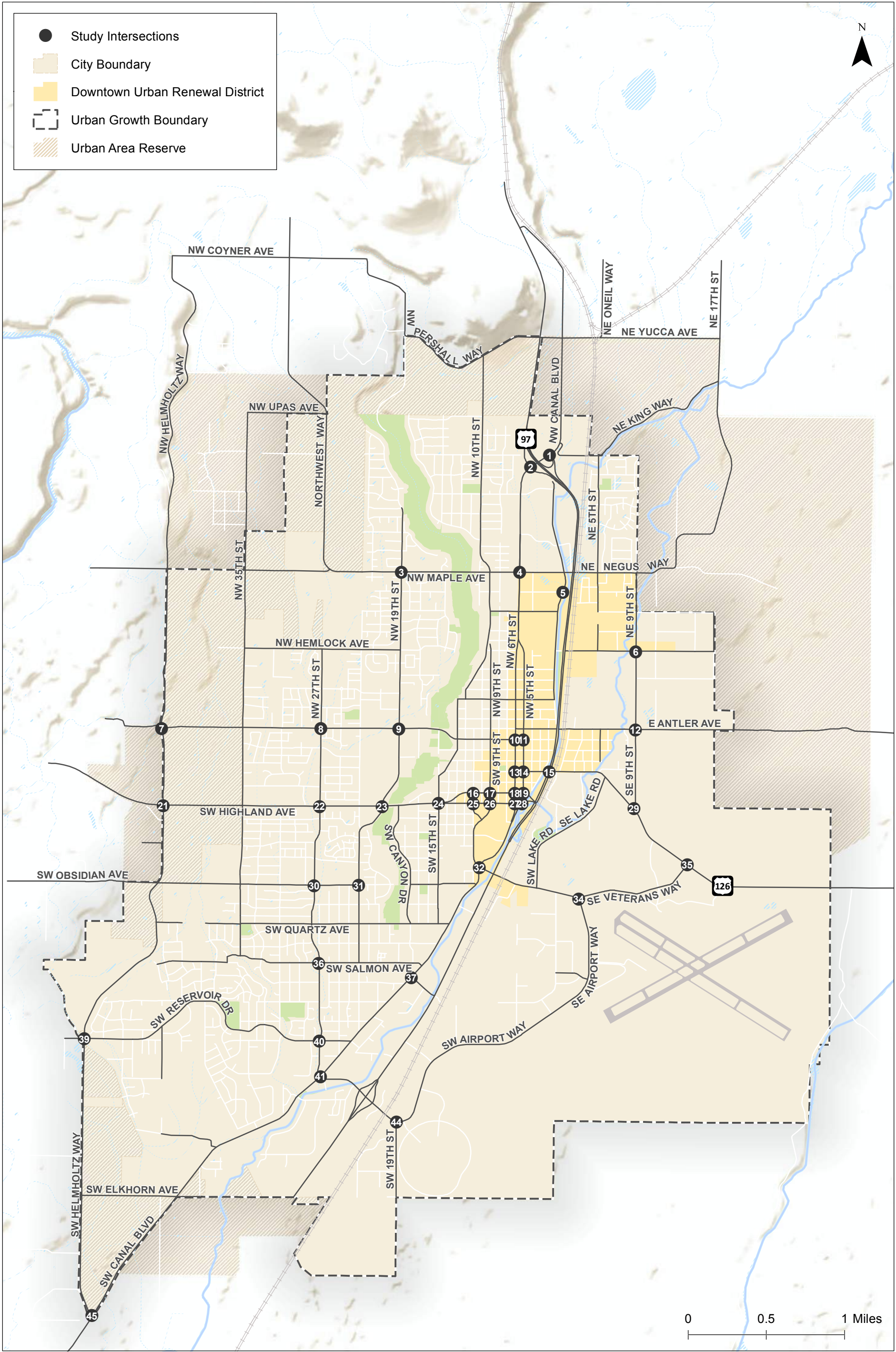
Subject: Existing Conditions Analysis

This memorandum summarizes the transportation inventory and identification of existing needs in support of the Redmond Transportation System Plan (TSP) Update. The majority of the inventory and analysis results are presented in figures and tables, with supplemental text provided to explain the illustrated information and more detailed information provided in the supporting appendices. The memorandum is organized into the following sections:

TSP Study Area.....	1
Land Use and Population.....	2
Roadway System Inventory	7
Access Spacing and Access Management.....	17
Existing intersection and street operations.....	18
Historic Crash Analysis.....	24
Active Transportation Analysis	30
Bridge Conditions	36
Rail System.....	36
Air Transportation System.....	40
Truck Freight Routes.....	40
Summary of Existing Conditions	42

TSP STUDY AREA

The existing transportation needs, opportunities and constraints reflect an inventory of the multimodal transportation system characteristics conducted in the Spring and Fall of 2017. This inventory included all major transportation-related facilities and services within the City of Redmond Urban Growth Boundary (UGB). Key roadway features, traffic and safety conditions at forty five intersections and seven roadway segments, bicycle facilities, pedestrian facilities, transit service, and air, rail and pipeline facilities are analyzed. The transportation facilities within the UGB are shown in Figure 1. The intersections and segments are summarized in Appendix A.



**Study Area
Redmond, Oregon**

**Figure
1**

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl

Land Use and Population

To help inform the analysis of year 2040 transportation system needs, existing land use patterns, economic development opportunities and population and job forecasts were inventoried. This information can also help the community and project team develop future alternatives that address transportation system deficiencies, capture the City's vision for an enhanced multimodal network, and identify the projects, programs and policies needed to support economic development in the city and region in a manner consistent with the existing Comprehensive Plan and Zoning. For illustrative purposes for this memorandum, the City's current zoning map is shown in Figure 2.

Key Activity Centers

Providing pedestrian, bicycle, transit and vehicular connections to and between key activity centers and destinations is a key goal in achieving the City's Comprehensive Plan vision. Examples of these priority areas are illustrated in Figure 3.



Figure 2



Figure
3

Population Inventory

According to the Population Research Center at Portland State University (PSU), the coordinated year 2015 population estimate for the Redmond Urban Growth Boundary (UGB) is 27,715 people. Redmond represents approximately 16 percent of Deschutes County's total population. Tables 1-4 identify information related to the coordinated population forecasts within the County through the year 2040.

Table 1: Deschutes County Projected Population

Population	2015	2020	2025	2030	2035	2040
Deschutes County	170,605	186,068	206,338	226,410	249,037	267,797
Bend UGB	85,737	97,699	109,546	121,091	132,209	143,596
Redmond UGB	27,715	30,334	33,282	36,486	39,812	43,399
La Pine UGB	1,687	1,924	2,263	2,625	3,014	3,432
Sisters UGB	2,315	2,960	3,431	3,903	4,375	4,847
Outside UGBs	53,151	57,816	62,305	66,309	69,627	72,523

Table 2. Deschutes County Projected Population Growth

Population Growth (Annual)	2015	2020	2025	2030	2035	2040
Deschutes County	-	2.23%	2.00%	1.78%	1.55%	1.45%
Bend UGB	-	2.61%	2.29%	2.00%	1.76%	1.65%
Redmond UGB	-	1.81%	1.85%	1.84%	1.74%	1.73%
La Pine UGB	-	2.63%	3.25%	2.97%	2.76%	2.60%
Sisters UGB	-	4.92%	2.95%	2.58%	2.28%	2.05%
Outside UGBs	-	1.68%	1.50%	1.25%	0.98%	0.82%

Table 3. Percent Population of County

Population	2015	2020	2025	2030	2035	2040
Bend UGB	50%	51%	52%	53%	53%	54%
Redmond UGB	16%	16%	16%	16%	16%	16%
La Pine UGB	1%	1%	1%	1%	1%	1%
Sisters UGB	1%	2%	2%	2%	2%	2%
Outside UGBs	31%	30%	30%	29%	28%	27%

Table 4. Percent Projected Growth of County

Percent Growth of County	2015	2020	2025	2030	2035	2040
Bend UGB	-	59%	59%	59%	60%	61%
Redmond UGB	-	13%	15%	16%	18%	19%
La Pine UGB	-	1%	2%	2%	2%	2%
Sisters UGB	-	3%	2%	2%	3%	3%
Outside UGBs	-	23%	22%	20%	18%	15%

Note: 2015-2065 population projections source: Population Research Center, PSU (www.pdx.edu/prc/region-1-documents)

Demographics and Disadvantaged Populations

The City's transportation system should be designed and operated with the needs and safety of all travelers in mind, including people of all ages and abilities, especially the most vulnerable. To help shape the future bicycle, pedestrian, transit and street system plans, the City has assembled

information related to key geographic areas serving the minority, elderly, disabled, youth and low-income residents. Each of these key population segments are identified in detail in the figures provided in Appendix B.

As illustrated in Appendix B, there are a number of key corridors and areas for consideration for the future TSP alternatives evaluation, such as:

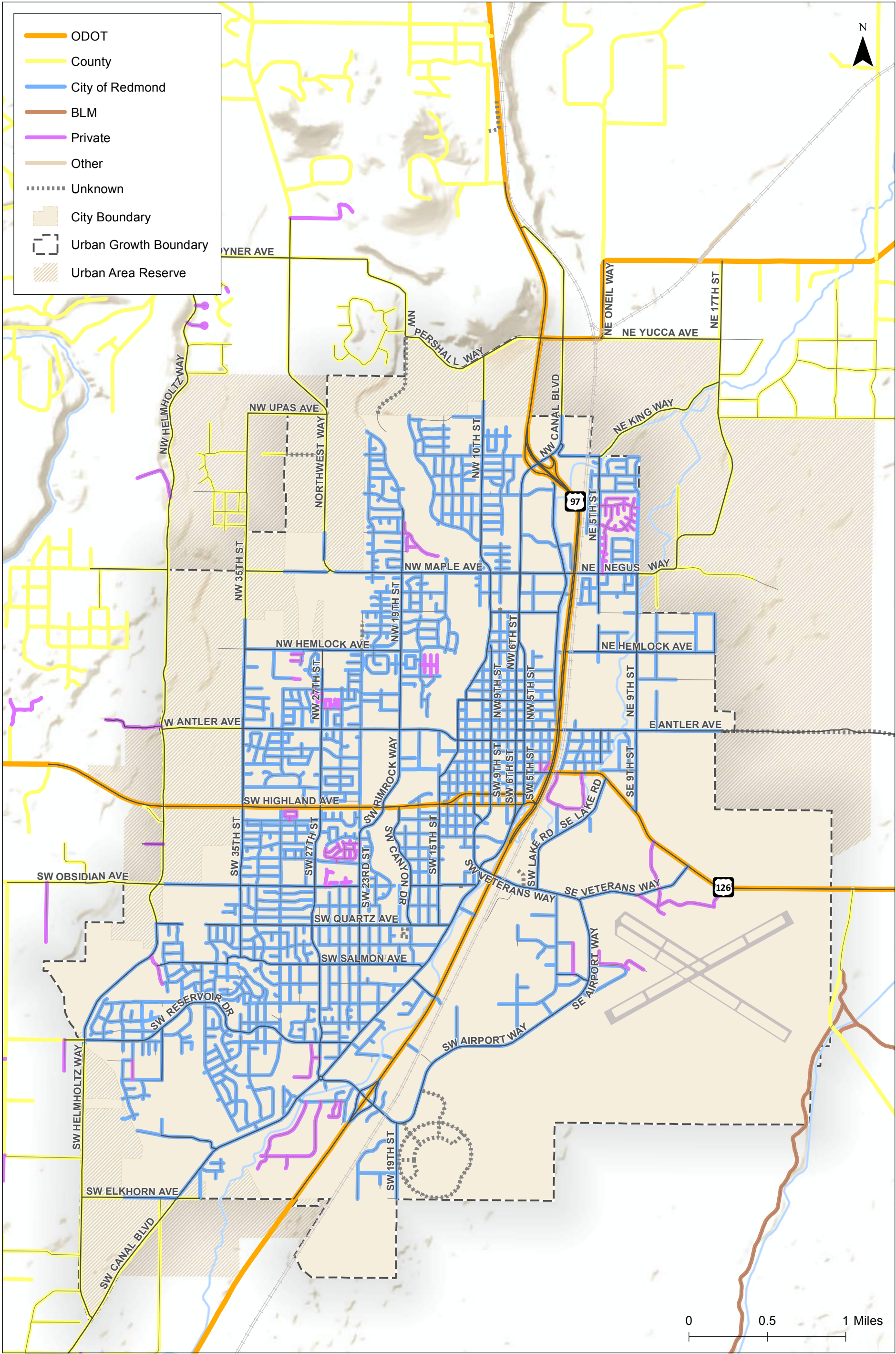
- The residential areas generally to the south of Highland Avenue and Veterans Way are home to more than 10 percent non-English speakers. Providing for transportation choices to single occupancy vehicle travel and for easy-to-understand wayfinding information in these areas should be further evaluated;
- The city is home to a diverse population of people of all ages. The elderly population (often considered more vulnerable when evaluating transportation mode choice options) is spread throughout the city but several senior living centers and senior communities are located on the west side of US 97, particularly outside the city limits and in the southwest area of the city; providing comfortable sidewalks and future transit options in this area, in particular, needs to be further reviewed;
- The residential areas generally to the south of NE Hemlock and to the east of NW 6th and S Canal Boulevard are home to more than 30 percent disabled residents. The evaluation of transit service to this area, in particular, will need further consideration as part of the TSP to ensure options are provided to single occupancy vehicle travel;
- The youth population resides in neighborhoods throughout the city, with no significant grouping in any particular geographic area; as such, providing bicycle and connectivity between neighborhoods throughout the city and schools and parks will be a priority for the TSP; and,
- The city is home to a population with a diverse range of incomes and a fairly high percentage of low income residents. As noted in the above bullets, the evaluation of future transit service options will be of particular importance to providing choices to this segment of the population.

ROADWAY SYSTEM INVENTORY

The evolution of the City's arterial, collector and local streets has been shaped, in large part, by the presence of the railroad, US 97, OR 126, several significant canals and drainage sheds, and Roberts Field. The street system is an important conveyance of personal travel, freight, public transit, and emergency response.

The City, County, and ODOT organize the streets into a functional classification based on a hierarchy of multimodal mobility and access to, through and between different land use types. The TSP inventory focused on those streets classified as collectors and arterials. The TSP does not address specific local

street needs. Primary arterial and collector streets, their characteristics, and existing operational performance and safety are summarized below. The Redmond roadway jurisdiction map is shown in Figure 4.



Roadway Jurisdiction
Redmond, Oregon

Figure
4

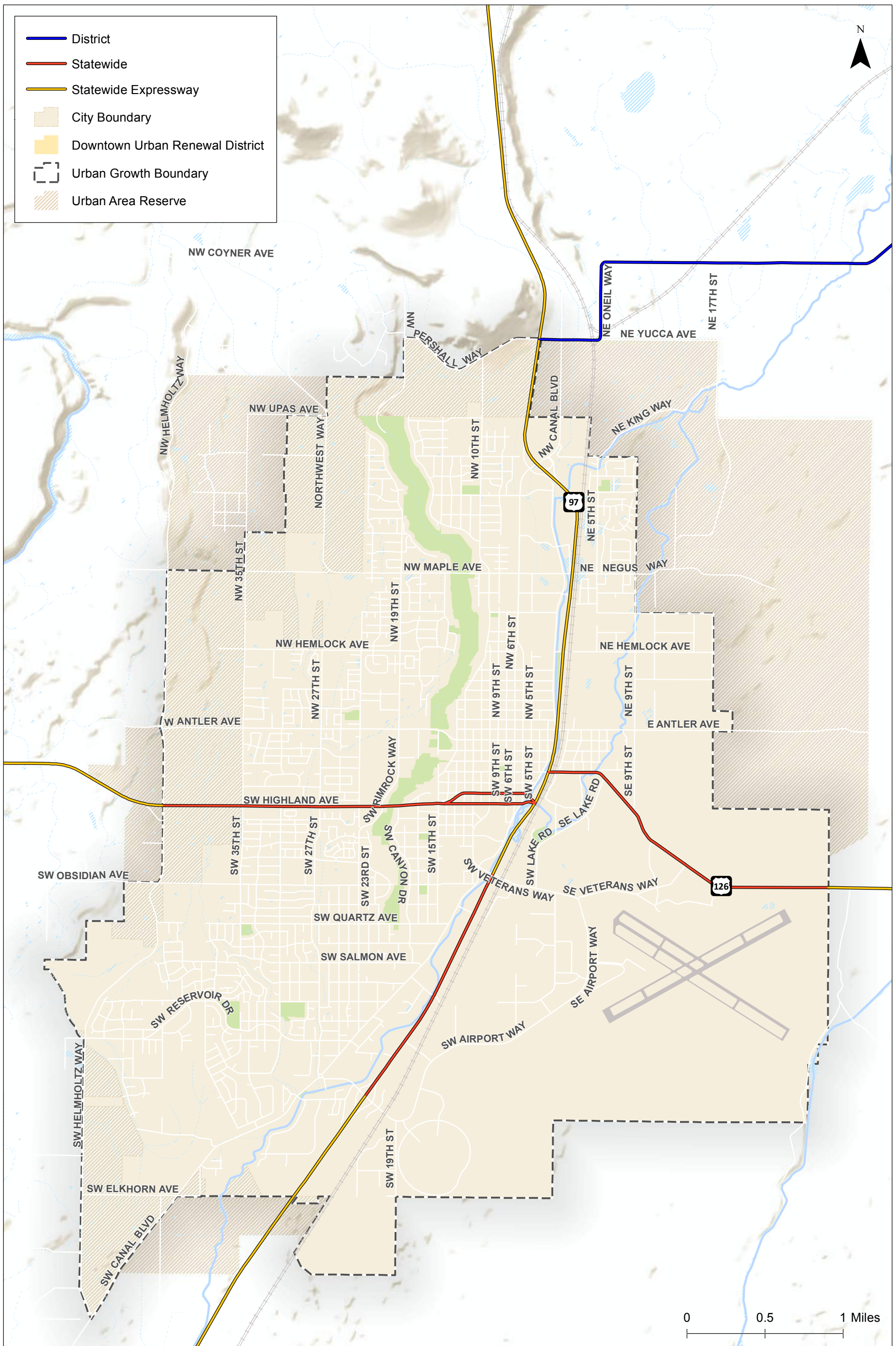
State Roadways

The state highways connect the city's residents, employees, and visitors with other areas in Central Oregon as well as through the state. These highways also provide connections between areas within the city and at the same time, can present a barrier to walking and cycling. In addition, per the Oregon Resilience Plan, US 97 is a Tier I, Phase I Lifeline Route that would serve as a critical statewide route in the event of a catastrophic emergency, such as a Cascadia Subduction Zone earthquake.

Figure 5 shows the ODOT Highway Plan functional classification for state facilities in Redmond. Table 5 summarizes the characteristics of each of these facilities.

Table 5: Redmond State Highway Characteristics

Route Name	Facility Extents	Posted Speed Limit (mph)	Number of Lanes	Travel Lane Width	Minimum ROW Available
OR 126	Entire Section within City Limits	25-55, depending on location	2-5	11-12 feet	60 feet
US 97	Entire Section within City Limits	40-55 mph, depending on location	5-7 (some areas center medians where others have center left lanes)	11-12 feet	98 feet



OHP Highway Classification and Expressways Redmond, Oregon

Figure
5

County Roadways

The County has jurisdiction over 9.1 miles of roadways that within the UGB but outside of city limits.

Table 6 gives a brief description of the County's functional classification descriptions that apply to streets within Redmond.

Table 6: Deschutes County Functional Classification

Functional Classification	Description	Example Roadway Applied To
Principal Arterial	Statewide highways that serve major activity centers in an urban area. Carry the highest portion of traffic entering, leaving, and bypassing the urban area.	State Highways
Arterial	Distributes vehicles to areas without penetrating specific neighborhoods. Provides services within urban area at a lower mobility.	Helmholtz Way
Collector	Primarily serves residential neighborhoods, commercial districts and industrial areas to distribute trips to their final destinations.	Quartz Avenue Extension, Elkhorn Avenue
Local	Lowest level of travel mobility to provide access to individual properties and developments.	Antler Avenue

Source: Deschutes County Transportation System Plan (2012)

City of Redmond Roadways

City residents, employees, and visitors are served by more than 162 miles of roadways that facilitate both local and regional connectivity. The majority of the city-owned and -operated streets are paved with asphalt or concrete. Table 7 gives a brief description of the City's street classifications in accordance with the functional role they serve within the city's transportation system whereas Table 8 provides design standards related to how each of the roadways are intended to "look and feel" to the users. Figure 6 illustrates the functional classification of each roadway within the city.

Table 7: City of Redmond Functional Classification

Functional Classification	Description
Arterial	Long roadways serving high volume of traffic intended to connect the city. Typically spaced about one mile apart to deter regional use of collector and local roadways. Access is intentionally controlled to improve the flow of through traffic.
Major Collector	Roadways commonly 0.5 to 1.0 miles in length that provides access and circulation to residential, commercial, and industrial areas. Distribute trips to and from the regional network to the local network.
Minor Collector	As known as neighborhood routes, the main function of a minor collector is to provide connectivity from local streets to collectors and arterials. These roadways have more traffic than local roadways but may have traffic calming measures to retain neighborhood characteristics.
Local	Solely provide access to immediate adjacent land uses.

Source: Redmond Transportation System Plan (2008)

Table 8: Redmond Functional Classification Standards

Functional Classification	Cross Section	Minimum ROW ¹	Min. Pavement Width	Bike Lane	Sidewalks	On-Street Parking
Minor Arterial	5 lanes	100 feet	72 feet	6 feet	7 feet	No
Minor Arterial	3 lanes	100 feet	48 feet	6 feet	7 feet	No
Major Collector	2 lanes	80 feet	36 feet	6 feet	5 feet	No
Minor Collector	2 lanes	60 feet	36 feet	Shared	5 feet	Both Sides (8 ft)
Collector (Industrial)	2 lanes	80 feet	38 feet	6 feet	5 feet	No
Local (Industrial)	2 lanes	60 feet	38 feet	Shared	5 feet	Optional
Local (Residential)	2 lanes	60 feet	28/32 feet ²	Shared	5 feet	Both Sides (unstriped)

¹ ROW = Right-of-way

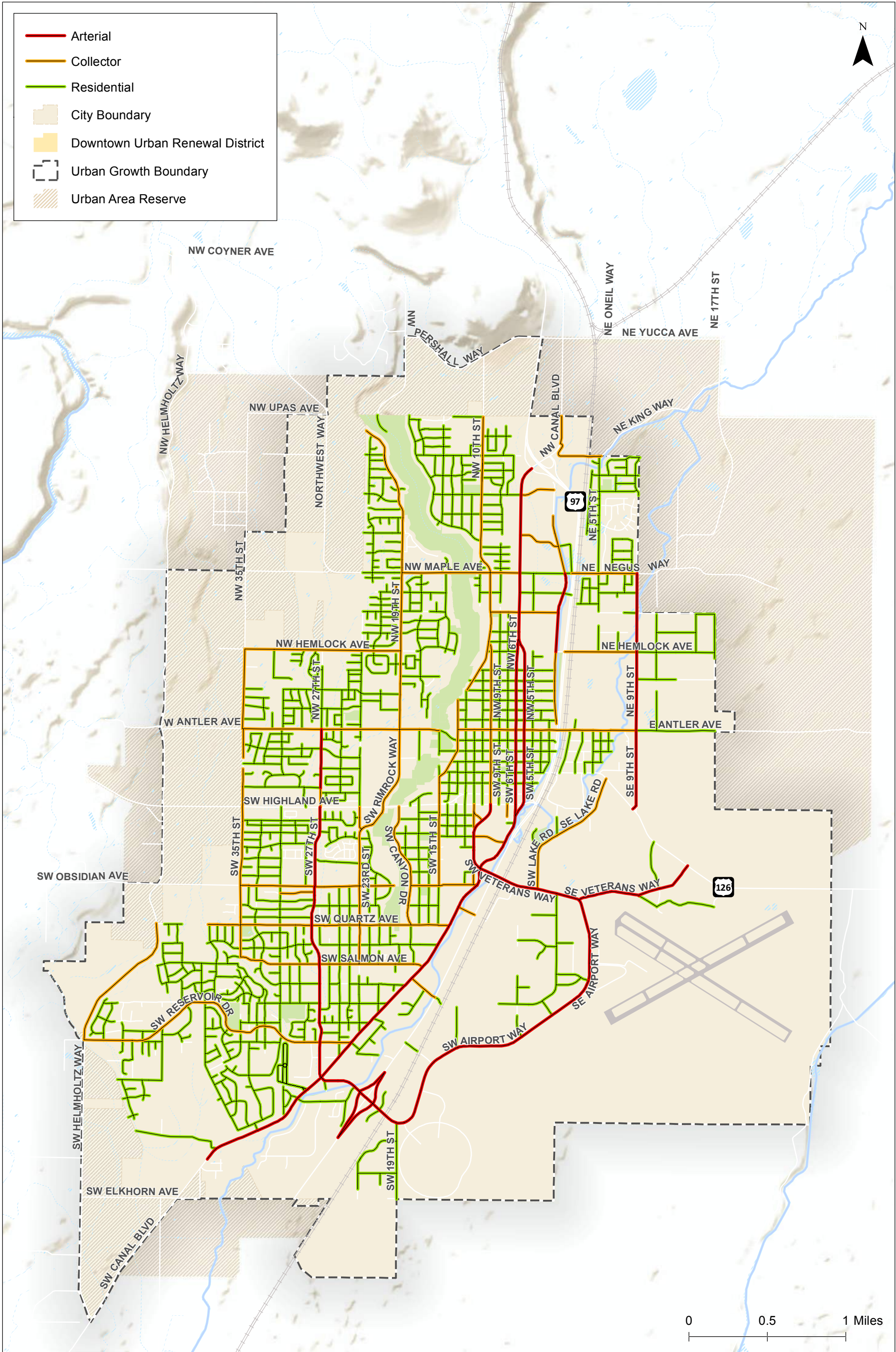
² Local 1: 32' in 50' ROW (with 5' utility easements)

Local 2: 28' in 40' ROW (with 10' utility easements-used in conjunction with alleys adjacent to single family homes only)

The inventory also includes an assessment of current pavement conditions of city streets based on information obtained from the Redmond Geographic Information System (GIS). Figure 7 illustrates a pavement condition index based on the quality of city roadways. As shown, there is a high portion of poor to fair pavement conditions concentrated in the downtown district and throughout many areas of the city.

Signalized Intersections

Within the UGB, ODOT has ownership of the signalized intersections along OR 126 and US 97 and the City owns all other signals, though ODOT typically maintains the signals. Figure 8 shows the signalized intersections within the UGB and indicates ownership. A majority of the signalized intersections are located within and near the downtown area.



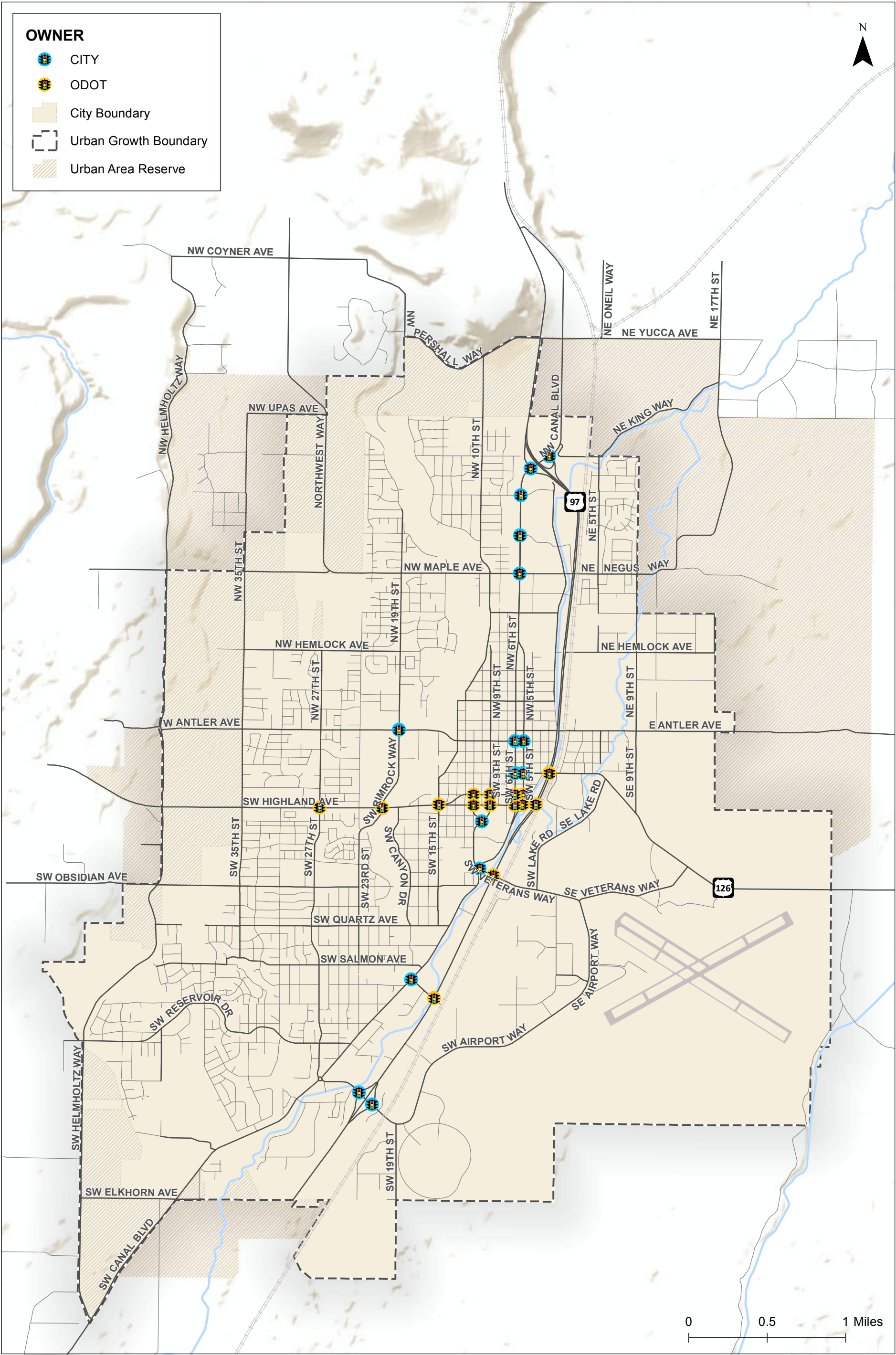
Redmond Functional Roadway Classifications
Redmond, Oregon

Figure
6

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl



Figure 7



Signalized Intersections
Redmond, Oregon

Figure
8

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl

ACCESS SPACING AND ACCESS MANAGEMENT

Providing adequate access to streets, land uses, and key destinations is a critical part of operating and planning for an effective transportation system for all users. ODOT, the County, and the City all maintain standards to help balance the needs for both “through travelers” (including freight and public transportation) as well as serving the needs of area residents, employees and visitors. The following subsections identify current standards for streets within Redmond.

State Highways

ODOT specifies access management spacing standards in the Oregon Highway Plan (OHP) and OAR 734-051-4020(8). The applicable access management spacing standards for state facilities within the Redmond UGB are summarized in Table 9. These standards are based on the 2015 AADT (Annual Average Daily Traffic volume), posted speed limit, and functional classification.

Table 9: ODOT Access Management Spacing Standards for Highway Segments

Route Name	Facility Extents	Facility Designation	2015 AADT	Posted Speed Limit (mph)	Access Spacing Standard (feet)
OR 126	Entire Section within UGB	Statewide Freight Route	>5,000	25/30/35/45/55	350/500 (for 30 & 35 mph)/800/1320
US 97	Entire Section within UGB	Statewide Freight Route; Expressway designation from North UGB to Veteran’s Way	>5,000	40/45/50/55	800 (for 40 and 45 mph)/1100/1320
O’Neil Highway	Entire Section without UGB	District Highway	<5,000	35	250/360/425/650 (30/40/50/55)

AADT = Average Annual Daily Traffic

MPH = miles per hour

Source: Oregon Highway Plan, Appendix C Revisions to Address Senate Bill 264 (2011) Table 14

City of Redmond & Deschutes County Streets

The City of Redmond’s access management spacing standards are summarized in Table 10 and vary based on functional classification. In cases where physical constraints or characteristics limit the ability to achieve the access spacing standards, the City of Redmond retains the right to grant an access spacing variance. Within the UGB, Deschutes County applies the City’s access management standards as well.

Table 10: Redmond Minimum Intersection Spacing Standards

Functional Classifications	Minimum Spacing ¹ between Driveways	Minimum Spacing between Intersections	Maximum Spacing between Intersections
Major Arterial	800 feet	½ mile	1 mile
Minor Arterial (Downtown)	165 feet	330 feet	660 feet
Minor Arterial (Other Areas)	330 feet	¼ mile	½ mile
Major Collector	165 feet	330 feet	660 feet
Minor Collector	80 feet	330 feet	660 feet
Industrial Collector	165 feet	330 feet	1,320 feet
Local Industrial	Access to each lot	330 feet	1,320 feet
Local Residential	Access to each lot	330 feet	660 feet

¹ Minimum spacing intended for future development.

EXISTING INTERSECTION AND STREET OPERATIONS

As part of the inventory, existing operations at 45 key intersections were compared to the established performance standards. This analysis can help identify where strategic capital improvements can be focused within the existing system as well as where new roadways may be needed to serve future economic development and associated multimodal travel.

Analysis Methodology and Performance Standards

All operations analysis described herein are in conformance with State, County, and City methodologies. More details on the analysis methodology can be found in Appendix C.

The operational results for the intersections and segments were compared with applicable City, State and/or County performance standards to identify existing deficiencies. These standards are shown in Table 11. ODOT defines intersection performance standards by “mobility targets” that are represented by a volume-to-capacity ratio. The City defines performance standards by “level-of-service”, which is a rating from A to F to describe the experience of the user.

Redmond South US 97 Corridor Plan

ODOT and the City of Redmond are engaged in an ongoing evaluation of the US 97 corridor between Glacier/Highland/OR 126 in the north and to just beyond the Redmond UGB in the south. Because of the in-depth analysis being conducted as part of that effort, this TSP update will incorporate findings from that project’s study area into this analysis as it becomes available.

Table 11: Study Intersection Control and Mobility Target

Study Int. #	Intersection	Classification/ Jurisdiction	Intersection Control	Performance Standard
1	NW Canal Blvd/ US 97 NB Ramps	ODOT	Signalized	v/c<0.85
2	NW Canal Blvd/ US 97 SB Ramps	ODOT	Signalized	v/c<0.85
3	NW Maple Ave/ NW 19th St	City	Unsignalized	LOS E, v/c<0.90
4	NW Maple Ave/ NW 6th St	City	Signalized	LOS E
5	NW Larch Ave/ NW Canal Blvd	City	Unsignalized	LOS E, v/c<0.90
6	NE Hemlock Ave/ NE 9th St	City	Unsignalized	LOS E, v/c<0.90
7	W Antler Ave/ SW Helmholtz Way	City	Unsignalized	LOS E, v/c<0.90
8	W Antler Ave/ SW 27th St	City	Signalized	LOS E
9	W Antler Ave/ SW Rimrock Way	City	Signalized	LOS E
10	SW Black Butte Blvd/ SW 6th St	City	Signalized	LOS E
11	SW Black Butte Blvd/ SW 5th St	City	Signalized	LOS E
12	E Antler Ave/ NE 9th St	City	Unsignalized	LOS E, v/c<0.90
13	SW Evergreen Ave/ SW 6th St	City	Signalized	LOS E
14	SW Evergreen Ave/ SW 5th St	City	Signalized	LOS E
15	SW Evergreen Ave/ US 97	ODOT	Signalized	Alternative Mobility Target
16	OR 126 (SW Glacier Ave)/ SW 11th St	ODOT	Signalized	v/c<0.85
17	OR 126 (SW Glacier Ave)/ SW 9th St	ODOT	Signalized	v/c<0.85
18	OR 126 (SW Glacier Ave)/ SW 6th St	ODOT	Signalized	v/c<0.85
19	OR 126 (SW Glacier Ave)/ SW 5th St	ODOT	Signalized	v/c<0.85
20	OR 126 (SW Glacier/Highland Ave)/ US 97	ODOT	Signalized	v/c<0.80
21	OR 126 (SW Highland Ave) / SW Helmholtz Way	ODOT	Unsignalized	v/c<0.80
22	OR 126 (SW Highland Ave)/ SW 27th St	ODOT	Signalized	v/c<0.80
23	OR 126 (SW Highland Ave)/ SW Rimrock Way	ODOT	Signalized	v/c<0.80
24	OR 126 (SW Highland Ave)/ SW 15th St	ODOT	Signalized	v/c<0.85
25	OR 126 (SW Highland Ave)/ SW 11th St	ODOT	Signalized	v/c<0.85
26	OR 126 (SW Highland Ave)/ SW 9th St	ODOT	Signalized	v/c<0.85
27	OR 126 (SW Highland Ave)/ SW 6th St	ODOT	Signalized	v/c<0.85
28	OR 126 (SW Highland Ave)/ SW 5th St	ODOT	Signalized	v/c<0.85
29	OR 126/ SE 9th St (McCaffrey Rd)	ODOT	Unsignalized	v/c<0.80
30	SW Obsidian Ave/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
31	SW Obsidian Ave/ SW 23rd St	City	Unsignalized	LOS E, v/c<0.90
32	SW Veterans Way/ SW Canal Blvd	City	Signalized	LOS E
33	SW Veterans Way/ US 97	ODOT	Signalized	v/c<0.80
34	SW Veterans Way/ SE Airport Way	City	Unsignalized	LOS E, v/c<0.90
35	SW Veterans Way/ OR 126	ODOT	Unsignalized	Alternative Mobility Target
36	SW Salmon Ave/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
37	SW Odem Medo Way/ SW Canal Blvd	City	Signalized	LOS E
38	SW Odem Medo Way/ US 97	ODOT	Signalized	v/c<0.80

Study Int. #	Intersection	Classification/ Jurisdiction	Intersection Control	Performance Standard
39	SW Wickiup Ave/ SW 51st St (SW Helmholtz Way)	City	Unsignalized	LOS E, v/c<0.90
40	SW Wickiup Ave (Forked Horn Rd)/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
41	SW Canal Blvd/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
42	SW Yew Ave/ US 97 SB Ramps	ODOT	Signalized	v/c<0.80
43	SE Airport Way/ US 97 NB Ramps	ODOT	Signalized	v/c<0.80
44	SE Airport Way/ SW 19th St	City	Unsignalized	LOS E, v/c<0.90
45	S Canal Blvd / SW Helmholtz Way	City	Unsignalized	LOS E, v/c<0.90

As shown in Table 11, ODOT and the City have adopted alternative mobility targets at the Evergreen Avenue/US 97 and Veterans Way/OR 126 intersections. These alternative targets are documented in Intergovernmental Agreement Number 28621 and established for the Senate Bill 1544 lands. As allowed by ODOT policy, the following steps were taken to establish the targets at these locations:

- Identify all feasible improvements (based on reasonable expectations of funding likely through the planning horizon).
- If the intersection meets the mobility target with improvements, no changes are needed.
- If the intersection is greater than the mobility target but less than a v/c ratio of 1.0, establish the standard based on the projected performance.
- Identify whether the overall hour (versus the 15-minute peak) can remain below a v/c ratio of 1.0.
- Consider the average annual v/c ratio rather than the 30th highest design hour.
- Consider an alternative analysis period (such as second highest hour).
- All changes to highway mobility targets need to request adoption from the OTC.

Roadway Segment Analyses

To help identify future needs along key corridors in the city, the existing volume-to-capacity ratio of six roadway segments was calculated. Table 12 summarizes the measured peak period traffic volumes, as recorded in Spring 2017, and the resultant volume-to-capacity ratio. As shown, this analysis revealed that all of the corridors operate under capacity and in accordance with agency performance expectations with the exception of both directions of OR 126 to the east of 35th Street. As part of the needs analysis, corridor alternatives that consider the travel needs of Redmond's residents, employees and visitors as well as regional and state travel in vicinity of the western portion of OR 126 should be considered.

Table 12: Study Segment Analysis Results

Roadway Segment	2017 Daily Traffic Volumes	Peak Hour from 2017 Traffic Counts	Peak Hour Traffic Volumes	Capacity Estimate (vphpl)	Calculated V/C Ratio
US 97, south of Yew Avenue, NB	<i>Included in Redmond South US 97 Corridor Plan</i>				
US 97, south of Yew Avenue, SB	<i>Included in Redmond South US 97 Corridor Plan</i>				
US 97 south of Highland Avenue, NB	<i>Included in Redmond South US 97 Corridor Plan</i>				
US 97 south of Highland Avenue, SB	<i>Included in Redmond South US 97 Corridor Plan</i>				
US 97 north of Canal Boulevard, NB	12,378	4:30-5:30PM	1,256	1,700	0.38
US 97 north of Canal Boulevard, SB	12,250	3:45-4:45PM	1,067	1,700	0.32
OR 126 east of 35 th Street, EB	6,608	4:45-5:45PM	643	1,700	0.41
OR 126 east of 35 th Street, WB	6,765	4:15-5:15PM	822	1,700	0.49
OR 126 west of Veterans Way, EB	3,721	3:30-4:30PM	348	1,700	0.21
OR 126 west of Veterans Way, WB	3,559	4:00-5:00PM	359	1,700	0.22
Canal Blvd north of Badger Avenue, NB	3,507	5:00-6:00PM	423	700	0.62
Canal Blvd north of Badger Avenue, NB	2,986	6:45-7:45AM	390	700	0.57

Note: Vehicles per hour per plan (vphpl)

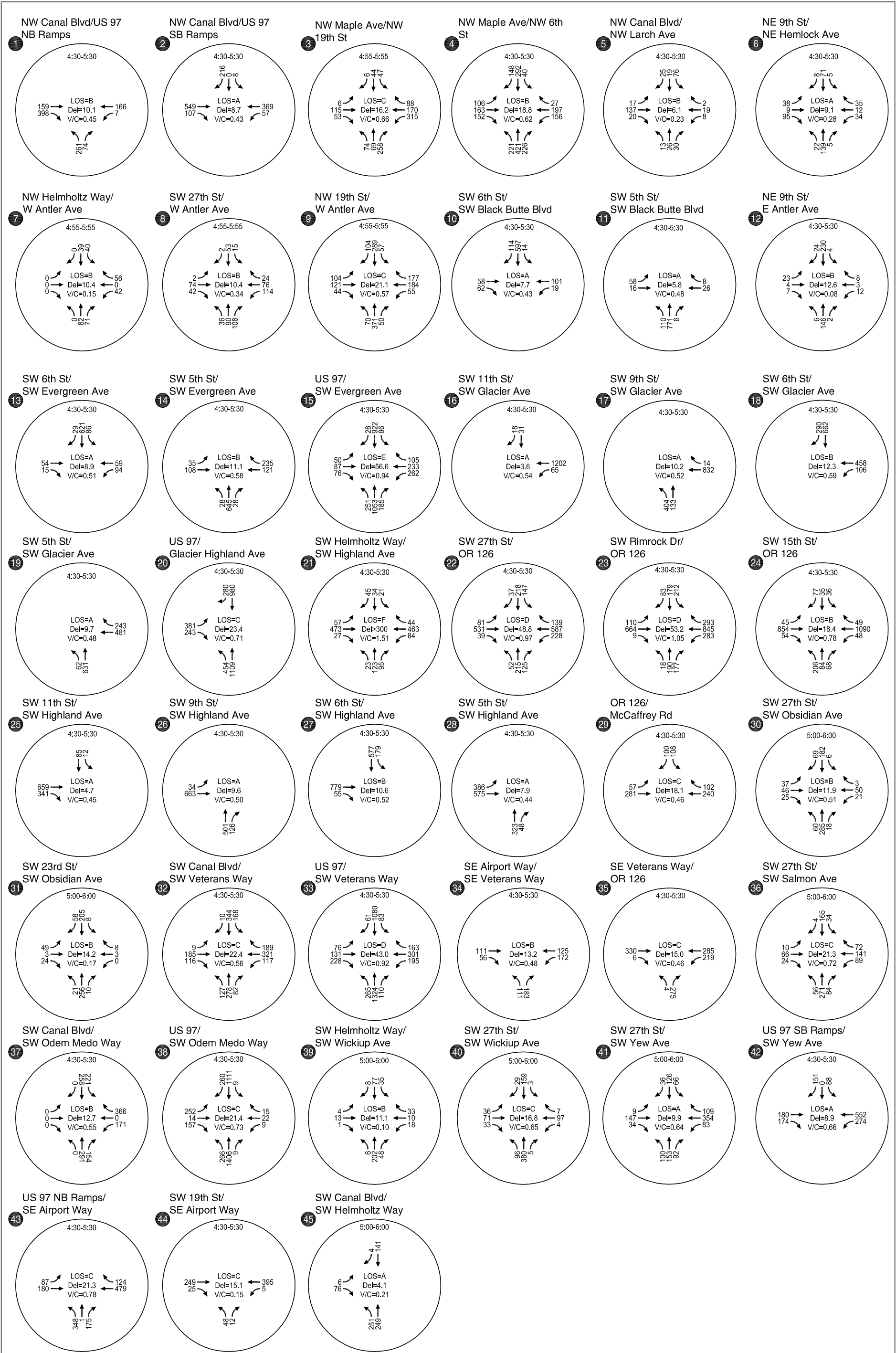
Intersection Traffic Operations Analysis Results

To understand where investments in traffic signals or roundabouts may be merited, as well as consideration of alternative performance standards, the intersection operations at 45 locations within the city were evaluated. Details on this analysis are provided in Appendix F. Figure 9 illustrates the existing peak hour traffic volumes and lane configurations and Figure 10 illustrates the results of the peak hour intersection operations. As shown, three locations do not meet state mobility targets, including:

1. OR 126 (SW Highland Ave) at SW Helmholtz Way
2. OR 126 (SW Highland Ave) at SW 27th St
3. OR 126 (SW Highland Ave) at SW Rimrock Way

These intersections are within the roadway segment of OR 126 also shown to exceed performance targets.

Appendix F also contains detailed information about intersection queuing under existing conditions. This information will also help to inform future corridor and intersection needs. As shown in the appendix, US 97 and SW Evergreen currently experience long queues during the peak hour.



Intersection Peak Hours, Peak Hour Volumes, and Lane Configurations
Redmond, Oregon

Figure
9



HISTORIC CRASH ANALYSIS

Reported crash data was analyzed at all the 45 key intersections in effort to identify patterns and trends that may indicate an opportunity to reduce crash frequency and severity. The data was obtained from ODOT for the five-year period from January 1, 2011 through December 31, 2015 and includes information about crash location, type, weather, roadway surface conditions, traffic control, and vehicle information. A summary of reported crashes by study segment is provided in Appendix G.

Figures 11 – 13 provide details on the location and type of crashes recorded during the most recent five-year period. As shown, six fatalities, three of which involved pedestrians, occurred during the analysis period. Five of the six fatalities and all of the reported bicycle and pedestrian crashes occurred on the collectors or arterials. Appendix H includes a table that summarizes the location, type, severity, and number of crashes that were reported at the study intersections.

Fatal Crashes Discussion

During this period, there were six fatal crashes, five of which occurred on a major roadway (collector or arterial). One of the crashes occurred approximately a quarter of a mile south of Canal Boulevard on US 97. This collision happened during icy roadway conditions in February of 2012 when a vehicle crossed over the median and crashed into an oncoming vehicle. Two fatalities and several injuries resulted from the crash.

There were three nighttime pedestrian related fatalities that occurred during the study period: one at the intersection of Canal Boulevard/Odem Medo Way, one just north of Yew Avenue on US 97, and one at NW 6th Street/Kingwood Avenue. In two scenarios the pedestrians were wearing dark clothing and were reportedly illegally in the roadway. Alcohol was indicated in two of the pedestrian fatalities.

The remaining two collisions involved a motorcycle animal crash and a sideswipe-overtaking crash. The motorcycle crash occurred on NW Poplar Avenue and alcohol was indicated in the crash report. The sideswipe crash occurred on US 97 just south of Yew Avenue. The crash report indicated a vehicle improperly changed lanes and overtook another vehicle.

Half of the fatal crashes were pedestrian related and half of the fatal crashes occurred on US 97, however, there does not appear to be a trend for fatal crashes associated with location, crash type, time of day, or weather conditions.

Statewide Crash Performance Standards

Table 13 identifies the study intersections that exceed ODOT crash performance standards and the study intersection locations identified in the table are shown in Figure 14. Appendices I - K provide additional information and a summary of key observations at study intersections and study segments.

Table 13. Summary of Study Intersections that Exceed ODOT Crash Performance Standards

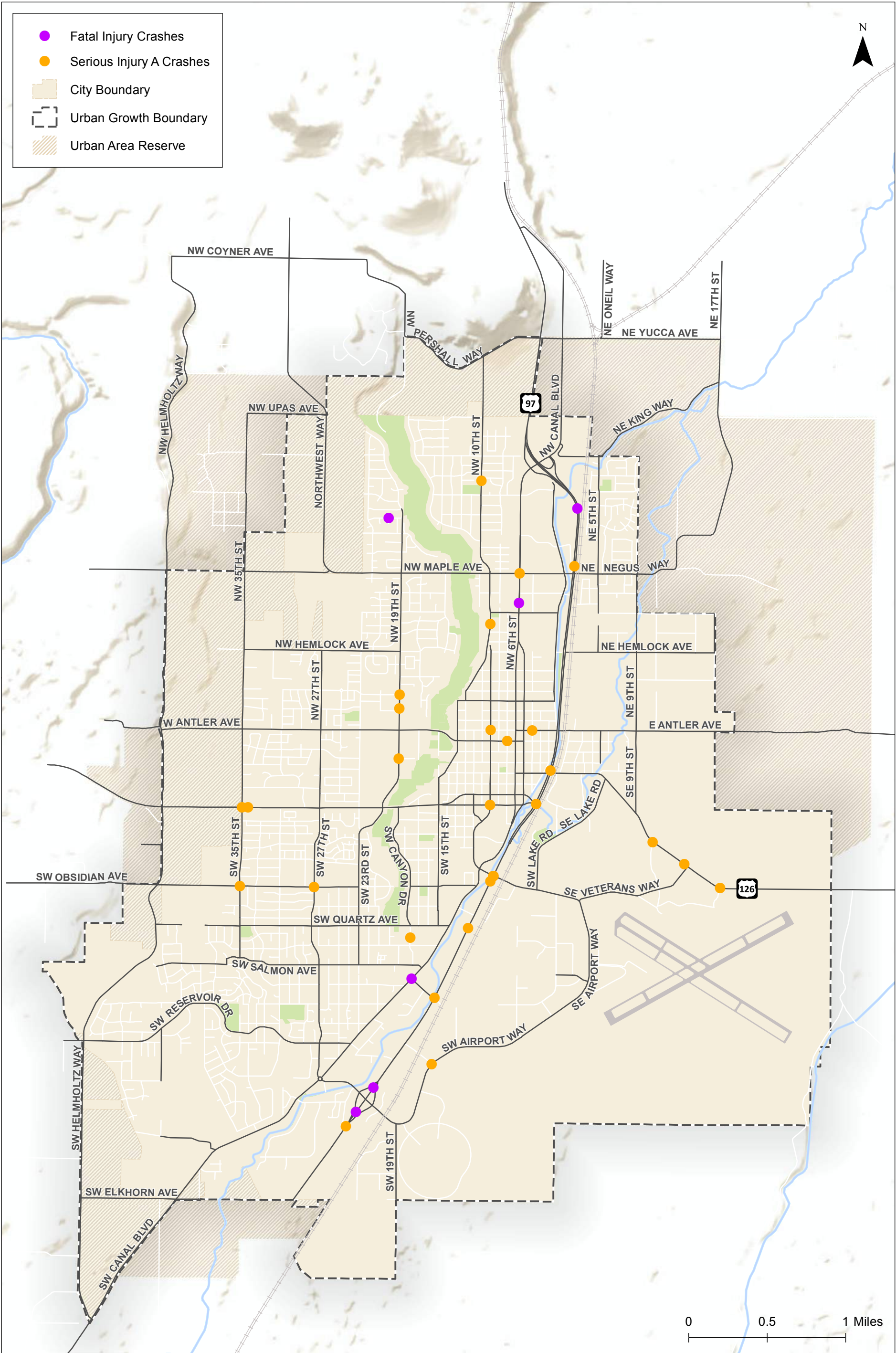
Intersection	90 th Percentile Crash Rate	Critical Crash Rate	Top 85% SPIS Site
NW Maple Ave/NW 6 th St	Does not Exceed	Exceeds	Does not Exceed
NW Larch Ave/NW Canal Blvd	Exceeds	Exceeds	Does not Exceed
SW Evergreen Ave/US 97	Does not Exceed	Does not Exceed	Exceeds
OR 126 (SW Glacier Ave)/SW 6 th St	Exceeds	Exceeds	Exceeds
OR 126 (SW Glacier Ave)/SW 5 th St	Does not Exceed	Does not Exceed	Exceeds
OR 126 (SW Glacier/Highland Ave)/US 97	Exceeds	Does not Exceed	Does not Exceed
OR 126 (SW Highland Ave)/SW Rimrock Way	Does not Exceed	Exceeds	Does not Exceed
OR 126 (SW Highland Ave)/SW 5 th St	Does not Exceed	Does not Exceed	Exceeds
OR 126 (SW Highland Ave)/SW 6 th St	Exceeds	Exceeds	Exceeds
SW Salmon Ave/SW 27 th St	Exceeds	Do not Exceed	Does not Exceed
SW Wickiup Ave/SW Helmholtz Way	Exceeds	Exceeds	Does not Exceed
SW Canal Blvd/SW 27 th St	Exceeds	Exceeds	Does not Exceed
S Canal Blvd/SW Helmholtz Way	Exceeds	Exceeds	Does not Exceed

Key Trends and Findings

Table 13 and the corresponding figures show nearly half of the intersections identified as exceeding the ODOT crash performance standards are occurring along the OR 126 corridor. This corridor is the highest east-west connection throughout the city and experiences a high level of demand. The majority of the study intersections along OR 126 are signalized intersections. There are a high proportion of rear-end, turning movement, and angle crashes at these intersections; typical of in urban environment. All locations will be evaluated as part of the future needs analysis to determine if safety treatments may be implemented to help reduce crash risks or crash frequency/severity.



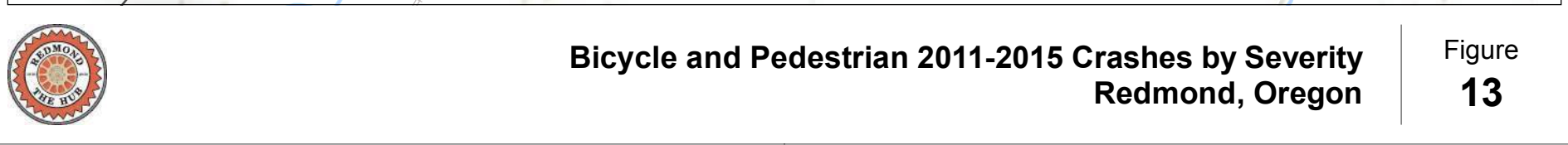
Figure 11



**Fatal and Serious Injury Crashes
Redmond, Oregon**

**Figure
12**





ACTIVE TRANSPORTATION ANALYSIS

Pedestrian System

The City's sidewalk and multi-use pathways contribute to support an economically vital, healthy and equitable community. Area residents enjoy the Dry Canyon Trail system for recreation as well as to provide access to several parks, community facilities and the Redmond High School.

Figure 15 illustrates the location of sidewalks and the trail system. The figure also includes the location of ADA accessible ramps throughout the city. As shown, many of the streets north of OR 126 have sidewalks whereas a number of gaps in the sidewalk system are present to the south. As future alternatives are considered, the potential to prioritize sidewalks that connect neighborhoods with key destinations in the city will be analyzed. The findings of the ongoing Redmond Neighborhood Revitalization Plan will also be incorporated into the TSP Update to help inform priority locations.

American With Disabilities Act (ADA) Access Plan

Figure 16 shows the network of ADA routes throughout the UGB, as identified by other City planning efforts. The routes highlight locations where sidewalk and ramps meet ADA standards, do not meet ADA standards, or are non-existent. Much of the street network has sidewalk and ramps and many of those facilities meet ADA standards. The City does not maintain information on pedestrian push buttons. There are sections within the UGB, primarily surrounding the downtown region, where the sidewalk and ramps need to be improved and where they need to be installed.

Pedestrian Level of Stress

Pedestrian "Level of Traffic Stress" (PLTS) is a measure often used as part of planning projects to communicate the level of comfort pedestrians experience while using specific facilities. The PLTS takes into account the presence and condition of sidewalks and ADA ramps, the nature of crossings, and the characteristics of the adjacent roadway. The City's Neighborhood Revitalization Project rated several key pedestrian facilities in the city and identified the following deficiencies:

- Citywide sidewalk coverage is largely limited and incomplete.
- The majority of city sidewalks are classified as PLTS 3 (medium stress).
- The only low stress facilities (PLTS 1) throughout the city are separate multiuse paths such as the Dry Canyon Trail.
- Overall, the high stress scores citywide are predominately a result of sidewalk width and condition. Other characteristics affecting the scores included proximity to high speed vehicle corridors, curb ramp conditions and high-stress crossings.



Figure 15



Figure 16

Bicycle System

Today, two types of bicycle facilities are generally provided along key streets within the city, including:

- **Shared Roadway** – On a shared roadway, bicyclists and motorists share the same travel lanes. A motorist will usually have to cross over into the adjacent travel lane to pass a bicyclist. Shared roadways are common on neighborhood streets and on low volume rural roads and highways and may, or may not, include “sharrows” (pavement marking that indicate the shared use of the roadway).
- **Dedicated bike Facilities** – Some roadways dedicate a portion of the roadway (or off-street location) for preferential use by bicyclists. These type of facilities are used to provide high-quality, low-stress riding experiences and are appropriate for roadways that carry higher traffic volumes and speeds than local streets and minor/neighborhood collector streets. Dedicated bike facilities can be constructed as bike lanes, buffered bike lanes, cycle tracks and separated pathways, and must always be well-marked to call attention to their preferential use by bicyclists.

Today, the City primarily has a limited number of on-street bike lanes and off-street pathways. The City is also planning to implement Bicycle Boulevards in the future, in which the typical operation of a local street is modified to function as a through street for bicyclist while maintaining local access for motor vehicles. Traffic calming devices reduce motor vehicle speeds and through trips and traffic controls limit the potential for conflicts between bicyclists and motorists.

As shown in Figure 17, most of the collector streets within the city are planned to include bike lanes or bike boulevards in the future but very few do today. As part of future alternatives, the need for additional bike facilities to support commuting, recreational and personal travel will be identified.



Figure 17

Bicycle Level of Traffic Stress

ODOT uses a “Bicycle Level of Traffic Stress” to help communities prioritize future investments in bike facilities for users of all ages and abilities. This analytical approach is based on the premise that as much as 60 percent of the population is “interested, but concerned” about cycling as a mode of transportation. The City’s Neighborhood Revitalization Project used this methodology to identify the following deficiencies:

- Neighborhood communities provide a low-stress environment for bicycles, but are generally isolated by high-stress collector and arterial roadways
- Nearly all higher order roadways that provide continuous north-south and east-west connectivity scored as LTS 3 (medium stress) or LTS 4 (high stress)
- Where on-street bike lanes are provided, high posted speeds often reduce the benefit of the dedicated bike facility
- The eastern portion of the city has large areas connected by low stress bicycle environments
- The western portion of the city has frequent instances of high stress roadways acting as barriers between destinations and residential areas
- The Dry Canyon Trail provides a low stress north-south facility through the city, but has limited east-west crossings, causing significant out of direction travel for east-west travelers

These findings will help to identify potential key areas of bicycle priority projects as part of the TSP update.

Public Transit System

According to the *2013 Central Oregon Regional Transit Master Plan*, approximately 57% of Redmond’s population consists of demographic groups related to age, disabilities and income that typically rely on public transportation in other communities. Within the City of Redmond, less than one percent of the population (0.4%) utilizes public transportation. Today, the city is served by “dial-a-ride” demand response service and community connector shuttles but does not have fixed route transit. The local dial-a-ride and community connector shuttles are operated through Cascades East Transit (CET) with funding from several state and federal sources. The community connector service provides weekday service between Redmond and other Central Oregon cities. Redmond residents also have access to the Central Oregon Breeze, which provides a transit route from Central Oregon to the Portland area.

In 2013, 41% of riders using the local bus were traveling to work. The remaining riders were traveling for reasons related to medical needs, school, shopping, and “other” trips, which primarily consist of connections to community connector shuttles. These shuttles include:

- Prineville – Redmond: six round trips per day;
- Madras – Redmond: five round trips per day;

- Sisters – Redmond: three round trips per day;
- Redmond – Bend: eight round trips per day.

Of the four, the Redmond-Bend shuttle serves the highest ridership.

BRIDGE CONDITIONS

The City's UGB contains 11 bridges owned and maintained by various agencies¹. These locations are identified in Figure 18. A more detailed listing of the bridge identification numbers and owners/maintainers is provided in Appendix L.

A bridge sufficiency rating is calculated by the Federal Highway Administration (FHWA) based on factors such as condition, materials, load capacity, and geometry (i.e., dimensions). FHWA uses the rating as a tool to prioritize the allocation of funds for bridge repairs. In general, bridges with a sufficiency rating of less than 50 (on a scale of 0 to 100) are given priority. In reviewing the ratings, it is important to note that a low rating may be an indication of an older bridge that is narrow and not designed to the same width or height clearance of today's standards; a low sufficiency rating does not necessarily indicate a structural issue.

According to the 2016 ODOT Bridge Condition Report, there are no bridges in the Redmond UGB with sufficiency ratings below 50 or classified as "structurally deficient."

RAIL SYSTEM

The BNSF Railway and Union Pacific Railroad are significant drivers of economic opportunity for Redmond. The two companies share use of track through Redmond although in recent years UP has relied upon BNSF to serve customers on UP's behalf. Nevertheless, the ability of Redmond freight shippers and receivers to use either carrier is a competitive privilege infrequently found elsewhere. The rail line interfaces with the Redmond community between US 97 and the industrial area near the airport, which is near OR 126 and southeast of the Redmond city core. The freight-only line, directly east of US 97 and running parallel to the highway through Redmond, is a segment of an interstate route between the Pacific Northwest and California. As such, freight trains running over the line carry a wide variety of commodities.

Just northeast of Redmond the City of Prineville Railway maintains a connection with BNSF and UP at Prineville Jct. Municipally-owned since construction in 1918, this 18-mile short line links Prineville to the national rail system. In 2014 the short line completed a 13-acre bulk transfer facility at Prineville Jct., featuring 5,000 feet of track equipped with facilities for unloading both liquid and dry bulk commodities. A boiler was recently added for heating tank cars with steam or hot water to improve the

¹ Source: ODOT Transgis, <https://gis.odot.state.or.us/transgis/>

viscosity of certain liquids for transfer from rail to truck. The facility is paved and recently an office was established there with a full-time staff person. Commodities off-loaded have included hazardous chemicals, seasonal golf course sand, dried distillers grains and magnesium chloride used by the Department of Transportation as a road deicer.

Today, there are seven at-grade crossings of the railroad within the city. Figure 19 shows the existing railroad facilities in the Redmond UGB.



Figure 18



Figure 19

AIR TRANSPORTATION SYSTEM

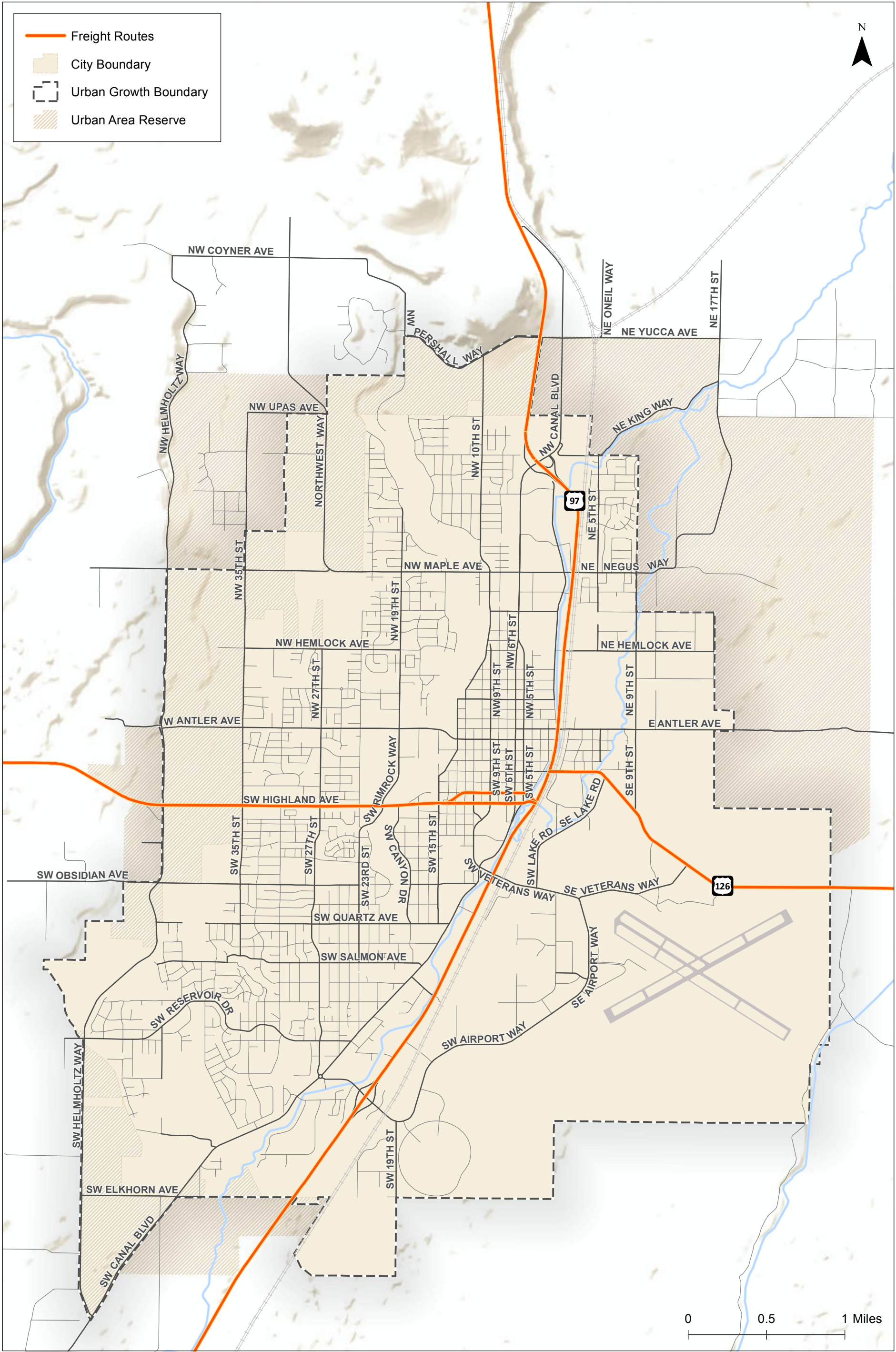
The City of Redmond owns and operates Redmond Municipal Airport/Roberts Field for the tri-county area. It is located two miles southeast of downtown Redmond and provides passenger and commercial service, air cargo and general aviation. The airport has two asphalt paved runways – 7,040 by 150 feet and 7,006 by 100 feet. The facility is designated as Category I (Commercial Service Airport) according to the *Oregon Aviation Plan* and the *Redmond Municipal Airport Master Plan*. The *Oregon Aviation Plan* defines Category I airports as airports that “support some level of scheduled commercial airline service in addition to a full range of general aviation aircraft.” The flight destinations can be domestic and international.

Airport development is governed by its own Master Plan, which is currently being updated. This TSP will incorporate the findings of that update, including offsite transportation improvements necessary to support future growth at the airport.

FREIGHT GENERATORS

Redmond contains sections of two freight routes. Figure 20 depicts the freight routes in the city. Both highways, US 97 and OR 126, are part of the State Highway Freight System and are federally designated Truck Routes. US 97 is also designated as a strategic corridor in the *Oregon Freight Plan*.

Freight is a critical component of the Redmond and regional economy. Several significant employers within Redmond rely on freight access, particularly within the eastern area of the city. Also, large areas of land on the east side are zoned for industrial uses, which will likely increase the demand for freight access in the area of town in the future.



**Freight Routes
Redmond, Oregon**

**Figure
20**

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl

SUMMARY OF EXISTING CONDITIONS

The assessment of the existing transportation system conditions and the transportation network inventory identified the following:

- Approximately 57% of Redmond's population consists of demographic groups related to age, disabilities and income that typically rely on public transportation in other communities; however, less than one percent of the population (0.4%) utilizes public transportation.
- Three study intersections locations do not meet state mobility targets, including:
 - OR 126 (SW Highland Ave) at SW Helmholtz Way
 - OR 126 (SW Highland Ave) at SW 27th St
 - OR 126 (SW Highland Ave) at SW Rimrock Way
- OR 126 east of 35th Street in the westbound direction exceeds segment capacity during the PM peak hour.
- No operational deficiencies were identified on the local Redmond system.
- The South Redmond US 97 Corridor Plan is identifying safety and operation conditions on US 97 and Canal Boulevard between Veterans Way and the southern UGB. This TSP update will incorporate finding and recommendations from that study as they become available.
- Six fatal crashes occurred in the Redmond UGB from 2011-2015. Five of these crashes occurred on a major roadway facility and three fatal crashes involved a pedestrian.
- Thirteen intersections exceed the at least one of the ODOT crash performance standards nearly half of which are along the OR 126 corridor.
- The City's Neighborhood Revitalization Project identified deficiencies in the bicycle and pedestrian network that can be used to help inform upcoming TSP efforts.
 - Nearly all higher order roadways that provide continuous north-south and east-west connectivity scored as LTS 3 (medium stress) or LTS 4 (high stress).
 - Citywide sidewalk coverage is largely limited and incomplete.
- No bridges in the Redmond UGB were identified as having a low sufficiency rating or classified as "structurally deficient/distressed".
- Freight access, particularly on the east side of town, is a critical component of the Redmond economy.

Appendix A – Study Intersections

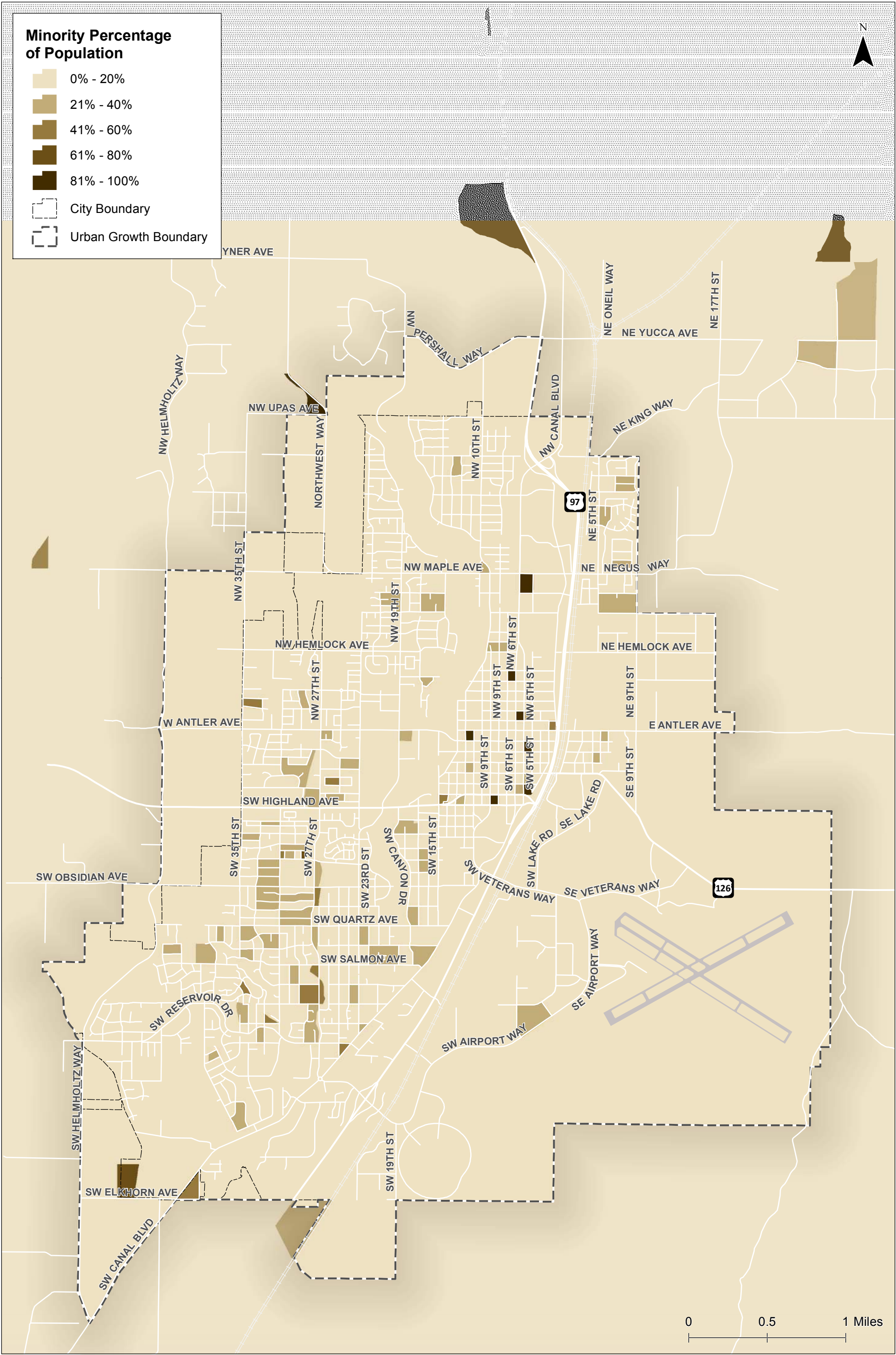
Midweek 4-hour (2-6PM) Intersection Counts

Study Intersection	East-West Road Name	North-South Road Name
1	NW Canal Blvd	US 97 NB Ramps
2	NW Canal Blvd	US 97 SB Ramps
3	NW Maple Ave	NW 19th St
4	NW Maple Ave	NW 6th St
5	NW Larch Ave	NW Canal Blvd
6	NE Hemlock Ave	NE 9th St
7	W Antler Ave	SW Helmholtz Way
8	W Antler Ave	SW 27th St
9	W Antler Ave	SW Rimrock Way
10	SW Black Butte Blvd	SW 6th St
11	SW Black Butte Blvd	SW 5th St
12	E Antler Ave	NE 9th St
13	SW Evergreen Ave	SW 6th St
14	SW Evergreen Ave	SW 5th St
15	SW Evergreen Ave	US 97
16	OR 126 (SW Glacier Ave)	SW 11th St
17	OR 126 (SW Glacier Ave)	SW 9th St
18	OR 126 (SW Glacier Ave)	SW 6th St
19	OR 126 (SW Glacier Ave)	SW 5th St
20	OR 126 (SW Glacier/Highland Ave)	US 97
21	OR 126 (SW Highland Ave)	SW Helmholtz Way
22	OR 126 (SW Highland Ave)	SW 27th St
23	OR 126 (SW Highland Ave)	SW Rimrock Way
24	OR 126 (SW Highland Ave)	SW 15th St
25	OR 126 (SW Highland Ave)	SW 11th St
26	OR 126 (SW Highland Ave)	SW 9th St
27	OR 126 (SW Highland Ave)	SW 6th St
28	OR 126 (SW Highland Ave)	SW 5th St
29	OR 126	SE 9th St (McCaffrey Rd)
30	SW Obsidian Ave	SW 27th St
31	SW Obsidian Ave	SW 23rd St
32	SW Veterans Way	SW Canal Blvd
33	SW Veterans Way	US 97
34	SW Veterans Way	SE Airport Way
35	OR 126	SW Veterans Way
36	SW Salmon Ave	SW 27th St
37	SW Odem Medo Way	SW Canal Blvd
38	SW Odem Medo Way	US 97
39	Harry Rd/SW Wickiup Ave	SW 51st St (SW Helmholtz Way)
40	SW Wickiup Ave/Forked Horn Rd	SW 27th St
41	SW 27th St	SW Canal Blvd
42	SW Yew Ave	US 97 SB Ramps
43	SE Airport Way	US 97 NB Ramps
44	SE Airport Way	SW 19th St
45	SW Helmholtz Way	S Canal Blvd

48-Hour Tube Segment Counts

Study Segment	Segment Mainline and Cross Street
1	US 97 near Yew Avenue
2	US 97 near Highland/Glacier
3	US 97 near Canal Boulevard
4	OR 126 near SW 35 th Street
5	OR 126 near Veterans Way
6	Canal Boulevard near Badger Avenue

Appendix B – Demographic Figures

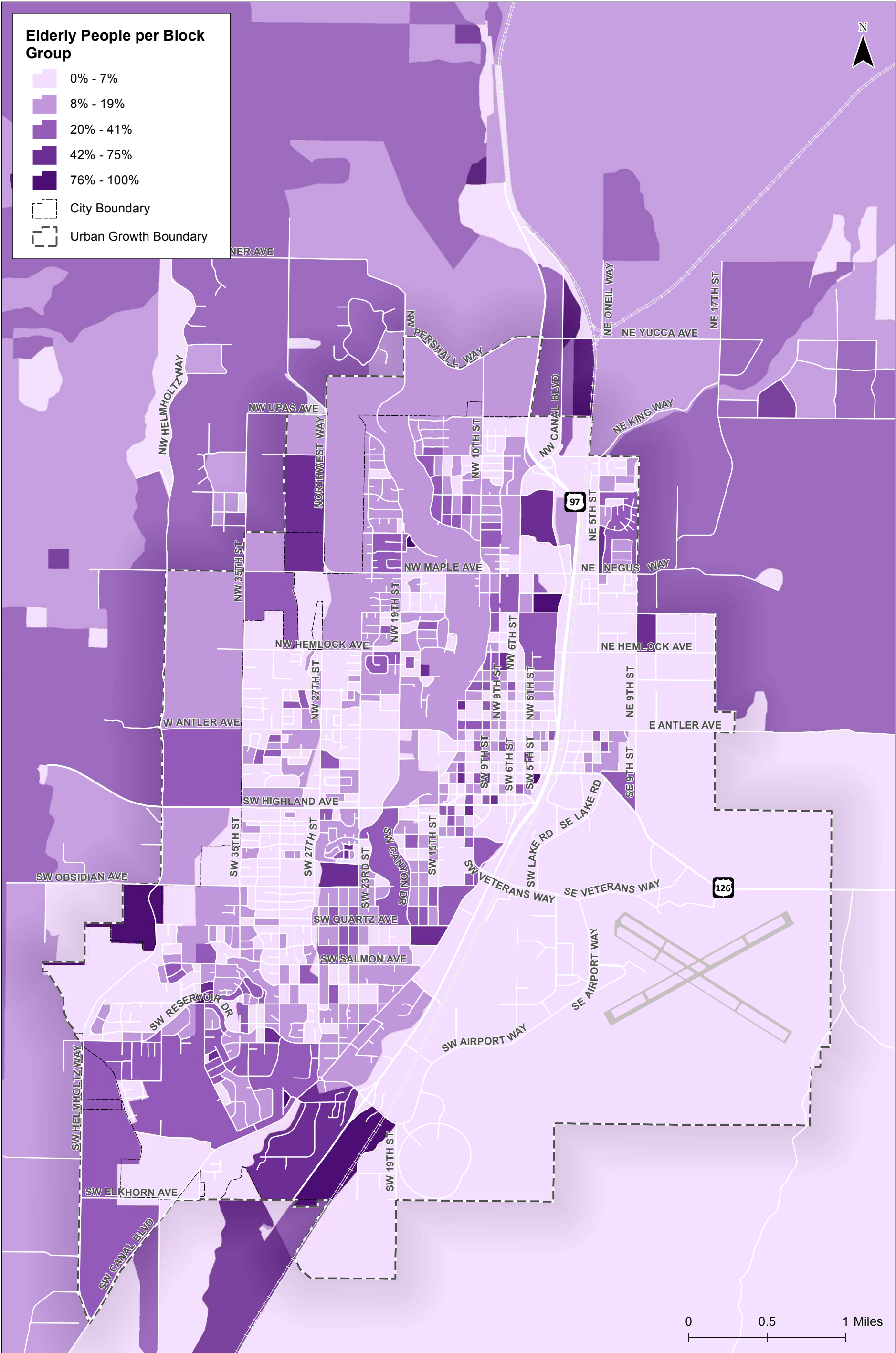


Minority Population
Redmond, Oregon

Figure
B1

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl
Data Source: US Census Table DEC_10_PL_P1

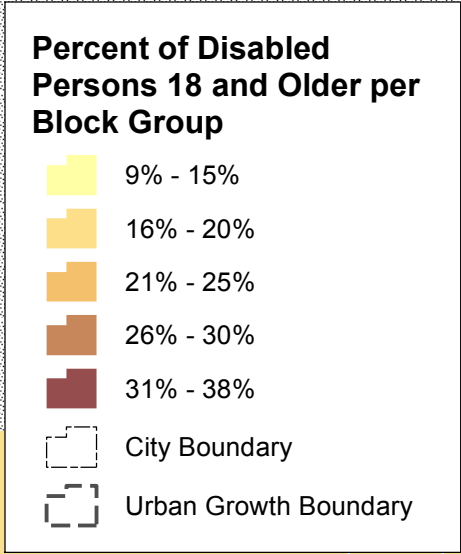




**Elderly Population
Redmond, Oregon**

**Figure
B3**

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl
Data Source: US Census Table DEC_10_SF1_P12

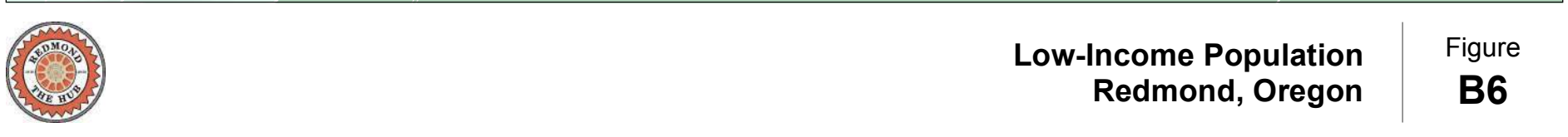


Disabled Population Redmond, Oregon

Figure
B4



Figure
B5



Appendix C – Methodology Memo

FINAL Technical Memorandum #2

Date: September 7, 2017

Project #:17720

To: Redmond TSP PMT

From: Julia Kuhn, PE, Matt Kittelson, PE and Jacqueline Gulczynski

Project: Redmond Transportation System Plan Update

Subject: Analysis Methodology and Assumptions Methodology

This memorandum documents the methodology and key assumptions that we propose to use as part of the existing and future conditions analyses for the Redmond Transportation System Plan (TSP) Update. The methodologies included in this memorandum are based on guidance provided in the Oregon Department of Transportation (ODOT) *Transportation System Plan Guidelines (2008)* and the *Analysis Procedures Manual (APM)*, Versions 1 and 2 as they relate to the City of Redmond. This memorandum serves as the Consultant Task 2.3 Deliverable per the approved ODOT scope (PA #27456; WOC#66) for the TSP Update.

STUDY INTERSECTIONS

Figure 1 identifies the locations where four-hour traffic counts (2:00-6:00 PM) were collected in April 2017 to help guide the TSP update. The counts were collected Tuesday, April 18th and Wednesday, April 19th and include vehicle turning movements, pedestrian volumes, bicycle volumes, truck volumes and passenger car volumes.

In addition to the turning movement counts, 48-hour tube counts were collected at the following locations in June 2017 while school was still in-session:

- US 97 south of Yew Avenue
- US 97 south of Highland Avenue
- US 97 north of Canal Boulevard
- OR 126 east of 35th Street
- OR 126 west of Veterans Way
- Canal Boulevard north of Badger Avenue

The data collected includes vehicle speed, classification, and total volume. Figure 1 illustrates the location of the identified study intersections. Both the turning movement counts and the tube counts were collected consistent with Task 3.1.B.1 of the ODOT scope. A list of the study intersections is provided in Appendix A.



INTERSECTION OPERATIONAL STANDARDS

Per Task 3.1.B.2, we will present the following information for each study intersection, regardless of jurisdictional control:

- Volume-to-capacity (v/c) ratio;
- Level-of-service (LOS);
- Delay;
- 95th Percentile queuing (not-simulation based); and
- Turning movement counts.

This information will be provided in tables, figures, and/or technical appendices, but where possible will be provided in figures to give the general public a more clear and relatable understanding of the analysis results.

ODOT Mobility Targets

ODOT assess intersections operations based on established mobility targets (as defined by the volume-to-capacity (v/c) ratio). Table 6 of the *Oregon Highway Plan* (OHP) provides the mobility targets for facilities outside the Portland Metro area. The OHP targets will be used to evaluate existing and future no-build conditions. (Note that Highway Design Manual standards will be used to evaluate potential solutions in TM #7, Identification of Alternatives, unless alternative standards are established.) There are two state facilities within the City of Redmond: US 97 (The Dalles-California Highway) and OR 126 (Ochoco Highway). Both facilities are designated by the OHP as Statewide Freight Routes. US 97 is further classified as an expressway north of Veteran's Way and south of Yew Avenue. US 26 is designated as an expressway west of Helmholtz and east of the city limits.

Table 1 includes the mobility targets for expressways and statewide freight routes based on the posted speed. Both US 97 and OR 126 bisect the city center, where the posted speed is below 45 miles per hour (mph). Action 1F.1 of the OHP states that:

*For unsignalized intersections, achieving the volume to capacity ratios in Tables 6 and 7 for the state highway approaches indicates that state mobility targets are being met. In order to maintain safe operation of the intersection, **non-state highway approaches** are expected to meet or not to exceed the volume to capacity ratios for District/Local Interest Roads in Table 6.(Emphasis added)*

These ratios are identified under the "Unsignalized" column in Table 1. The OHP acknowledges the unique characteristics of an interchange opposed to an intersection directly on the state facility. The OHP states that the maximum v/c ratio for the interchange ramp termini should be designated as 0.85 unless the intersection v/c ratio target is less than 0.85. In which case, the intersection v/c ratio should be applied to the interchange.

Table 1. Volume to Capacity Ratio for State Freight Routes (US 97 and OR 126)

	Speed (Miles Per Hour)	Signalized	Unsignalized
Freight Route on a Statewide Highway	<=35mph	0.85	0.95
	40mph	0.80	0.90
	>=45mph	0.80	0.90
Statewide Expressway	>=45mph	0.85	0.80

The City of Redmond has adopted a performance standard based on Level of Service. The City requires an intersection to operate at a Level of Service E or better during the peak 15 minute period of the peak hour. For unsignalized intersections with a low minor street volume, the City may presume the intersection to operate acceptably with a v/c ratio less than 0.90 and a 95th percentile queue of less than 4 vehicles during the peak hour.

Table 2 shows the intersection control and mobility targets for the study intersections.

Table 2. Study Intersection Control and Mobility Target

Study Int. #	Intersection	Classification/ Jurisdiction	Intersection Control	Mobility Target
1	NW Canal Blvd/ US 97 NB Ramps	ODOT	Signalized	v/c<0.85
2	NW Canal Blvd/ US 97 SB Ramps	ODOT	Signalized	v/c<0.85
3	NW Maple Ave/ NW 19th St	City	Unsignalized	LOS E, v/c<0.90
4	NW Maple Ave/ NW 6th St	City	Signalized	LOS E
5	NW Larch Ave/ NW Canal Blvd	City	Unsignalized	LOS E, v/c<0.90
6	NE Hemlock Ave/ NE 9th St	City	Unsignalized	LOS E, v/c<0.90
7	W Antler Ave/ SW Helmholtz Way	City	Unsignalized	LOS E, v/c<0.90
8	W Antler Ave/ SW 27th St	City	Signalized	LOS E
9	W Antler Ave/ SW Rimrock Way	City	Signalized	LOS E
10	SW Black Butte Blvd/ SW 6th St	City	Unsignalized	LOS E, v/c<0.90
11	SW Black Butte Blvd/ SW 5th St	City	Unsignalized	LOS E, v/c<0.90
12	E Antler Ave/ NE 9th St	City	Unsignalized	LOS E, v/c<0.90
13	SW Evergreen Ave/ SW 6th St	City	Signalized	LOS E
14	SW Evergreen Ave/ SW 5th St	City	Signalized	LOS E
15	SW Evergreen Ave/ US 97	ODOT	Signalized	Alternative Mobility Standard
16	OR 126 (SW Glacier Ave)/ SW 11th St	ODOT	Signalized	v/c<0.85
17	OR 126 (SW Glacier Ave)/ SW 9th St	ODOT	Signalized	v/c<0.85
18	OR 126 (SW Glacier Ave)/ SW 6th St	ODOT	Signalized	v/c<0.85
19	OR 126 (SW Glacier Ave)/ SW 5th St	ODOT	Signalized	v/c<0.85
20	OR 126 (SW Glacier/Highland Ave)/ US 97	ODOT	Signalized	v/c<0.85
21	OR 126 (SW Highland Ave) / SW Helmholtz Way	ODOT	Unsignalized	v/c<0.80/0.90
22	OR 126 (SW Highland Ave)/ SW 27th St	ODOT	Signalized	v/c<0.80

Study Int. #	Intersection	Classification/ Jurisdiction	Intersection Control	Mobility Target
23	OR 126 (SW Highland Ave)/ SW Rimrock Way	ODOT	Signalized	v/c<0.80
24	OR 126 (SW Highland Ave)/ SW 15th St	ODOT	Signalized	v/c<0.85
25	OR 126 (SW Highland Ave)/ SW 11th St	ODOT	Signalized	v/c<0.85
26	OR 126 (SW Highland Ave)/ SW 9th St	ODOT	Signalized	v/c<0.85
27	OR 126 (SW Highland Ave)/ SW 6th St	ODOT	Signalized	v/c<0.85
28	OR 126 (SW Highland Ave)/ SW 5th St	ODOT	Signalized	v/c<0.85
29	OR 126/ SE 9th St (McCaffrey Rd)	ODOT	Unsignalized	v/c<0.80
30	SW Obsidian Ave/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
31	SW Obsidian Ave/ SW 23rd St	City	Unsignalized	LOS E, v/c<0.90
32	SW Veterans Way/ SW Canal Blvd	City	Signalized	LOS E
33	SW Veterans Way/ US 97	ODOT	Signalized	v/c<0.80
34	SW Veterans Way/ SE Airport Way	City	Unsignalized	LOS E, v/c<0.90
35	SW Veterans Way/ OR 126	ODOT	Unsignalized	Alternative Mobility Standard
36	SW Salmon Ave/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
37	SW Odem Medo Way/ SW Canal Blvd	City	Signalized	LOS E
38	SW Odem Medo Way/ US 97	ODOT	Signalized	v/c<0.80
39	SW Wickiup Ave/ SW 51st St (SW Helmholtz Way)	City	Unsignalized	LOS E, v/c<0.90
40	SW Wickiup Ave(Forked Horn Rd)/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
41	SW Canal Blvd/ SW 27th St	City	Unsignalized	LOS E, v/c<0.90
42	SW Yew Ave/ US 97 SB Ramps	ODOT	Signalized	v/c<0.80
43	SE Airport Way/ US 97 NB Ramps	ODOT	Signalized	v/c<0.80
44	SE Airport Way/ SW 19th St	City	Unsignalized	LOS E, v/c<0.90
45	S Canal Blvd / SW Helmholtz Way	City	Unsignalized	LOS E, v/c<0.90

SEASONAL ADJUSTMENT FACTOR

Per Task 3.1.B.1, we will adjust all traffic counts along the state routes to reflect 30th highest hour conditions. Version 2 of the APM identifies three methods for identifying seasonal adjustment factors for highway traffic volumes, of which the on-site Automatic Traffic Recorders (ATR) have been identified by ODOT as the most accurate method of use. There are five on-site ATR stations located within or near the Redmond city limits, as shown in Figure 2.

- ATR 09-020: Located on US 97, The Dalles-California Highway, Mile Post (MP) 124.40
- ATR 09-021: Located on OR 126, McKenzie Highway, MP 108.27
- ATR 09-022: Located on US 97, The Dalles-California Highway, MP 120.94
- ATR 09-023: Located on US 97, The Dalles-California Highway, MP 119.09
- ATR 07-002: Located on OR 126, McKenzie Highway, MP 3.23



As stated within section 5.4.1 of the APM,

Per the on-site ATR method, we calculated the applicable seasonal adjustment factors. These calculations are provided in Appendix B and summarized in Table 3.

Table 3: On-Site ATR Method Seasonal Adjustment Method

ATR Station	ATR Location	Seasonal Adjustment Factor	Applied Area
ATR 07-002	OR 126 0.35 miles west of Deschutes/Crook County line	1.10	OR 126 east of US 97
ATR 09-020	US 97 0.79 miles south of Yew Avenue	1.10	US 97 south of Highland Avenue
ATR 09-021	OR 126 1.38 miles west of SW Helmholtz Way	1.29	OR 126 west of US 97
ATR 09-022	US 97 0.04 miles north of Antler Avenue	1.13	Between Antler Avenue and Highland Avenue
ATR 09-023	US 97 0.57 miles south of O'Neil Highway	1.16	US 97 north of Antler Avenue

A significant number of study intersections in Redmond are located on state facilities. With five On-site ATR locations, seasonal adjustment factors were assigned based on proximity and roadway characteristics.

Table 4 summarizes ODOT intersections to be analyzed as part of the TSP and corresponding seasonal adjustment factors. As shown in Table 4, US 97 was used as the bisector on OR 126 to separate the seasonal adjustment factors on OR 126. Intersections on OR 126 west of US 97 apply the adjustment factor associated with ATR 09-021, and intersections east US 97 apply the seasonal adjustment factor associated with ATR 07-002. The seasonal adjustment factors at intersection along the US 97 corridor were applied based on location, average ADT, and roadway characteristics. No seasonal adjustment factors are proposed for intersections on the City of Redmond transportation system.

Table 4. Summary of Intersection Standards and Adjustment Factors

Study Int. #	Intersection	Classification/ Jurisdiction	Seasonal Adjustment Factor
1	NW Canal Blvd/ US 97 NB Ramps	ODOT	1.16
2	NW Canal Blvd/ US 97 SB Ramps	ODOT	1.16
15	SW Evergreen Ave/ US 97	ODOT	1.13
16	OR 126 (SW Glacier Ave)/ SW 11th St	ODOT	1.29
17	OR 126 (SW Glacier Ave)/ SW 9th St	ODOT	1.29
18	OR 126 (SW Glacier Ave)/ SW 6th St	ODOT	1.29
19	OR 126 (SW Glacier Ave)/ SW 5th St	ODOT	1.29
20	OR 126 (SW Glacier/Highland Ave)/ US 97	ODOT	1.29
21	OR 126 (SW Highland Ave) / SW Helmholtz Way	ODOT	1.29
22	OR 126 (SW Highland Ave)/ SW 27th St	ODOT	1.29
23	OR 126 (SW Highland Ave)/ SW Rimrock Way	ODOT	1.29
24	OR 126 (SW Highland Ave)/ SW 15th St	ODOT	1.29
25	OR 126 (SW Highland Ave)/ SW 11th St	ODOT	1.29
26	OR 126 (SW Highland Ave)/ SW 9th St	ODOT	1.29
27	OR 126 (SW Highland Ave)/ SW 6th St	ODOT	1.29
28	OR 126 (SW Highland Ave)/ SW 5th St	ODOT	1.29
29	OR 126/ SE 9th St (McCaffrey Rd)	ODOT	1.10
33	SW Veterans Way/ US 97	ODOT	1.10
35	SW Veterans Way/ OR 126	ODOT	1.10
38	SW Odem Medo Way/ US 97	ODOT	1.10
42	SW Yew Ave/ US 97 SB Ramps	ODOT	1.10
43	SE Airport Way/ US 97 NB Ramps	ODOT	1.10

ANALYSIS MODEL PARAMETERS

The bullets below identify the proposed sources of data and methodologies to be used to analyze traffic conditions in Redmond. Analyses of all state facilities will be conducted according to the most-recent version of the APM, unless otherwise agreed upon by both ODOT's Transportation Planning and Analysis Unit (TPAU) and the consultant team.

1. *Intersection/Roadway Geometry* (lane numbers and arrangements, cross-section elements, signal phasing, etc.) will be reviewed through aerial photography and confirmed through a field review. Available as-built data may also be used to verify existing roadway geometry. The analysis models will be built on scaled roadway line work from GIS or aerial photography in Synchro analysis software.
2. *Operational Data* (such as posted speeds, intersection control, parking, right-turn on red, etc.) will be field verified. Data will be reviewed during a field visit and supplemented by available GIS data, aerials, photos, and the ODOT Video Log.
3. *Peak Hour Factors* (PHF) will be calculated for each intersection and applied to the existing conditions analyses. Where applicable, corridor or regional PHFs may be developed. PHFs of 0.95 will be used for the future analysis for high-order facilities (arterials), with 0.90 applied to

medium-order facilities (collectors) and 0.85 applied to local roads. If the existing PHF is greater than these default future values, the existing PHF will be applied.

4. Traffic Operations

- a. Highway Capacity Manual (HCM) methodology shall be used for intersection analyses of the design hour conditions. Signalized intersection analysis will be based on HCM methods. The existing and future no-build analysis will utilize Synchro software for all study intersections. Level-of-service, delay, and volume-to-capacity ratios will be reported at each of the study intersections regardless of roadway jurisdiction.
- b. Queuing analysis methodology will be based on Synchro 95th percentile queue lengths as appropriate; ODOT's two-way stop-controlled intersection calculator tool will be used to estimate queue lengths for two-way stop-controlled intersections. Microsimulation is not proposed as part of the long-range planning effort.

SYNCHRO INPUT ASSUMPTIONS

Synchro software will be used for the intersection analyses. This analysis will be consistent with the HCM procedures. Table 5 lists the proposed input parameters.

Table 5. Synchro Operations Parameters/Assumptions

Arterial Intersection Parameters	Existing Conditions
Peak Hour Factor	From traffic counts
Conflicting Bikes and Pedestrian per Hour	From traffic counts, as available
Ideal Saturation Flow Rate (for all movements)	1,750 passenger cars per hour green per lane
Lane Width	12 feet unless field observations suggest otherwise
Percent Heavy Vehicles	From traffic counts by movement, as available
95th percentile vehicle queues	Synchro HCM summary output

CRASH ANALYSES

Per Task 3.1.B.4, we will review most recent five years of crash data, as provided by ODOT, at the study intersections and study segments (where tube count data was collected). Any intersections or roadway segments that are identified as a Top 5% and 10% Safety Priority Index System (SPIS) site will be included in the crash data.

Intersection crash rates at each location will be compared to the 90th percentile rates and critical crash rates, per the APM. Crash rates will also be compared to the ODOT Crash Tables II and IV severe injury and fatal crash rates. Any locations where the rates are exceeded, we will identify potential countermeasures using the ODOT All Roads Transportation Safety (ARTS) crash reduction factors.

FORECAST YEAR VOLUME DEVELOPMENT

To assist in the development of traffic volumes for the Future Scenario Conditions (per Task 4 of the scope), we will obtain 2040 Bend Redmond travel demand data from ODOT's Transportation Planning Analysis Unit (TPAU). The model output data will be post-processed using NCHRP Report 255 methodologies.

ACTIVE TRANSPORTATION ANALYSIS

Per Task 3.1.B.3, the scope of work, we will identify existing gaps in the sidewalks, bicycle network, and transit network along the city's collector and arterial roadways. The Bicycle Level of Traffic Stress (LTS) and pedestrian methodology will reference the Redmond Neighborhood Revitalization Plan as it has recently been completed as part of that project.

Quantitative and qualitative analysis of active transportation facilities be performed consistent with APM version 2 and include:

1. Qualitative (multimodal) assessment for transit modes;
2. A qualitative assessment of transit service and identification of underserved areas.
3. Gaps in intermodal connectivity.

NEXT STEPS

We look forward to your review of the assumptions and parameters to be used as part of the Redmond TSP Existing and Future conditions analyses.

Appendix A- Study Intersections

Study Intersection Locations

Study Intersection	East-West Road Name	North-South Road Name
1	NW Canal Blvd	US 97 NB Ramps
2	NW Canal Blvd	US 97 SB Ramps
3	NW Maple Ave	NW 19th St
4	NW Maple Ave	NW 6th St
5	NW Larch Ave	NW Canal Blvd
6	NE Hemlock Ave	NE 9th St
7	W Antler Ave	SW Helmholtz Way
8	W Antler Ave	SW 27th St
9	W Antler Ave	SW Rimrock Way
10	SW Black Butte Blvd	SW 6th St
11	SW Black Butte Blvd	SW 5th St
12	E Antler Ave	NE 9th St
13	SW Evergreen Ave	SW 6th St
14	SW Evergreen Ave	SW 5th St
15	SW Evergreen Ave	US 97
16	OR 126 (SW Glacier Ave)	SW 11th St
17	OR 126 (SW Glacier Ave)	SW 9th St
18	OR 126 (SW Glacier Ave)	SW 6th St
19	OR 126 (SW Glacier Ave)	SW 5th St
20	OR 126 (SW Glacier/Highland Ave)	US 97
21	OR 126 (SW Highland Ave)	SW Helmholtz Way
22	OR 126 (SW Highland Ave)	SW 27th St
23	OR 126 (SW Highland Ave)	SW Rimrock Way
24	OR 126 (SW Highland Ave)	SW 15th St
25	OR 126 (SW Highland Ave)	SW 11th St
26	OR 126 (SW Highland Ave)	SW 9th St
27	OR 126 (SW Highland Ave)	SW 6th St
28	OR 126 (SW Highland Ave)	SW 5th St
29	OR 126	SE 9th St (McCaffrey Rd)
30	SW Obsidian Ave	SW 27th St
31	SW Obsidian Ave	SW 23rd St
32	SW Veterans Way	SW Canal Blvd
33	SW Veterans Way	US 97
34	SW Veterans Way	SE Airport Way
35	SW Veterans Way	OR 126
36	SW Salmon Ave	SW 27th St
37	SW Odem Medo Way	SW Canal Blvd
38	SW Odem Medo Way	US 97
39	Harry Rd/SW Wickiup Ave	SW 51st St (SW Helmholtz Way)
40	SW Wickiup Ave/Forked Horn Rd	SW 27th St
41	SW Canal Blvd	SW 27th St
42	SW Yew Ave	US 97 SB Ramps
43	SE Airport Way	US 97 NB Ramps
44	SE Airport Way	SW 19th St
45	S Canal Blvd	SW Helmholtz Way

Appendix B – Seasonal Adjustment Factor Data

ODOT ATR 09-020, US97; MP 124.39; THE DALLES-CALIFORNIA HIGHWAY NO. 4; 0.79 mile south of Yew Avenue												
Year	15-Jan	15-Feb	15-Mar	15-Apr	15-May	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct	15-Nov	15-Dec
2015	92	98	102	108	108	115	122	116	113	113	101	102
2014	97	96	104	105	107	117	120	119	112	112	101	97
2013	92	100	102	107	108	114	115	117	111	111	104	100
2012	92	99	99	107	110	116	112	119	112	110	104	97
2011	99	99	103	107	109	113	115	117	109	108	102	101
Average	93.7	98.7	102.3	107.0	108.3	115.0	116.7	117.7	111.7	111.0	102.3	99.3
Count Adj	1.26	1.19	1.15	1.10	1.09	1.02	1.01	1.00	1.05	1.06	1.15	1.18

ODOT ATR 09-021, OR126; MP 108.27; MCKENZIE HIGHWAY NO. 15; 1.38 miles west of S.W. Helmholtz Way (S.W. 43rd Street)												
Year	15-Jan	15-Feb	15-Mar	15-Apr	15-May	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct	15-Nov	15-Dec
2015	79	83	92	97	105	118	122	116	109	103	86	86
2014	79	75	91	100	109	117	125	121	109	103	87	83
2013	81	78	84	95	104	114	123	119	113	100	92	88
2012	81	81	86	95	106	113	122	123	110	101	90	85
2011	82	81	87	95	104	114	124	122	110	103	88	86
Average	80.3	80.0	88.0	95.7	105.0	115.0	123.0	120.7	109.7	102.3	88.3	85.7
Count Adj	1.53	1.54	1.40	1.29	1.17	1.07	1.00	1.02	1.12	1.20	1.39	1.44

ODOT ATR 09-022, US97; MP 120.92; THE DALLES-CALIFORNIA HIGHWAY NO. 4; 0.04 mile north of S.W. Antler Avenue												
Year	15-Jan	15-Feb	15-Mar	15-Apr	15-May	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct	15-Nov	15-Dec
2015	88	95	99	104	107	113	118	113	109	108	94	93
2014	90	88	100	106	110	114	118	116	110	108	94	90
2013	84	92	97	105	110	113	116	115	109	107	99	93
2012	87	92	94	102	107	112	115	116	108	106	100	93
2011	92	91	97	102	107	113	116	116	108	104	97	97
Average	88.3	91.7	97.7	103.7	108.0	113.0	116.7	115.7	108.7	107.0	96.7	93.0
Count Adj	1.32	1.27	1.19	1.13	1.08	1.03	1.00	1.01	1.07	1.09	1.21	1.25

ODOT ATR 09-023, US97; MP 119.09; THE DALLES-CALIFORNIA HIGHWAY NO. 4; 0.57 mile south of O'Neil Highway No. 370												
Year	15-Jan	15-Feb	15-Mar	15-Apr	15-May	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct	15-Nov	15-Dec
2015	84	91	97	101	105	111	117	112	108	105	92	90
2014	85	84	97	103	108	113	117	115	109	105	91	87
2013	83	91	95	100	105	110	114	114	108	103	96	91
2012	84	90	92	99	105	111	115	116	109	103	96	89
2011	89	90	95	99	105	112	116	115	107	102	92	95
Average	84.3	90.3	95.7	100.0	105.0	111.3	116.0	114.7	108.3	103.7	93.3	90.0
Count Adj	1.38	1.28	1.21	1.16	1.10	1.04	1.00	1.01	1.07	1.12	1.24	1.29

ODOT ATR 07-002, OR126; MP 3.23; OCHOCO HIGHWAY NO. 41; 0.35 mile west of Deschutes-Crook County Line												
Year	15-Jan	15-Feb	15-Mar	15-Apr	15-May	15-Jun	15-Jul	15-Aug	15-Sep	15-Oct	15-Nov	15-Dec
2015	91	96	103	105	108	114	119	113	112	113	101	101
2014	90	91	98	107	109	114	118	117	113	112	103	97
2013	92	100	102	108	110	114	115	114	110	108	99	96
2012	90	90	93	105	109	116	118	119	112	114	106	95
2011	93	97	100	106	110	114	115	115	110	107	99	98
Average	91.0	94.7	100.0	106.0	109.3	114.0	117.0	115.3	111.3	111.0	101.0	97.0
Count Adj	1.29	1.24	1.17	1.10	1.07	1.03	1.00	1.01	1.05	1.05	1.16	1.21

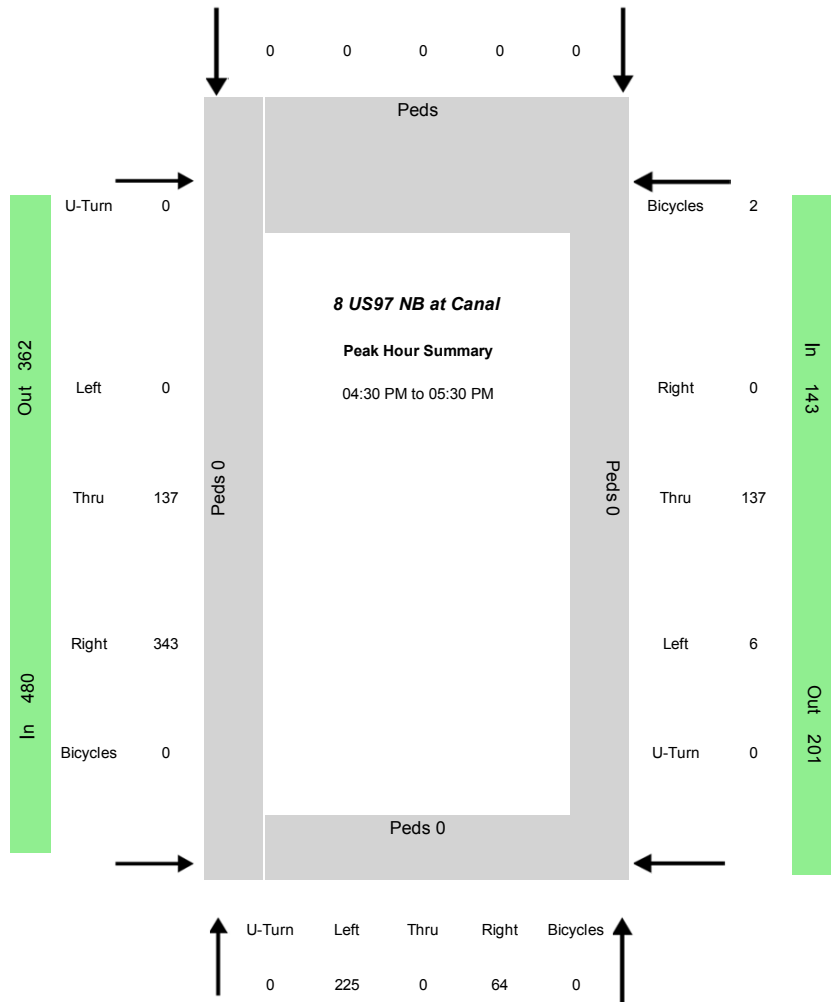
Peak month
Min/Max removed from average

Appendix D – Traffic Counts



Data Provided by K-D-N.com 503-594-4224	
N/S street	US-97 NB Ramps
E/W street	SW Canal Blvd
City, State	Redmond OR
Site Notes	
Location	44.301879 - -121.17016
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	8
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.92

Eastbound
SW Canal Blvd
Heavy Vehicle 1.9%



Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
225	0	64	0	0	0	0	0	0	137	343	0	6	137	0	0	289	0	480	143	349	0	362	201
Percent Heavy Vehicles																							
1.8%	0.0%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	2.0%	0.0%	16.7%	2.2%	0.0%	0.0%	1.7%	0.0%	1.9%	2.8%	2.3%	0.0%	1.9%	1.5%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0		0	0					0	0	0	0	0	2		0		2	0		0	0		0
All Vehicle Volumes																							
Time	Northbound US-97 NB Ramps				Southbound				Eastbound SW Canal Blvd				Westbound SW Canal Blvd				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	14		4	0					10	28	0		0	7		0							
02:05:00 PM	15		3	0					9	23	0		2	12		0							
02:10:00 PM	15		4	0					5	27	0		0	6		0		184					
02:15:00 PM	8		1	0					14	19	0		0	7		0		170					
02:20:00 PM	8		4	0					7	27	0		0	10		0		162					
02:25:00 PM	12		7	0					9	16	0		2	7		0		158					
02:30:00 PM	12		3	0					7	18	0		3	4		0		156					
02:35:00 PM	9		5	0					9	24	0		0	7		0		154					
02:40:00 PM	14		8	0					9	17	0		0	6		0		155					
02:45:00 PM	18		7	0					3	25	0		0	16		0		177					
02:50:00 PM	12		5	0					10	22	0		0	9		0		181					
02:55:00 PM	19		5	0					7	35	0		0	13		0		206	703				
03:00:00 PM	9		2	0					13	27	0		0	11		0		199	702				
03:05:00 PM	19		2	0					7	31	0		1	16		0		217	714				
03:10:00 PM	26		1	0					8	28	0		0	14		0		215	734				
03:15:00 PM	18		3	0					10	26	0		1	14		0		225	757				
03:20:00 PM	12		4	0					9	33	0		1	9		0		217	769				
03:25:00 PM	11		5	0					11	17	0		1	9		0		194	770				
03:30:00 PM	25		4	0					10	19	0		0	16		0		196	797				
03:35:00 PM	23		5	0					5	22	0		0	15		0		198	813				
03:40:00 PM	12		3	0					12	16	0		1	6		0		194	809				
03:45:00 PM	16		6	0					13	32	0		1	8		0		196	816				
03:50:00 PM	19		5	0					9	23	0		1	7		0		190	822				
03:55:00 PM	16		9	0					7	30	0		0	6		0		208	811				
04:00:00 PM	16		2	0					12	14	0		0	17		0		193	810				
04:05:00 PM	24		2	0					12	21	0		0	9		0		197	802				
04:10:00 PM	18		5	0					6	18	0		1	12		0		189	785				
04:15:00 PM	18		4	0					9	25	0		1	13		0		198	783				
04:20:00 PM	14		0	0					13	27	0		0	10		0		194	779				
04:25:00 PM	12		4	0					7	21	0		0	8		0		186	777				
04:30:00 PM	19		2	0					7	38	0		1	7		0		190	777				
04:35:00 PM	28		4	0					11	18	0		0	15		0		202	783				
04:40:00 PM	12		4	0					16	31	0		0	18		0		231	814				
04:45:00 PM	14		7	0					10	19	0		0	11		0		218	799				
04:50:00 PM	21		4	0					11	29	0		0	14		0		221	814				
04:55:00 PM	17		3	0					16	26	0		0	12		0		214	820				
05:00:00 PM	22		9	0					3	31	0		0	10		0		228	834				
05:05:00 PM	16		3	0					12	35	0		1	14		0		230	847				
05:10:00 PM	18		10	0					12	28	0		2	7		0		233	864				
05:15:00 PM	24		6	0					14	30	0		2	14		0		248	884				
05:20:00 PM	12		9	0					15	25	0		0	8		0		236	889				
05:25:00 PM	22		3	0					10	33	0		0	7		0		234	912				
05:30:00 PM	17		5	0					13	25	0		0	11		0		215	909				
05:35:00 PM	16		2	0					12	23	0		1	11		0		211	898				
05:40:00 PM	17		8	0					4	25	0		0	7		0		197	878				
05:45:00 PM	14		5	0					13	24	0		2	14		0		198	889				
05:50:00 PM	19		12	0					16	31	0		0	7		0		218	895				
05:55:00 PM	11		6	0					7	18	0		0	8		0		207	871				

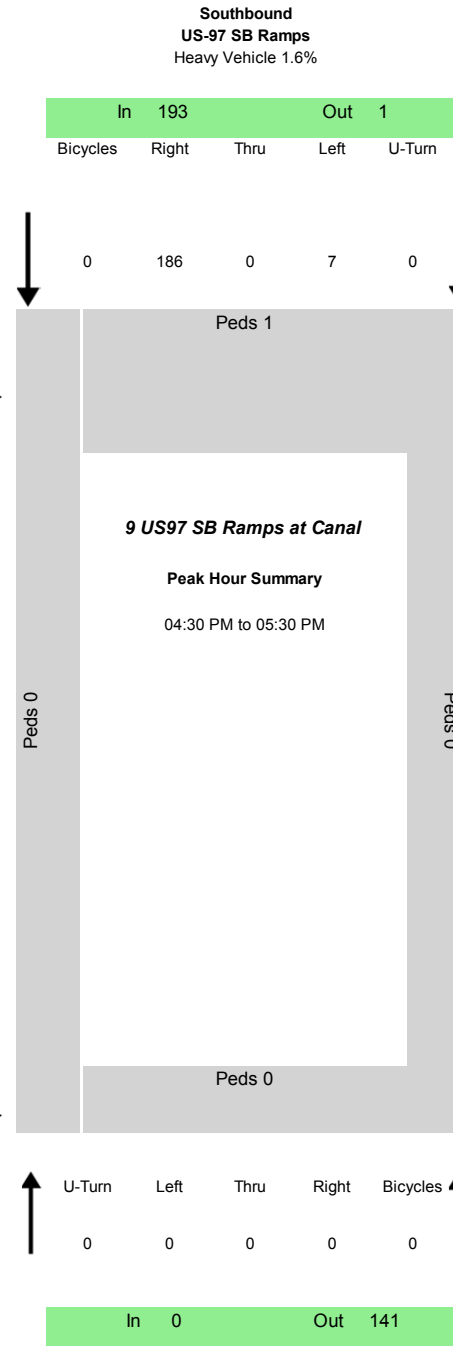


Data Provided by K-D-N.com 503-594-4224	
N/S street	US-97 SB Ramps
E/W street	NW Canal Blvd
City, State	Redmond OR
Site Notes	
Location	44.30071 - -121.17246
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	9
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:30:00 PM
PHF (15-Min Int)	0.92

Eastbound
NW Canal Blvd
Heavy Vehicle 1.2%

In 561
Out 504

U-Turn	0
Left	0
Thru	469
Right	92
Bicycles	0



Bicycles	2
Right	1
Thru	318
Left	49
U-Turn	0

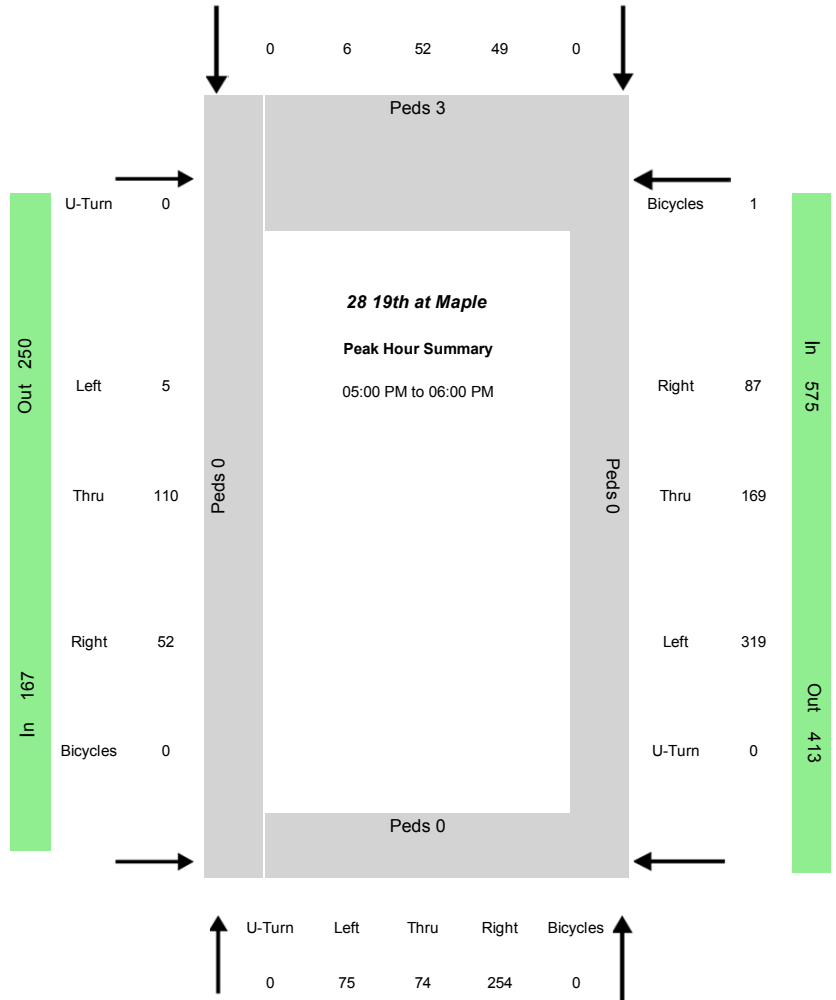
In 368
Out 476

Peak-Hour Volumes (PHV)																											
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving							
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB				
0	0	0	0	7	0	186	0	0	469	92	0	49	318	1	0	0	193	561	368	141	1	504	476				
Percent Heavy Vehicles																											
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	1.6%	0.0%	0.0%	#DIV/0!	1.6%	1.2%	1.4%	0.0%	0.0%	1.6%	1.5%				
PHV- Bicycles																PHV - Pedestrians											
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum						
0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	1	0	0	0	1					
All Vehicle Volumes																											
Time	Northbound US-97 SB Ramps				Southbound US-97 SB Ramps				Eastbound NW Canal Blvd				Westbound NW Canal Blvd				15 Min							1 HR			
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum							Sum			
02:00:00 PM	0	0	0	0	0	1	17	0	0	37	5	0	4	17	0	0											
02:05:00 PM	0	0	0	0	0	0	15	0	0	32	7	0	2	24	0	0											
02:10:00 PM	0	0	0	0	2	0	19	0	0	32	7	0	6	13	0	0	240										
02:15:00 PM	0	0	0	0	0	0	13	0	0	34	7	0	3	16	0	0	232										
02:20:00 PM	0	0	0	0	0	0	17	0	0	31	11	0	6	10	0	0	227										
02:25:00 PM	0	0	0	0	0	0	10	0	0	29	4	0	4	17	0	0	212										
02:30:00 PM	0	0	0	0	0	0	15	0	0	24	12	0	2	14	0	0	206										
02:35:00 PM	0	0	0	0	0	0	16	0	0	30	3	0	1	14	0	0	195										
02:40:00 PM	0	0	0	0	1	0	21	0	0	26	9	0	5	14	0	0	207										
02:45:00 PM	0	0	0	0	0	0	23	0	0	28	7	0	7	28	0	0	233										
02:50:00 PM	0	0	0	0	1	0	12	0	0	32	5	0	1	20	0	0	240										
02:55:00 PM	0	0	0	0	0	0	18	0	0	39	6	0	1	29	0	0	257							916			
03:00:00 PM	0	0	0	0	0	0	13	0	0	44	4	0	4	17	0	0	246							917			
03:05:00 PM	0	0	0	0	0	0	16	0	0	36	10	0	11	21	0	0	269							931			
03:10:00 PM	0	0	0	0	0	0	12	0	0	35	9	0	4	39	0	0	275							951			
03:15:00 PM	0	0	0	0	1	0	16	0	0	35	6	0	5	27	0	0	283							968			
03:20:00 PM	0	0	0	0	0	0	17	0	0	45	12	0	4	15	0	0	282							986			
03:25:00 PM	0	0	0	0	0	0	17	0	0	27	3	0	1	23	0	0	254							993			
03:30:00 PM	0	0	0	0	1	0	27	0	0	28	8	0	4	37	0	0	269							1031			
03:35:00 PM	0	0	0	0	1	0	24	0	0	26	9	0	3	30	0	0	269							1060			
03:40:00 PM	0	0	0	0	2	0	19	0	0	25	8	0	2	20	0	0	274							1060			
03:45:00 PM	0	0	0	0	1	0	26	0	0	45	7	0	4	18	0	0	270							1068			
03:50:00 PM	0	0	0	0	0	0	22	0	0	33	10	0	2	23	0	0	267							1087			
03:55:00 PM	0	0	0	0	0	0	15	0	0	35	10	0	3	18	0	0	272							1075			
04:00:00 PM	0	0	0	0	0	1	19	0	0	26	8	0	6	29	0	0	260							1082			
04:05:00 PM	0	0	0	0	1	0	24	0	0	34	9	0	4	25	0	0	267							1085			
04:10:00 PM	0	0	0	0	0	0	27	0	0	22	4	0	6	28	0	0	273							1073			
04:15:00 PM	0	0	0	0	0	0	27	0	0	37	7	0	6	29	0	0	290							1089			
04:20:00 PM	0	0	0	0	0	0	23	0	0	36	10	0	3	22	0	0	287							1090			
04:25:00 PM	0	0	0	0	0	0	14	0	0	28	2	0	1	16	0	0	261							1080			
04:30:00 PM	0	0	0	0	0	0	16	0	0	45	10	0	2	26	0	0	254							1074			
04:35:00 PM	0	0	0	0	1	0	14	0	0	28	7	0	9	36	0	0	255							1076			
04:40:00 PM	0	0	0	0	1	0	19	0	0	48	8	0	2	32	1	0	305							1111			
04:45:00 PM	0	0	0	0	0	0	21	0	0	31	6	0	7	18	0	0	289							1093			
04:50:00 PM	0	0	0	0	0	0	15	0	0	35	9	0	4	28	0	0	285							1094			
04:55:00 PM	0	0	0	0	1	0	18	0	0	38	6	0	3	26	0	0	266		1105								
05:00:00 PM	0	0	0	0	0	0	16	0	0	34	9	0	2	31	0	0	275		1108								
05:05:00 PM	0	0	0	0	1	0	14	0	0	47	8	0	5	25	0	0	284		1111								
05:10:00 PM	0	0	0	0	0	0	12	0	0	44	11	0	1	20	0	0	280		1112								
05:15:00 PM	0	0	0	0	2	0	17	0	0	38	5	0	6	34	0	0	290		1108								
05:20:00 PM	0	0	0	0	0	0	11	0	0	38	9	0	2	18	0	0	268		1092								
05:25:00 PM	0	0	0	0	1	0	13	0	0	43	4	0	6	24	0	0	271		1122								
05:30:00 PM	0	0	0	0	1	0	24	0	0	38	6	0	5	23	0	0	266		1120								
05:35:00 PM	0	0	0	0	0	0	17	0	0	33	7	0	5	20	1	0	271		1108								
05:40:00 PM	0	0	0	0	0	0	15	0	0	29	10	0	5	20	0	0	259		1076								
05:45:00 PM	0	0	0	0	0	0	7	0	0	35	16	0	9	19	0	0	248		1079								
05:50:00 PM	0	0	0	0	0	0	18	0	0	46	6	0	2	24	0	0	261		1084								
05:55:00 PM	0	0	0	0	0	0	11	0	0	26	8	0	1	19	0	0	247		1057								



Data Provided by K-D-N.com 503-594-4224	
N/S street	NW 19th St
E/W street	NW Maple Ave
City, State	Redmond OR
Site Notes	
Location	44.290964 - -121.189143
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	28
Peak Hour Start	05:00:00 PM
Peak 15 Min Start	05:45:00 PM
PHF (15-Min Int)	0.93

Eastbound
NW Maple Ave
Heavy Vehicle 1.2%



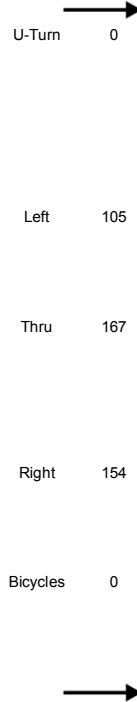
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
75	74	254	0	49	52	6	0	5	110	52	0	319	169	87	0	403	107	167	575	423	166	250	413
Percent Heavy Vehicles																							
0.0%	0.0%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.7%	0.0%	1.2%	0.3%	0.5%	0.0%	0.0%	1.2%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	3	0	0	3		
All Vehicle Volumes																							
Time	Northbound NW 19th St				Southbound NW 19th St				Eastbound NW Maple Ave				Westbound NW Maple Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	6	1	20	0	2	1	0	0	1	11	2	0	14	10	0	0							
02:05:00 PM	3	3	22	0	6	0	0	0	1	9	2	0	9	9	4	0							
02:10:00 PM	4	3	23	0	5	3	1	0	0	11	2	0	8	15	5	0	216						
02:15:00 PM	11	2	18	0	4	4	1	0	0	7	4	0	14	6	4	0	223						
02:20:00 PM	3	1	21	0	5	6	0	0	0	9	6	0	14	12	4	0	236						
02:25:00 PM	1	2	18	0	4	2	1	0	1	5	7	0	33	9	11	0	250						
02:30:00 PM	0	2	8	0	1	5	0	0	0	6	7	0	23	16	4	0	247						
02:35:00 PM	1	7	25	0	3	3	0	0	0	6	3	0	12	12	5	0	243						
02:40:00 PM	7	7	25	0	3	1	0	0	1	6	6	0	19	7	7	0	238						
02:45:00 PM	6	4	27	0	7	2	2	0	0	10	2	0	21	13	5	0	265						
02:50:00 PM	6	4	28	0	1	4	0	0	0	9	5	0	16	11	6	0	278						
02:55:00 PM	7	4	27	0	3	1	1	0	0	8	5	0	24	7	3	0	279	983					
03:00:00 PM	5	2	26	0	4	3	0	0	2	6	8	0	21	12	4	0	273	1008					
03:05:00 PM	6	5	26	0	7	0	0	0	0	12	3	0	18	11	3	0	274	1031					
03:10:00 PM	8	3	22	0	1	2	0	0	0	11	2	0	24	12	7	0	276	1043					
03:15:00 PM	10	6	18	0	4	3	0	0	0	9	1	0	16	10	7	0	267	1052					
03:20:00 PM	3	7	31	0	5	3	0	0	4	8	4	0	15	15	5	0	276	1071					
03:25:00 PM	6	9	25	0	8	0	1	0	2	6	3	0	13	10	12	0	279	1072					
03:30:00 PM	2	3	24	0	6	2	0	0	1	9	3	0	11	13	10	0	279	1084					
03:35:00 PM	4	1	22	0	10	7	5	0	0	9	3	0	16	12	7	0	275	1103					
03:40:00 PM	4	4	12	0	4	6	1	0	0	10	3	0	20	11	4	0	259	1093					
03:45:00 PM	2	7	16	0	1	1	0	0	0	15	4	0	25	24	9	0	279	1098					
03:50:00 PM	3	5	19	0	2	0	0	0	0	6	6	0	33	9	8	0	274	1099					
03:55:00 PM	9	3	15	0	3	2	0	0	0	4	4	0	20	18	6	0	279	1093					
04:00:00 PM	5	1	15	0	3	1	0	0	0	6	7	0	27	11	5	0	256	1081					
04:05:00 PM	6	2	15	0	5	4	1	0	0	10	3	0	13	21	6	0	251	1076					
04:10:00 PM	1	3	21	0	7	1	0	0	1	7	6	0	18	13	5	0	250	1067					
04:15:00 PM	4	3	15	0	8	4	0	0	1	19	4	0	20	12	5	0	264	1078					
04:20:00 PM	6	8	19	0	2	2	0	0	1	9	6	0	24	15	9	0	279	1079					
04:25:00 PM	6	11	19	0	5	4	0	0	3	9	6	0	19	14	7	0	299	1087					
04:30:00 PM	3	8	30	0	4	8	0	0	1	14	8	0	10	10	8	0	308	1107					
04:35:00 PM	7	11	14	0	4	5	5	0	1	12	4	0	21	11	7	0	309	1113					
04:40:00 PM	7	3	11	0	1	5	0	0	0	5	4	0	22	9	3	0	276	1104					
04:45:00 PM	6	3	24	0	4	3	1	0	0	17	8	0	24	16	2	0	280	1108					
04:50:00 PM	3	7	28	0	4	5	0	0	1	10	6	0	22	16	6	0	286	1125					
04:55:00 PM	6	4	28	0	4	2	1	0	1	14	2	0	23	15	7	0	323	1148					
05:00:00 PM	4	6	28	0	5	4	0	0	0	9	5	0	27	14	7	0	324	1176					
05:05:00 PM	4	6	20	0	4	5	0	0	0	8	2	0	33	16	8	0	322	1196					
05:10:00 PM	7	5	16	0	3	4	0	0	0	5	4	0	28	21	6	0	314	1212					
05:15:00 PM	6	4	21	0	5	3	0	0	2	9	5	0	26	14	9	0	309	1221					
05:20:00 PM	8	4	18	0	5	5	2	0	0	11	3	0	14	14	12	0	299	1216					
05:25:00 PM	4	10	13	0	5	1	0	0	2	3	4	0	35	15	4	0	296	1209					
05:30:00 PM	12	7	22	0	4	0	2	0	1	10	6	0	23	13	8	0	300	1213					
05:35:00 PM	5	7	19	0	2	4	0	0	0	7	3	0	19	19	4	0	293	1200					
05:40:00 PM	4	8	26	0	7	2	0	0	0	12	8	0	27	8	8	0	307	1240					
05:45:00 PM	4	1	22	0	1	7	1	0	0	11	7	0	30	13	10	0	306	1239					
05:50:00 PM	10	7	25	0	2	7	0	0	0	16	4	0	30	8	5	0	331	1245					
05:55:00 PM	7	9	24	0	6	10	1	0	0	9	1	0	27	14	6	0	335	1252					



Data Provided by K-D-N.com 503-594-4224	
N/S street	NW 6th St
E/W street	NW Maple Ave
City, State	Redmond OR
Site Notes	
Location	44.291026 - -121.173973
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	29
Peak Hour Start	04:25:00 PM
Peak 15 Min Start	04:55:00 PM
PHF (15-Min Int)	0.91

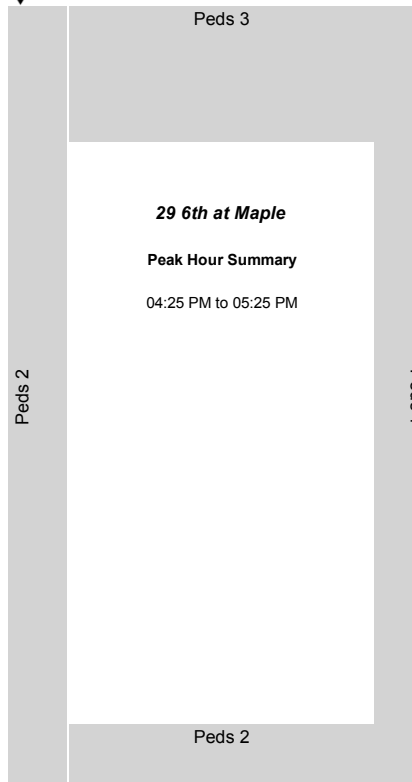
Eastbound
NW Maple Ave
Heavy Vehicle 1.6%

In 426 Out 554



Southbound NW 6th St Heavy Vehicle 2.0%				
In	494	Out	552	
Bicycles	Right	Thru	Left	U-Turn

1	150	303	40	0
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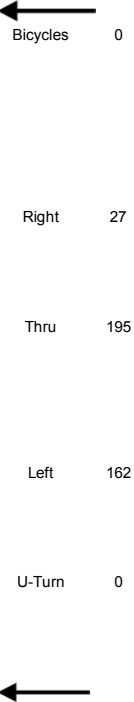
U-Turn	Left	Thru	Right	Bicycles
0	209	420	224	0

In	853	Out	619
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Heavy Vehicle 0.5%
NW 6th St
Northbound

Westbound
NW Maple Ave
Heavy Vehicle 1.0%

In 384 Out 431



Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
209	420	224	0	40	303	150	0	105	167	154	0	162	195	27	0	853	493	426	384	619	552	554	431
Percent Heavy Vehicles																							
1.0%	0.5%	0.0%	0.0%	10.0%	1.3%	1.3%	0.0%	3.8%	0.6%	1.3%	0.0%	0.0%	2.1%	0.0%	0.0%	0.5%	2.0%	1.6%	1.0%	1.0%	1.1%	1.4%	1.2%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	2	3	2	1	8		
All Vehicle Volumes																							
Time	Northbound NW 6th St				Southbound NW 6th St				Eastbound NW Maple Ave				Westbound NW Maple Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	11	32	16	0	2	35	11	0	5	17	7	0	6	9	4	0							
02:05:00 PM	11	26	23	0	3	22	8	0	8	13	23	0	15	11	3	0							
02:10:00 PM	16	30	19	0	2	19	7	0	2	12	16	0	10	14	3	0	471						
02:15:00 PM	16	33	19	0	4	31	6	0	5	12	16	0	14	18	5	0	495						
02:20:00 PM	14	35	16	0	3	24	12	0	7	9	24	0	12	5	3	0	493						
02:25:00 PM	17	32	12	0	6	23	3	0	10	14	9	0	13	13	2	0	497						
02:30:00 PM	10	42	8	0	2	20	7	0	7	12	8	0	25	15	1	0	475						
02:35:00 PM	12	32	9	0	2	42	12	0	3	8	18	0	7	10	1	0	467						
02:40:00 PM	9	30	23	0	4	23	3	0	7	11	16	0	10	12	4	0	465						
02:45:00 PM	9	35	25	0	4	36	11	0	4	18	18	0	15	8	3	0	494						
02:50:00 PM	12	30	28	0	6	33	13	0	4	13	15	0	11	8	2	0	513						
02:55:00 PM	8	37	15	0	2	26	6	0	5	11	22	0	17	13	1	0	524	1957					
03:00:00 PM	9	32	20	0	4	19	4	0	10	16	13	0	10	17	3	0	495	1959					
03:05:00 PM	19	29	20	0	5	33	13	0	3	14	15	0	15	16	1	0	503	1976					
03:10:00 PM	11	32	18	0	2	21	8	0	9	12	19	0	9	8	2	0	491	1977					
03:15:00 PM	11	27	10	0	3	22	4	0	8	6	16	0	10	14	1	0	466	1930					
03:20:00 PM	17	39	18	0	5	26	10	0	8	12	10	0	7	12	2	0	449	1932					
03:25:00 PM	13	31	12	0	3	27	10	0	10	11	17	0	10	8	2	0	452	1932					
03:30:00 PM	8	38	18	0	4	26	9	0	5	6	13	0	17	12	2	0	478	1933					
03:35:00 PM	12	30	24	0	6	30	13	0	10	6	17	0	19	12	2	0	493	1958					
03:40:00 PM	17	28	20	0	3	25	10	0	9	7	13	0	16	23	6	0	516	1983					
03:45:00 PM	15	40	14	0	5	26	13	0	7	12	11	0	12	21	4	0	538	1977					
03:50:00 PM	20	42	16	0	3	21	10	0	4	14	10	0	9	10	0	0	516	1961					
03:55:00 PM	18	42	19	0	3	23	13	0	11	7	8	0	13	8	1	0	505	1964					
04:00:00 PM	17	27	22	0	5	21	9	0	8	7	11	0	10	15	6	0	483	1965					
04:05:00 PM	18	38	24	0	3	29	12	0	8	8	7	0	16	17	1	0	505	1963					
04:10:00 PM	12	29	13	0	3	26	9	0	10	13	10	0	24	20	5	0	513	1986					
04:15:00 PM	15	27	20	0	4	21	9	0	8	9	11	0	11	5	1	0	496	1995					
04:20:00 PM	13	29	16	0	1	22	12	0	6	14	15	0	16	22	5	0	486	2000					
04:25:00 PM	13	32	20	0	2	28	10	0	8	15	13	0	14	9	1	0	477	2011					
04:30:00 PM	15	37	12	0	3	25	15	0	9	16	13	0	15	15	5	0	516	2033					
04:35:00 PM	13	21	20	0	3	29	11	0	12	10	12	0	16	22	0	0	514	2021					
04:40:00 PM	16	37	20	0	6	27	12	0	5	9	10	0	8	17	1	0	517	2012					
04:45:00 PM	13	29	14	0	1	28	11	0	12	14	16	0	22	12	4	0	513	2008					
04:50:00 PM	17	25	19	0	2	26	21	0	12	12	9	0	11	12	3	0	513	2018					
04:55:00 PM	31	37	21	0	3	21	13	0	8	15	11	0	13	13	3	0	534	2041					
05:00:00 PM	15	38	16	0	5	17	10	0	14	24	12	0	14	15	4	0	542	2067					
05:05:00 PM	22	62	29	0	5	23	9	0	3	13	16	0	10	24	1	0	590	2103					
05:10:00 PM	18	30	18	0	5	24	14	0	5	11	10	0	12	20	4	0	572	2100					
05:15:00 PM	15	36	19	0	3	30	15	0	7	11	14	0	14	15	1	0	568	2139					
05:20:00 PM	21	36	16	0	2	25	9	0	10	17	18	0	13	21	0	0	539	2156					
05:25:00 PM	25	33	22	0	2	17	8	0	9	11	11	0	8	11	1	0	526	2149					
05:30:00 PM	22	27	12	0	4	23	7	0	3	11	9	0	6	15	1	0	486	2109					
05:35:00 PM	21	39	11	0	1	18	25	0	8	19	13	0	9	12	2	0	476	2118					
05:40:00 PM	16	33	24	0	2	23	8	0	7	7	13	0	16	13	1	0	481	2113					
05:45:00 PM	21	19	20	0	7	22	15	0	7	18	5	0	10	18	3	0	506	2102					
05:50:00 PM	16	22	16	0	1	16	9	0	12	15	16	0	14	21	6	0	492	2097					
05:55:00 PM	17	30	13	0	4	17	15	0	6	6	10	0	11	21	1	0	480	2059					

Data Provided by K-D-N.com 503-594-4224	
N/S street	NW Canal Blvd
E/W street	NW Larch Ave
City, State	Redmond OR
Site Notes	
Location	44.289197 - -121.16834
Start Date	Wednesday, October 11, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	03:35:00 PM
Peak 15 Min Start	03:55:00 PM
PHF (15-Min Int)	0.88

Eastbound
NW Larch Ave
Heavy Vehicle 4.7%

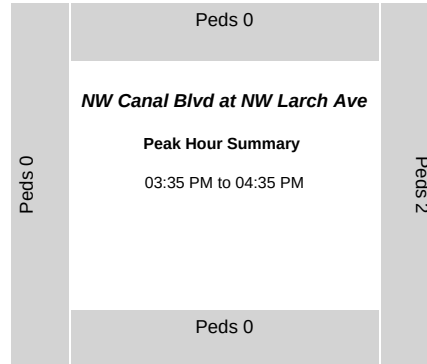


U-Turn	0
Left	16
Thru	115
Right	19
Bicycles	0

Southbound
NW Canal Blvd
Heavy Vehicle 1.4%

In	138	Out	71	
Bicycles	Right	Thru	Left	U-Turn

0	27	20	91	0
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U-Turn Left Thru Right Bicycles

1	20	47	36	0
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In	104	Out	49
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Heavy Vehicle 0.0%
NW Canal Blvd
Northbound

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
20	47	36	1	91	20	27	0	16	115	19	0	9	24	8	0	104	138	150	41	49	71	71	242
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%	5.2%	5.3%	0.0%	0.0%	16.7%	0.0%	0.0%	0.0%	1.4%	4.7%	9.8%	2.0%	0.0%	5.6%	3.3%

PHV- Bicycles																PHV - Pedestrians					
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2

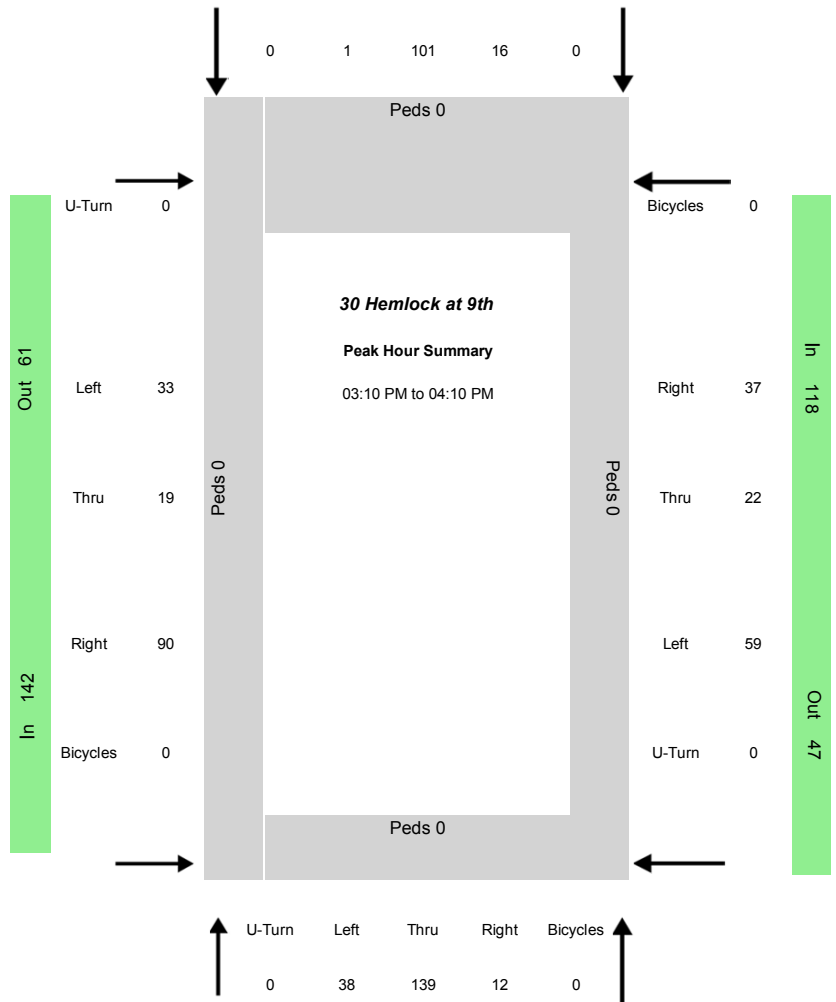
All Vehicle Volumes																		
Time	Northbound NW Canal Blvd				Southbound NW Canal Blvd				Eastbound NW Larch Ave				Westbound NW Larch Ave				15 Min	1 HR
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
02:00:00 PM	2	3	2	0	9	4	6	0	3	2	2	0	0	1	1	0		
02:05:00 PM	0	3	2	0	5	4	5	0	3	6	0	0	0	4	1	0		
02:10:00 PM	0	4	1	0	1	2	7	0	3	11	3	0	2	2	0	0	104	
02:15:00 PM	5	5	1	0	6	1	1	0	3	11	1	0	0	5	3	0	111	
02:20:00 PM	1	7	2	0	5	3	0	0	3	16	2	0	4	2	1	0	124	
02:25:00 PM	3	5	2	0	8	3	5	0	2	10	1	0	0	3	1	0	131	
02:30:00 PM	4	3	4	0	6	1	0	0	1	6	1	0	1	1	0	0	117	
02:35:00 PM	3	3	4	0	4	2	2	0	6	5	0	0	3	2	1	0	106	
02:40:00 PM	2	5	3	0	4	3	2	0	2	8	0	0	1	1	1	0	95	
02:45:00 PM	3	3	0	0	6	1	3	0	2	9	1	0	0	4	0	0	99	
02:50:00 PM	0	6	2	0	6	1	4	0	5	6	1	0	1	3	0	0	99	
02:55:00 PM	0	2	1	0	5	3	2	0	1	6	1	0	1	2	2	0	93	423
03:00:00 PM	1	3	2	0	7	2	0	0	1	16	1	0	1	7	0	0	102	429
03:05:00 PM	0	4	6	0	7	4	0	0	0	6	4	0	0	1	0	0	99	428
03:10:00 PM	2	2	2	0	6	4	4	0	2	6	1	0	1	2	3	0	108	427
03:15:00 PM	1	2	1	0	6	4	2	0	4	3	3	0	1	1	2	0	97	415
03:20:00 PM	0	0	2	0	6	3	5	0	3	11	0	0	0	2	2	0	99	403
03:25:00 PM	0	1	4	0	3	2	0	0	3	9	2	0	2	1	0	0	91	387
03:30:00 PM	1	3	1	0	6	2	3	0	2	4	2	0	0	3	0	0	88	386
03:35:00 PM	3	6	3	1	5	1	1	0	1	12	4	0	0	2	0	0	93	390
03:40:00 PM	4	6	4	0	8	1	1	0	0	8	0	0	0	1	0	0	99	391
03:45:00 PM	3	5	2	0	10	1	0	0	0	10	1	0	0	1	0	0	105	392
03:50:00 PM	0	3	0	0	4	0	2	0	2	12	1	0	1	3	0	0	94	385
03:55:00 PM	1	1	4	0	11	1	3	0	4	11	2	0	1	6	0	0	106	404

04:00:00 PM	5	7	4	0	9	3	1	0	1	6	1	0	1	2	1	0	114	404
04:05:00 PM	0	3	3	0	11	2	4	0	2	7	2	0	0	2	1	0	123	409
04:10:00 PM	0	3	1	0	7	3	2	0	1	11	0	0	0	1	1	0	108	404
04:15:00 PM	1	3	5	0	8	5	2	0	1	8	2	0	1	3	2	0	108	415
04:20:00 PM	3	6	2	0	5	0	1	0	2	9	0	0	3	1	0	0	103	413
04:25:00 PM	0	1	4	0	9	2	4	0	1	10	1	0	0	1	3	0	109	422
04:30:00 PM	0	3	4	0	4	1	6	0	1	11	5	0	2	1	0	0	106	433
04:35:00 PM	1	3	3	0	5	3	0	0	1	4	0	0	0	0	0	0	94	414
04:40:00 PM	1	1	2	0	6	0	1	0	0	6	1	0	0	1	0	0	77	400
04:45:00 PM	1	1	2	0	7	1	4	0	1	11	0	0	2	3	0	0	72	400
04:50:00 PM	1	2	4	0	6	1	1	0	2	12	1	0	0	3	0	0	85	405
04:55:00 PM	1	1	5	0	7	2	1	0	1	9	0	0	0	0	0	0	93	387
05:00:00 PM	1	3	5	0	5	1	4	0	2	10	0	0	1	1	0	0	93	379
05:05:00 PM	0	3	2	0	6	1	2	0	2	21	2	0	0	4	0	0	103	385
05:10:00 PM	0	4	0	0	2	2	2	0	5	16	3	0	0	2	0	0	112	391
05:15:00 PM	3	4	1	0	8	2	2	0	2	18	2	0	1	1	0	0	123	394
05:20:00 PM	1	1	2	0	12	2	2	0	0	15	3	0	0	2	1	0	121	403
05:25:00 PM	3	0	0	0	8	3	0	0	0	4	3	0	2	1	1	0	110	392
05:30:00 PM	3	3	1	0	9	1	1	0	1	7	2	0	0	0	1	0	95	383
05:35:00 PM	0	5	1	0	6	0	1	0	0	10	2	0	0	2	2	0	83	392
05:40:00 PM	3	4	2	0	11	4	0	0	0	14	1	0	1	1	0	0	99	414
05:45:00 PM	1	4	3	0	7	1	0	0	1	10	2	0	1	1	0	0	101	412
05:50:00 PM	2	1	1	0	4	3	0	0	1	11	5	0	0	1	0	0	101	408
05:55:00 PM	1	2	2	0	4	1	0	0	0	10	4	0	1	1	0	0	86	407



Data Provided by K-D-N.com 503-594-4224	
N/S street	NE 9th St
E/W street	NE Hemlock Ave
City, State	Redmond OR
Site Notes	
Location	44.283804 - -121.158847
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	30
Peak Hour Start	03:10:00 PM
Peak 15 Min Start	03:30:00 PM
PHF (15-Min Int)	0.76

Eastbound
NE Hemlock Ave
Heavy Vehicle 13.4%



U-Turn	Left	Thru	Right	Bicycles
0	38	139	12	0

In	189	Out	250
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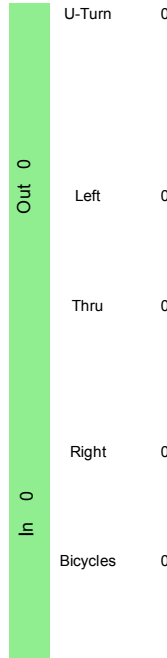
Heavy Vehicle 9.0%
NE 9th St
Northbound

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
38	139	12	0	16	101	1	0	33	19	90	0	59	22	37	0	189	118	142	118	250	209	61	47
Percent Heavy Vehicles																							
21.1%	5.0%	16.7%	0.0%	18.8%	12.9%	0.0%	0.0%	6.1%	21.1%	14.4%	0.0%	5.1%	22.7%	2.7%	0.0%	9.0%	13.6%	13.4%	7.6%	11.6%	4.8%	21.3%	19.1%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
All Vehicle Volumes																							
Time	Northbound NE 9th St				Southbound NE 9th St				Eastbound NE Hemlock Ave				Westbound NE Hemlock Ave				15 Min		1 HR				
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	1	13	0	0	0	6	1	0	0	0	6	0	1	3	1	0							
02:05:00 PM	2	6	3	0	1	2	0	0	0	0	8	0	3	1	1	0							
02:10:00 PM	0	4	2	0	2	6	0	0	2	2	1	0	0	1	1	0	80						
02:15:00 PM	4	7	0	0	4	11	0	0	1	1	7	0	0	2	4	0	89						
02:20:00 PM	4	12	0	0	1	11	1	0	2	2	1	0	1	3	2	0	102						
02:25:00 PM	2	4	4	0	1	9	0	0	6	0	3	0	3	1	0	0	114						
02:30:00 PM	3	7	2	0	1	14	1	0	2	3	7	0	4	1	6	0	124						
02:35:00 PM	9	13	1	0	1	9	1	0	3	1	8	0	3	2	5	0	140						
02:40:00 PM	2	10	3	0	2	6	1	0	2	3	10	0	1	1	1	0	149						
02:45:00 PM	3	11	0	0	3	14	0	0	2	3	4	0	2	3	0	0	143						
02:50:00 PM	3	6	2	0	3	6	0	0	3	1	2	0	1	6	2	0	122						
02:55:00 PM	1	11	2	0	0	10	1	0	2	3	3	0	3	2	2	0	120	463					
03:00:00 PM	5	9	1	0	3	10	2	0	3	2	5	0	3	1	0	0	119	475					
03:05:00 PM	3	9	1	0	1	8	0	0	2	2	9	0	2	4	2	0	127	491					
03:10:00 PM	2	12	1	0	3	14	0	0	0	1	3	0	4	0	1	0	128	511					
03:15:00 PM	1	13	3	0	1	8	1	0	3	1	4	0	2	0	1	0	122	508					
03:20:00 PM	7	9	0	0	1	7	0	0	2	4	10	0	1	3	1	0	124	513					
03:25:00 PM	3	3	0	0	0	5	0	0	2	1	14	0	4	3	0	0	118	515					
03:30:00 PM	6	13	2	0	3	7	0	0	1	2	3	0	12	3	9	0	141	525					
03:35:00 PM	3	13	2	0	1	14	0	0	4	3	10	0	8	3	6	0	163	536					
03:40:00 PM	4	14	1	0	1	7	0	0	3	0	15	0	6	3	4	0	186	552					
03:45:00 PM	2	13	1	0	0	8	0	0	2	0	9	0	3	1	0	0	164	546					
03:50:00 PM	3	12	0	0	1	5	0	0	4	2	4	0	2	2	2	0	134	548					
03:55:00 PM	2	9	2	0	3	7	0	0	3	1	2	0	3	2	1	0	111	543					
04:00:00 PM	2	14	0	0	0	12	0	0	5	3	6	0	7	1	9	0	131	558					
04:05:00 PM	3	14	0	0	2	7	0	0	4	1	10	0	7	1	3	0	146	567					
04:10:00 PM	3	12	1	0	0	7	0	0	2	1	4	0	4	1	2	0	148	563					
04:15:00 PM	2	8	0	0	0	8	0	0	1	2	8	0	1	3	2	0	124	560					
04:20:00 PM	4	11	1	0	2	8	0	0	0	2	7	0	3	2	2	0	114	557					
04:25:00 PM	5	10	2	0	1	7	1	0	3	1	7	0	4	1	2	0	121	566					
04:30:00 PM	2	12	0	0	1	5	0	0	2	2	6	0	8	0	6	0	130	549					
04:35:00 PM	4	10	0	0	1	7	0	0	5	3	5	0	3	2	3	0	131	525					
04:40:00 PM	2	12	0	0	0	7	2	0	0	0	9	0	5	2	7	0	133	513					
04:45:00 PM	2	11	0	0	1	1	0	0	2	0	9	0	5	4	3	0	127	512					
04:50:00 PM	0	10	1	0	1	6	0	0	4	1	5	0	1	0	3	0	116	507					
04:55:00 PM	0	7	0	0	0	3	1	0	4	0	8	0	2	0	1	0	96	498					
05:00:00 PM	2	9	0	0	0	7	1	0	4	0	8	0	2	1	1	0	93	474					
05:05:00 PM	2	16	0	0	0	9	1	0	2	0	17	0	3	0	2	0	113	474					
05:10:00 PM	2	17	0	0	1	2	0	0	2	1	11	0	2	0	4	0	129	479					
05:15:00 PM	3	16	3	0	0	11	0	0	4	0	5	0	0	0	2	0	138	488					
05:20:00 PM	2	12	1	0	0	10	3	0	6	2	6	0	3	1	3	0	135	495					
05:25:00 PM	1	7	0	0	0	3	0	0	3	0	6	0	0	2	0	0	115	473					
05:30:00 PM	1	7	1	0	1	5	0	0	0	1	7	0	1	1	0	0	96	454					
05:35:00 PM	0	12	0	0	0	8	1	0	4	1	3	0	2	0	4	0	82	446					
05:40:00 PM	1	8	0	0	1	2	0	0	5	0	6	0	0	0	1	0	84	424					
05:45:00 PM	3	7	0	0	0	3	0	0	2	0	1	0	0	0	0	0	75	402					
05:50:00 PM	1	8	0	0	0	3	0	0	3	0	2	0	1	0	1	0	59	389					
05:55:00 PM	1	6	1	0	0	2	0	0	3	0	3	0	0	0	1	0	52	380					

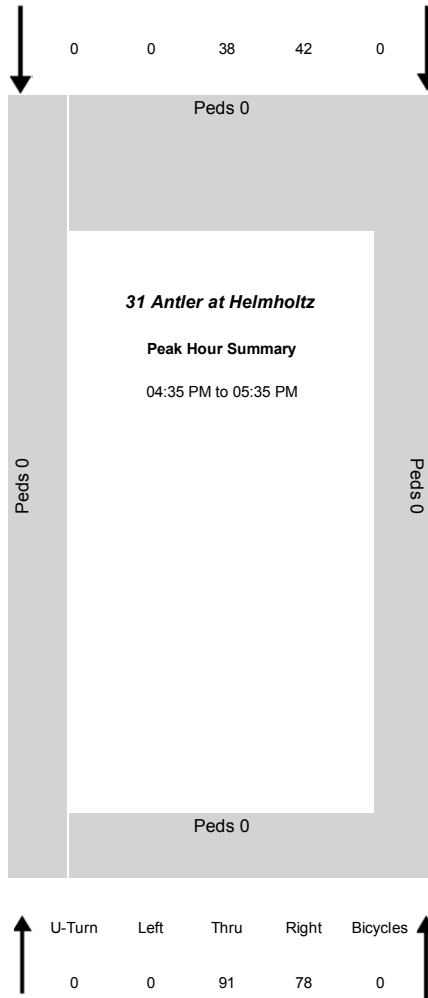


Data Provided by K-D-N.com 503-594-4224	
N/S street	NW Helmholtz Way
E/W street	W Antler Ave
City, State	Redmond OR
Site Notes	
Location	44.276304 - -121.219811
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	31
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:20:00 PM
PHF (15-Min Int)	0.86

Eastbound
W Antler Ave
Heavy Vehicle NaN



Southbound SW Helmholtz Way Heavy Vehicle 2.5%				
In	80	Out	142	
Bicycles		Right	Thru	Left



Northbound NW Helmholtz Way Heavy Vehicle 0.6%				
In	169	Out	78	
Bicycles		Right	Thru	Left

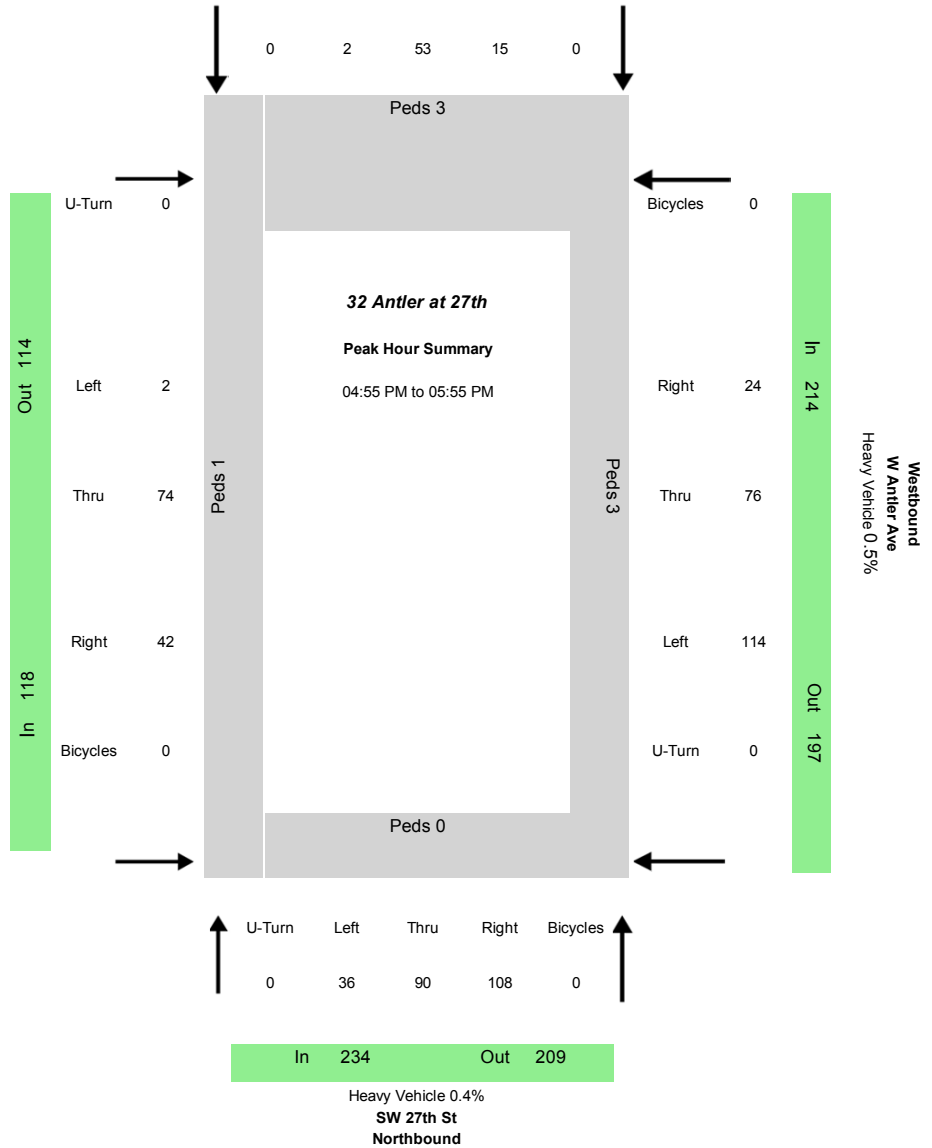
Westbound
W Antler Ave
Heavy Vehicle 0.0%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	91	78	0	42	38	0	0	0	0	0	0	40	0	51	0	169	80	0	91	78	142	0	120
Percent Heavy Vehicles																							
0.0%	0.0%	1.3%	0.0%	0.0%	5.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	2.5%	#DIV/0!	0.0%	2.6%	0.0%	#DIV/0!	0.8%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk				Sum		
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
All Vehicle Volumes																							
Time	Northbound NW Helmholtz Way				Southbound SW Helmholtz Way				Eastbound W Antler Ave				Westbound W Antler Ave										
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0	3	1	0	1	3	0	0	1	0	0	0	2	0	3	0							
02:05:00 PM	0	2	1	0	5	6	0	0	0	0	0	0	1	0	0	0							
02:10:00 PM	0	2	1	0	3	5	0	0	0	0	0	0	4	0	5	0	49						
02:15:00 PM	0	2	3	0	1	5	0	0	0	0	0	0	2	0	2	0	50						
02:20:00 PM	0	2	3	0	3	3	0	0	0	0	0	0	2	0	2	0	50						
02:25:00 PM	0	3	2	0	4	2	0	0	0	0	0	0	8	0	1	0	50						
02:30:00 PM	0	9	2	0	2	2	0	0	0	0	0	0	1	0	3	0	54						
02:35:00 PM	0	4	5	0	4	1	0	0	0	0	0	0	5	0	2	0	60						
02:40:00 PM	0	9	3	0	2	1	0	0	0	0	0	0	1	0	2	0	58						
02:45:00 PM	0	7	6	0	1	3	0	0	0	0	0	0	4	0	4	0	64						
02:50:00 PM	0	5	3	0	1	0	0	0	0	0	0	0	5	0	0	0	57						
02:55:00 PM	0	6	5	0	3	3	0	0	0	0	0	0	1	0	3	0	60	217					
03:00:00 PM	0	5	5	0	4	4	0	0	0	0	0	0	0	0	1	0	54	222					
03:05:00 PM	0	1	5	0	0	3	0	0	0	0	0	0	5	0	2	0	56	223					
03:10:00 PM	0	1	3	0	1	2	0	0	0	0	0	0	4	0	2	0	48	216					
03:15:00 PM	0	9	9	0	3	1	0	0	0	0	0	0	4	0	2	0	57	229					
03:20:00 PM	0	6	8	0	0	5	0	0	0	0	0	0	2	0	1	0	63	236					
03:25:00 PM	0	4	2	0	3	2	0	0	0	0	0	0	1	0	0	0	62	228					
03:30:00 PM	0	2	4	0	4	3	0	0	0	0	0	0	2	0	0	0	49	224					
03:35:00 PM	0	4	2	0	0	4	0	0	0	0	0	0	1	0	1	0	39	215					
03:40:00 PM	0	5	5	0	2	3	0	0	0	0	0	0	3	0	5	0	50	220					
03:45:00 PM	0	3	3	0	1	4	0	0	0	0	0	0	5	0	2	0	53	213					
03:50:00 PM	0	6	3	0	3	1	0	0	0	0	0	0	5	0	3	0	62	220					
03:55:00 PM	0	9	5	0	2	5	0	0	0	0	0	0	4	0	5	0	69	229					
04:00:00 PM	0	7	6	0	2	3	0	0	0	0	0	0	4	0	4	0	77	236					
04:05:00 PM	0	4	7	0	2	5	0	0	0	0	0	0	2	0	5	0	81	245					
04:10:00 PM	0	3	9	0	2	1	0	0	0	0	0	0	2	0	7	0	75	256					
04:15:00 PM	0	12	4	0	3	4	0	0	0	0	0	0	2	0	2	0	76	255					
04:20:00 PM	0	4	7	0	3	3	0	0	0	0	0	0	1	0	4	0	73	255					
04:25:00 PM	0	6	11	0	2	2	0	0	0	0	0	0	2	0	2	0	74	268					
04:30:00 PM	0	10	10	0	3	1	0	0	0	0	0	0	3	0	3	0	77	283					
04:35:00 PM	0	5	6	0	3	7	0	0	0	0	0	0	1	0	3	0	80	296					
04:40:00 PM	0	5	1	0	3	1	0	0	0	0	0	0	5	0	2	0	72	290					
04:45:00 PM	0	5	10	0	4	4	0	0	0	0	0	0	2	0	0	0	67	297					
04:50:00 PM	0	9	11	0	4	2	0	0	0	0	0	0	2	0	4	0	74	308					
04:55:00 PM	0	6	5	0	3	2	0	0	0	0	0	0	4	0	3	0	80	301					
05:00:00 PM	0	4	7	0	1	1	0	0	0	0	0	0	3	0	8	0	79	299					
05:05:00 PM	0	10	8	0	2	5	0	0	0	0	0	0	3	0	4	0	79	306					
05:10:00 PM	0	6	8	0	1	5	0	0	0	0	0	0	6	0	7	0	89	315					
05:15:00 PM	0	6	7	0	6	2	0	0	0	0	0	0	2	0	7	0	95	318					
05:20:00 PM	0	6	7	0	3	0	0	0	0	0	0	0	3	0	6	0	88	321					
05:25:00 PM	0	13	5	0	6	6	0	0	0	0	0	0	4	0	3	0	92	333					
05:30:00 PM	0	16	3	0	6	3	0	0	0	0	0	0	5	0	4	0	99	340					
05:35:00 PM	0	4	5	0	2	1	0	0	0	0	0	0	2	0	3	0	91	332					
05:40:00 PM	0	1	4	0	2	5	0	0	0	0	0	0	6	0	2	0	74	335					
05:45:00 PM	0	5	5	0	4	4	0	0	0	0	0	0	2	0	3	0	60	333					
05:50:00 PM	0	5	7	0	4	5	0	0	0	0	0	0	2	0	6	0	72	330					
05:55:00 PM	0	8	7	0	2	1	0	0	0	0	0	0	3	0	1	0	74	329					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 27th St
E/W street	W Antler Ave
City, State	Redmond OR
Site Notes	
Location	44.276414 - -121.19928
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	32
Peak Hour Start	04:55:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.87

Eastbound
W Antler Ave
Heavy Vehicle 2.5%



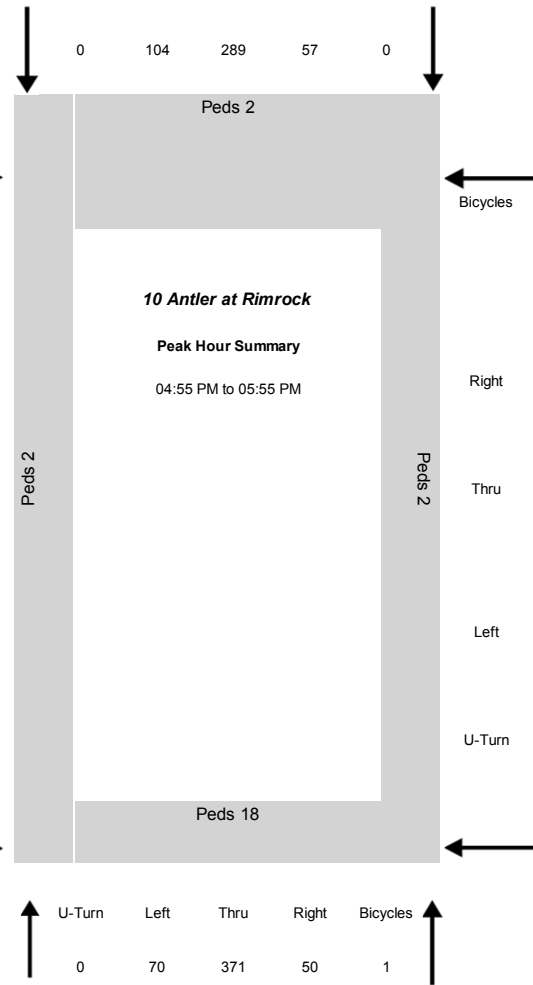
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
36	90	108	0	15	53	2	0	2	74	42	0	114	76	24	0	234	70	118	214	209	116	114	197
Percent Heavy Vehicles																							
0.0%	0.0%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%	2.4%	0.0%	0.9%	0.0%	0.0%	0.0%	0.4%	0.0%	2.5%	0.5%	1.0%	0.0%	0.0%	1.5%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	3	7		
All Vehicle Volumes																							
Time	Northbound SW 27th St				Southbound SW 27th St				Eastbound W Antler Ave				Westbound W Antler Ave										
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	3	5	2	0	1	0	0	0	0	1	0	0	3	3	2	0							
02:05:00 PM	1	4	6	0	1	1	0	0	0	3	5	0	5	4	2	0							
02:10:00 PM	2	3	6	0	0	1	0	0	0	3	4	0	4	4	0	0	79						
02:15:00 PM	1	5	4	0	0	4	0	0	0	3	4	0	3	3	1	0	87						
02:20:00 PM	3	6	10	0	0	5	0	0	0	1	3	0	6	2	0	0	91						
02:25:00 PM	3	1	4	0	1	2	1	0	0	5	4	0	4	3	2	0	94						
02:30:00 PM	1	0	9	0	2	3	0	0	0	0	2	0	6	4	1	0	94						
02:35:00 PM	1	4	7	0	1	4	0	0	0	4	2	0	5	6	0	0	92						
02:40:00 PM	4	3	8	0	2	3	0	0	1	5	3	0	9	7	1	0	108						
02:45:00 PM	1	7	6	0	0	3	0	0	0	3	3	0	11	5	3	0	122						
02:50:00 PM	2	3	5	0	2	10	0	0	0	7	0	0	4	4	1	0	126						
02:55:00 PM	2	3	12	0	0	0	0	0	0	5	2	0	0	2	1	0	107	388					
03:00:00 PM	4	9	8	0	3	1	0	0	0	8	3	0	6	4	2	0	113	416					
03:05:00 PM	2	4	12	0	0	4	1	0	0	4	0	0	7	3	0	0	112	421					
03:10:00 PM	3	5	7	0	0	4	1	0	0	6	1	0	5	5	3	0	125	434					
03:15:00 PM	3	6	9	0	0	6	0	0	0	4	2	0	14	9	3	0	133	462					
03:20:00 PM	4	6	12	0	1	2	0	0	0	4	2	0	12	7	0	0	146	476					
03:25:00 PM	2	2	9	0	2	5	0	0	0	4	1	0	8	3	0	0	142	482					
03:30:00 PM	1	2	9	0	0	1	1	0	0	4	3	0	8	1	0	0	116	484					
03:35:00 PM	2	7	4	0	2	2	0	0	1	4	1	0	9	3	2	0	103	487					
03:40:00 PM	2	7	14	0	2	4	0	0	0	1	2	0	7	5	3	0	114	488					
03:45:00 PM	3	10	5	0	1	4	0	0	0	5	2	0	12	10	6	0	142	504					
03:50:00 PM	4	3	5	0	2	4	0	0	0	3	2	0	6	7	2	0	143	504					
03:55:00 PM	1	6	6	0	0	3	0	0	0	6	2	0	5	4	0	0	129	510					
04:00:00 PM	5	5	10	0	2	7	0	0	1	2	4	0	7	15	1	0	130	521					
04:05:00 PM	3	4	8	0	0	3	0	0	0	3	2	0	4	4	2	0	125	517					
04:10:00 PM	2	8	11	0	0	3	0	0	1	4	1	0	4	5	0	0	131	516					
04:15:00 PM	0	6	8	0	1	5	0	0	1	2	3	0	7	8	3	0	116	504					
04:20:00 PM	0	6	8	0	2	3	0	0	0	5	0	0	4	4	2	0	117	488					
04:25:00 PM	1	4	9	0	0	4	0	0	0	4	5	0	10	2	2	0	119	493					
04:30:00 PM	4	1	13	0	1	3	0	0	1	8	3	0	9	4	1	0	123	511					
04:35:00 PM	3	9	5	0	1	1	0	0	0	3	1	0	7	5	0	0	124	509					
04:40:00 PM	0	9	10	0	3	3	0	0	1	4	1	0	6	3	0	0	123	502					
04:45:00 PM	2	6	15	0	2	1	0	0	1	7	3	0	9	6	2	0	129	498					
04:50:00 PM	1	4	15	0	2	5	0	0	1	4	1	0	7	5	2	0	141	507					
04:55:00 PM	2	5	9	0	0	4	0	0	0	8	3	0	9	5	0	0	146	519					
05:00:00 PM	1	9	12	0	2	1	1	0	0	2	2	0	7	3	3	0	135	503					
05:05:00 PM	6	8	7	0	3	3	0	0	0	7	5	0	17	10	2	0	156	538					
05:10:00 PM	1	7	11	0	1	4	0	0	0	3	4	0	13	10	3	0	168	556					
05:15:00 PM	6	4	7	0	2	8	0	0	1	11	2	0	8	7	1	0	182	569					
05:20:00 PM	5	6	6	0	0	3	1	0	0	6	7	0	9	7	5	0	169	590					
05:25:00 PM	4	10	11	0	0	5	0	0	1	9	3	0	2	7	1	0	165	602					
05:30:00 PM	3	9	6	0	0	8	0	0	0	2	5	0	10	4	0	0	155	601					
05:35:00 PM	2	11	8	0	0	3	0	0	0	3	3	0	8	4	3	0	145	611					
05:40:00 PM	1	8	9	0	4	8	0	0	0	6	4	0	9	5	2	0	148	627					
05:45:00 PM	3	8	15	0	1	0	0	0	0	9	1	0	13	7	1	0	159	631					
05:50:00 PM	2	5	7	0	2	6	0	0	0	8	3	0	9	7	3	0	166	636					
05:55:00 PM	3	1	7	0	0	6	0	0	0	4	0	0	8	6	1	0	146	627					



Data Provided by K-D-N.com 503-594-4224	
N/S street	NW 19th St
E/W street	W Antler Ave
City, State	Redmond OR
Site Notes	
Location	44.276463 - -121.189272
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	10
Peak Hour Start	04:55:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.93

Eastbound
W Antler Ave
Heavy Vehicle 1.1%

In 269 Out 358	U-Turn	0
	Left	104
	Thru	121
	Right	44
	Bicycles	0



In 416 Out 228	Bicycles	0
	Right	177
	Thru	184
	Left	55
	U-Turn	0

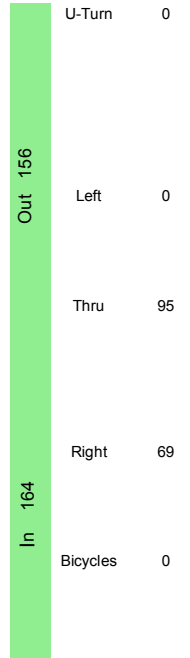
Westbound
W Antler Ave
Heavy Vehicle 0.5%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
70	371	50	0	57	289	104	0	104	121	44	0	55	184	177	0	491	450	269	416	388	652	358	228
Percent Heavy Vehicles																							
0.0%	1.1%	2.0%	0.0%	0.0%	0.3%	0.0%	0.0%	1.9%	0.8%	0.0%	0.0%	1.8%	0.5%	0.0%	0.0%	1.0%	0.2%	1.1%	0.5%	0.5%	0.9%	0.3%	0.9%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	18	2	2	2	24		
All Vehicle Volumes																							
Time	Northbound NW 19th St				Southbound SW Rimrock Dr				Eastbound W Antler Ave				Westbound W Antler Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	2	23	5	0	6	10	2	0	8	12	3	0	2	6	5	0							
02:05:00 PM	3	16	5	0	2	15	3	0	3	7	2	0	4	7	11	0							
02:10:00 PM	1	21	4	0	6	12	2	0	4	10	3	0	7	6	5	0	243						
02:15:00 PM	1	16	4	0	6	14	4	0	5	7	3	0	2	9	7	0	237						
02:20:00 PM	1	17	4	0	5	20	3	0	6	5	3	0	5	10	7	0	245						
02:25:00 PM	0	9	3	0	8	15	2	0	4	7	6	0	3	9	11	0	241						
02:30:00 PM	2	25	7	0	5	31	18	0	3	5	1	0	2	9	10	0	281						
02:35:00 PM	5	31	4	0	9	6	3	0	8	3	3	0	5	12	8	0	292						
02:40:00 PM	2	47	9	0	5	20	8	0	11	10	3	0	5	4	6	0	345						
02:45:00 PM	10	29	10	0	9	20	2	0	5	6	4	0	3	16	11	0	352						
02:50:00 PM	6	33	8	0	4	22	2	0	10	16	2	0	1	6	11	0	376						
02:55:00 PM	2	26	2	0	4	22	4	0	14	11	3	0	4	11	7	0	356	1185					
03:00:00 PM	4	32	6	0	4	15	3	0	8	7	9	0	2	8	14	0	343	1213					
03:05:00 PM	1	25	2	0	5	21	6	0	12	12	2	0	3	10	19	0	340	1253					
03:10:00 PM	3	29	7	0	6	14	7	0	8	10	4	0	3	14	11	0	346	1288					
03:15:00 PM	2	18	2	0	15	25	7	0	6	7	7	0	2	9	12	0	346	1322					
03:20:00 PM	7	29	4	0	11	21	7	0	13	11	13	0	0	8	3	0	355	1363					
03:25:00 PM	2	21	8	0	10	15	3	0	11	14	5	0	1	4	11	0	344	1391					
03:30:00 PM	3	17	1	0	7	17	5	0	11	9	3	0	2	9	10	0	326	1367					
03:35:00 PM	3	16	3	0	12	14	6	0	6	6	3	0	4	13	17	0	302	1373					
03:40:00 PM	4	21	7	0	10	16	2	0	8	3	1	0	13	17	24	0	323	1369					
03:45:00 PM	5	14	4	0	8	21	5	0	4	5	6	0	3	28	20	0	352	1367					
03:50:00 PM	2	23	6	0	4	27	6	0	1	9	0	0	6	5	15	0	353	1350					
03:55:00 PM	4	21	1	0	9	16	4	0	4	10	2	0	3	8	13	0	322	1335					
04:00:00 PM	7	19	5	0	4	26	8	0	7	5	7	0	7	13	8	0	315	1339					
04:05:00 PM	5	25	6	0	6	22	5	0	7	6	4	0	2	6	10	0	315	1325					
04:10:00 PM	5	26	4	0	7	20	4	0	3	8	5	0	4	12	14	0	332	1321					
04:15:00 PM	2	19	5	0	3	22	8	0	8	5	0	0	1	11	13	0	313	1306					
04:20:00 PM	3	21	1	0	4	27	3	0	12	3	5	0	2	9	10	0	309	1279					
04:25:00 PM	6	33	5	0	6	24	9	0	10	7	2	0	1	11	9	0	320	1297					
04:30:00 PM	5	28	3	0	2	26	6	0	14	9	2	0	2	8	9	0	337	1317					
04:35:00 PM	3	25	4	0	7	23	4	0	3	7	5	0	1	12	12	0	343	1320					
04:40:00 PM	4	21	4	0	5	27	8	0	5	15	3	0	4	12	10	0	338	1312					
04:45:00 PM	8	27	1	0	5	21	10	0	11	10	4	0	1	2	14	0	338	1303					
04:50:00 PM	5	25	3	0	5	13	12	0	12	18	4	0	2	12	12	0	355	1322					
04:55:00 PM	5	26	4	0	12	29	8	0	6	6	3	0	6	14	12	0	368	1358					
05:00:00 PM	7	25	3	0	6	10	11	0	10	9	3	0	2	21	12	0	373	1361					
05:05:00 PM	7	31	6	0	7	24	8	0	7	10	4	0	3	16	26	0	399	1406					
05:10:00 PM	8	38	3	0	6	27	10	0	10	11	2	0	2	22	10	0	417	1443					
05:15:00 PM	5	33	4	0	6	24	12	0	8	5	7	0	1	21	13	0	437	1485					
05:20:00 PM	1	28	6	0	2	26	7	0	5	11	3	0	9	18	24	0	428	1525					
05:25:00 PM	9	20	3	0	4	28	3	0	4	15	1	0	9	11	18	0	404	1527					
05:30:00 PM	9	31	5	0	3	24	11	0	15	7	4	0	3	8	13	0	398	1546					
05:35:00 PM	3	44	3	0	4	20	12	0	9	8	4	0	6	9	15	0	395	1577					
05:40:00 PM	5	26	3	0	0	25	10	0	10	10	4	0	5	22	14	0	404	1593					
05:45:00 PM	4	29	5	0	2	27	8	0	10	10	3	0	4	9	10	0	392	1600					
05:50:00 PM	7	40	5	0	5	25	4	0	10	19	6	0	5	13	10	0	404	1626					
05:55:00 PM	4	30	9	0	5	20	7	0	8	9	5	0	4	9	10	0	390	1615					



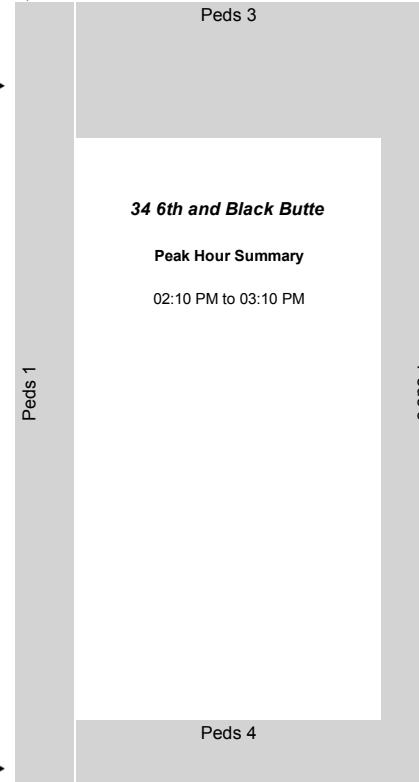
Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 6th St
E/W street	SW Black Butte Blvd
City, State	Redmond OR
Site Notes	
Location	44.275514 - -121.174284
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	02:10:00 PM
Peak 15 Min Start	02:20:00 PM
PHF (15-Min Int)	0.89

Eastbound
SW Black Butte Blvd
Heavy Vehicle 1.2%



Southbound SW 6th St Heavy Vehicle 2.7%				
In	787	Out	0	
Bicycles		Right	Thru	Left
				U-Turn

0	79	685	23	0
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U-Turn	Left	Thru	Right	Bicycles
0	0	0	0	0

In	0	Out	782
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Heavy Vehicle NaN
SW 6th St
Northbound

Westbound
SW Black Butte Blvd
Heavy Vehicle 0.0%



Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	23	685	79	0	0	95	69	0	28	77	0	0	0	787	164	105	782	0	156	118
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	2.9%	1.3%	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	#DIV/0!	2.7%	1.2%	0.0%	2.6%	0.0%	0.6%	1.7%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	4	3	1	3		
All Vehicle Volumes																							
Time	Northbound SW 6th St				Southbound SW 6th St				Eastbound SW Black Butte Blvd				Westbound SW Black Butte Blvd				15 Min		1 HR				
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum		Sum				
02:00:00 PM	0	0	0	0	3	63	8	0	0	8	4	0	5	5	0	0							
02:05:00 PM	0	0	0	0	2	45	9	0	0	8	5	0	2	10	0	0							
02:10:00 PM	0	0	0	0	1	48	4	0	0	5	7	0	2	5	0	0	249						
02:15:00 PM	0	0	0	0	0	56	12	0	0	7	5	0	1	3	0	0	237						
02:20:00 PM	0	0	0	0	4	65	8	0	0	12	6	0	3	10	0	0	264						
02:25:00 PM	0	0	0	0	2	73	5	0	0	7	2	0	6	3	0	0	290						
02:30:00 PM	0	0	0	0	1	60	8	0	0	4	8	0	2	8	0	0	297						
02:35:00 PM	0	0	0	0	0	49	7	0	0	4	7	0	1	5	0	0	262						
02:40:00 PM	0	0	0	0	1	51	7	0	0	10	10	0	3	5	0	0	251						
02:45:00 PM	0	0	0	0	1	47	4	0	0	7	3	0	2	10	0	0	234						
02:50:00 PM	0	0	0	0	4	60	8	0	0	10	2	0	2	9	0	0	256						
02:55:00 PM	0	0	0	0	3	57	6	0	0	10	5	0	1	7	0	0	258	1048					
03:00:00 PM	0	0	0	0	3	63	4	0	0	8	8	0	2	5	0	0	277	1045					
03:05:00 PM	0	0	0	0	3	56	6	0	0	11	6	0	3	7	0	0	274	1056					
03:10:00 PM	0	0	0	0	4	51	3	0	0	8	2	0	1	3	0	0	257	1056					
03:15:00 PM	0	0	0	0	0	36	5	0	0	8	4	0	4	6	0	0	227	1035					
03:20:00 PM	0	0	0	0	4	47	6	0	0	11	5	0	0	3	0	0	211	1003					
03:25:00 PM	0	0	0	0	0	46	3	0	0	10	4	0	2	10	0	0	214	980					
03:30:00 PM	0	0	0	0	1	55	6	0	0	4	3	0	1	8	0	0	229	967					
03:35:00 PM	0	0	0	0	2	49	11	0	0	1	6	0	2	4	0	0	228	969					
03:40:00 PM	0	0	0	0	3	41	7	0	0	7	3	0	2	7	0	0	223	952					
03:45:00 PM	0	0	0	0	2	53	7	0	0	5	4	0	2	3	0	0	221	954					
03:50:00 PM	0	0	0	0	3	52	8	0	0	7	11	0	1	6	0	0	234	947					
03:55:00 PM	0	0	0	0	3	43	7	0	0	6	9	0	2	5	0	0	239	933					
04:00:00 PM	0	0	0	0	3	50	5	0	0	4	7	0	3	7	0	0	242	919					
04:05:00 PM	0	0	0	0	5	52	11	0	0	3	5	0	2	3	0	0	235	908					
04:10:00 PM	0	0	0	0	4	58	8	0	0	5	6	0	3	4	0	0	248	924					
04:15:00 PM	0	0	0	0	1	36	10	0	0	1	7	0	4	7	0	0	235	927					
04:20:00 PM	0	0	0	0	4	59	6	0	0	3	6	0	1	5	0	0	238	935					
04:25:00 PM	0	0	0	0	2	52	9	0	0	5	3	0	3	7	0	0	231	941					
04:30:00 PM	0	0	0	0	1	52	11	0	0	7	3	0	1	5	0	0	245	943					
04:35:00 PM	0	0	0	0	0	73	7	0	0	6	6	0	3	7	0	0	263	970					
04:40:00 PM	0	0	0	0	2	44	7	0	0	3	2	0	1	8	0	0	249	967					
04:45:00 PM	0	0	0	0	1	52	6	0	0	10	8	0	2	6	0	0	254	976					
04:50:00 PM	0	0	0	0	2	51	14	0	0	3	9	0	1	7	0	0	239	975					
04:55:00 PM	0	0	0	0	4	48	11	0	0	2	4	0	2	11	0	0	254	982					
05:00:00 PM	0	0	0	0	0	43	15	0	0	3	6	0	3	13	0	0	252	986					
05:05:00 PM	0	0	0	0	0	45	8	0	0	7	8	0	3	8	0	0	244	984					
05:10:00 PM	0	0	0	0	1	49	10	0	0	6	2	0	1	10	0	0	241	975					
05:15:00 PM	0	0	0	0	1	44	9	0	0	4	5	0	2	12	0	0	235	986					
05:20:00 PM	0	0	0	0	0	46	9	0	0	4	4	0	0	3	0	0	222	968					
05:25:00 PM	0	0	0	0	2	50	7	0	0	3	5	0	0	11	0	0	221	965					
05:30:00 PM	0	0	0	0	1	29	6	0	0	6	1	0	3	13	0	0	203	944					
05:35:00 PM	0	0	0	0	0	50	5	0	0	4	7	0	1	5	0	0	209	914					
05:40:00 PM	0	0	0	0	0	42	9	0	0	1	2	0	2	8	0	0	195	911					
05:45:00 PM	0	0	0	0	0	29	3	0	0	3	6	0	1	9	0	0	187	877					
05:50:00 PM	0	0	0	0	0	45	5	0	0	3	8	0	2	4	0	0	182	857					
05:55:00 PM	0	0	0	0	0	33	7	0	0	7	5	0	0	7	0	0	177	834					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 5th St
E/W street	SW Black Butte Blvd
City, State	Redmond OR
Site Notes	
Location	44.275527 - -121.17322
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	33
Peak Hour Start	02:40:00 PM
Peak 15 Min Start	02:40:00 PM
PHF (15-Min Int)	0.88

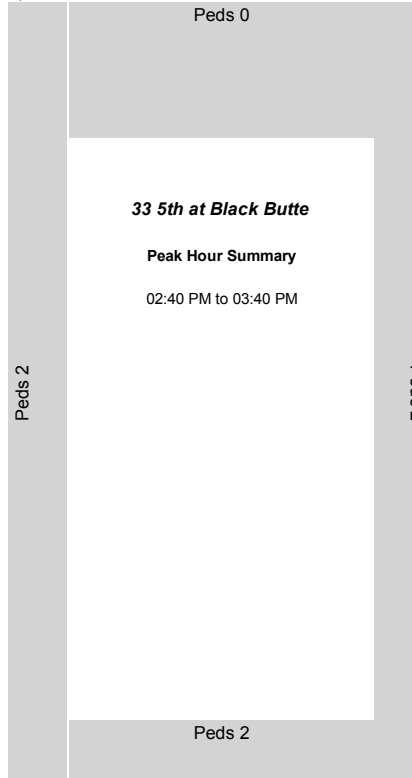
Eastbound
SW Black Butte Blvd
Heavy Vehicle 2.7%

In 110
Out 103

U-Turn	0
Left	97
Thru	13
Right	0
Bicycles	0

Southbound SW 5th St Heavy Vehicle 25.0%				
In	4	Out	898	
Bicycles		Right	Thru	Left
				U-Turn

0	0	0	4	0
---	---	---	---	---



U-Turn	Left	Thru	Right	Bicycles
0	87	782	6	2

In	875	Out	0
----	-----	-----	---

Heavy Vehicle 1.1%
SW 5th St
Northbound

Westbound
SW Black Butte Blvd
Heavy Vehicle 0.0%

In 33
Out 23

Bicycles	0
Right	17
Thru	16
Left	0
U-Turn	0

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
87	782	6	0	4	0	0	0	97	13	0	0	0	16	17	0	875	4	110	33	0	896	103	23
Percent Heavy Vehicles																							
2.3%	1.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	2.1%	7.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	25.0%	2.7%	0.0%	#DIV/0!	1.1%	1.9%	8.7%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk				Sum		
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	2	2	6		
All Vehicle Volumes																							
Time	Northbound SW 5th St				Southbound SW 5th St				Eastbound SW Black Butte Blvd				Westbound SW Black Butte Blvd				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	10	54	0	0	0	0	0	0	7	2	0	0	0	0	0	0							
02:05:00 PM	10	81	0	0	0	0	0	0	7	3	0	0	0	3	0	0							
02:10:00 PM	7	52	0	0	0	0	0	0	7	0	0	0	0	1	0	0	244						
02:15:00 PM	4	70	0	0	0	0	0	0	6	0	0	0	0	0	2	0	253						
02:20:00 PM	7	52	0	0	0	0	0	0	12	2	0	0	0	5	1	0	228						
02:25:00 PM	6	52	0	0	0	0	0	0	8	1	0	0	0	1	1	0	230						
02:30:00 PM	10	58	0	0	0	0	0	0	3	1	0	0	0	2	0	0	222						
02:35:00 PM	5	56	0	0	0	0	0	0	4	0	0	0	0	0	0	0	208						
02:40:00 PM	5	81	0	0	0	0	0	0	5	1	0	0	0	3	3	0	237						
02:45:00 PM	11	75	0	0	0	0	0	0	9	2	0	0	0	0	1	0	261						
02:50:00 PM	7	67	0	0	0	0	0	0	11	2	0	0	0	4	2	0	289						
02:55:00 PM	9	55	1	0	0	0	0	0	12	0	0	0	0	0	1	0	269	980					
03:00:00 PM	4	74	1	0	0	0	0	0	8	2	0	0	0	1	0	0	261	997					
03:05:00 PM	8	63	2	0	0	0	0	0	8	2	0	0	0	2	0	0	253	978					
03:10:00 PM	4	65	0	0	0	0	0	0	11	1	0	0	0	0	1	0	257	993					
03:15:00 PM	9	63	0	0	0	0	0	0	8	0	0	0	0	2	2	0	251	995					
03:20:00 PM	4	48	0	0	0	0	0	0	11	0	0	0	0	0	1	0	230	980					
03:25:00 PM	13	60	2	0	1	0	0	0	8	1	0	0	0	0	1	0	234	997					
03:30:00 PM	8	61	0	0	3	0	0	0	3	2	0	0	0	2	3	0	232	1005					
03:35:00 PM	5	70	0	0	0	0	0	0	3	0	0	0	0	2	2	0	250	1022					
03:40:00 PM	8	60	4	0	0	0	0	0	8	1	0	0	0	2	0	0	247	1007					
03:45:00 PM	7	59	0	0	0	0	0	0	7	0	0	0	0	2	0	0	240	984					
03:50:00 PM	4	61	0	0	0	0	0	0	6	1	0	0	0	3	1	0	234	967					
03:55:00 PM	9	74	1	0	0	0	0	0	10	1	0	0	0	0	3	0	249	987					
04:00:00 PM	8	74	0	0	0	0	0	0	4	1	0	0	0	4	1	0	266	989					
04:05:00 PM	8	53	1	0	0	0	0	0	7	1	0	0	0	2	1	0	263	977					
04:10:00 PM	6	62	0	0	0	0	0	0	7	1	0	0	0	0	1	0	242	972					
04:15:00 PM	11	57	2	0	0	0	0	0	3	0	0	0	0	1	0	0	224	962					
04:20:00 PM	9	67	0	0	0	0	0	0	4	0	0	0	0	0	0	0	231	978					
04:25:00 PM	8	55	0	0	0	0	0	0	4	2	0	0	0	0	2	0	225	963					
04:30:00 PM	7	63	2	0	0	0	0	0	4	3	0	0	0	1	1	0	232	962					
04:35:00 PM	10	65	1	0	0	0	0	0	6	1	0	0	0	2	1	0	238	966					
04:40:00 PM	12	60	0	0	0	0	0	0	3	1	0	0	0	1	1	0	245	961					
04:45:00 PM	4	54	1	0	0	0	0	0	8	2	0	0	0	4	0	0	237	959					
04:50:00 PM	10	66	0	0	0	0	0	0	6	1	0	0	0	1	0	0	235	967					
04:55:00 PM	13	69	1	0	0	0	0	0	5	1	0	0	0	0	2	0	248	960					
05:00:00 PM	12	86	0	0	0	0	0	0	3	0	0	0	0	4	1	0	281	974					
05:05:00 PM	9	66	0	0	0	0	0	0	6	1	0	0	0	3	0	0	282	986					
05:10:00 PM	6	60	0	0	0	0	0	0	6	1	0	0	0	6	0	0	270	988					
05:15:00 PM	14	51	0	0	0	0	0	0	4	2	0	0	0	2	0	0	237	987					
05:20:00 PM	3	74	0	0	0	0	0	0	2	1	0	0	0	0	0	0	232	987					
05:25:00 PM	10	57	1	0	0	0	0	0	5	2	0	0	0	2	2	0	232	995					
05:30:00 PM	12	66	0	0	0	0	0	0	7	0	0	0	0	3	0	0	247	1002					
05:35:00 PM	4	68	1	0	0	0	0	0	3	0	0	0	0	2	1	0	246	995					
05:40:00 PM	7	49	1	0	0	0	0	0	7	0	0	0	0	2	0	0	233	983					
05:45:00 PM	8	53	0	0	0	0	0	0	2	0	0	0	0	1	0	0	209	974					
05:50:00 PM	6	63	1	0	0	0	0	0	1	0	0	0	0	1	1	0	203	963					
05:55:00 PM	7	52	0	0	0	0	0	0	5	1	0	0	0	1	0	0	203	938					



Data Provided by K-D-N.com 503-594-4224	
N/S street	NE 9th St
E/W street	E Antler Ave
City, State	Redmond OR
Site Notes	
Location	44.276554 - -121.15882
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	11
Peak Hour Start	02:50:00 PM
Peak 15 Min Start	02:55:00 PM
PHF (15-Min Int)	0.90

Eastbound
E Antler Ave
Heavy Vehicle 23.8%

In 42 Out 36

U-Turn	0
Left	25
Thru	12
Right	5
Bicycles	0

Southbound NE 9th St Heavy Vehicle 11.5%					
In	243	Out	190		
Bicycles		Right	Thru	Left	U-Turn

0	21	199	23	0
---	----	-----	----	---

Peds 0

11 9th at East Antler

Peak Hour Summary

02:50 PM to 03:50 PM

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

U-Turn	Left	Thru	Right	Bicycles
0	3	141	10	0

In	154	Out	228
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Heavy Vehicle 17.5%
NE 9th St
Northbound

Bicycles	0
Right	24
Thru	12
Left	24
U-Turn	0

In 60 Out 45

Westbound
E Antler Ave
Heavy Vehicle 8.3%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
3	141	10	0	23	199	21	0	25	12	5	0	24	12	24	0	154	243	42	60	228	190	36	45
Percent Heavy Vehicles																							
66.7%	17.7%	0.0%	0.0%	13.0%	10.1%	23.8%	0.0%	32.0%	8.3%	20.0%	0.0%	8.3%	0.0%	12.5%	0.0%	17.5%	11.5%	23.8%	8.3%	10.1%	18.9%	19.4%	8.9%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk				Sum		
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
All Vehicle Volumes																							
Time	Northbound NE 9th St				Southbound NE 9th St				Eastbound E Antler Ave				Westbound E Antler Ave				15 Min						
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	1	6	0	0	0	17	0	0	0	0	0	0	0	0	1	0							
02:05:00 PM	0	8	0	0	1	10	1	0	2	1	0	0	0	0	0	0							
02:10:00 PM	0	11	1	0	0	14	1	0	2	0	0	0	0	0	0	0	77						
02:15:00 PM	0	8	3	0	0	14	1	0	3	0	0	0	1	1	1	0	84						
02:20:00 PM	0	7	0	0	2	12	2	0	2	1	1	0	1	0	2	0	91						
02:25:00 PM	0	7	0	0	2	16	3	0	2	1	2	0	0	1	3	0	99						
02:30:00 PM	0	9	1	0	1	26	0	0	0	0	2	0	2	0	2	0	110						
02:35:00 PM	0	8	2	0	1	24	3	0	2	2	1	0	0	0	1	0	124						
02:40:00 PM	1	10	0	0	3	14	3	0	0	0	3	0	1	1	0	0	123						
02:45:00 PM	2	11	2	0	1	11	1	0	3	0	1	0	0	0	2	0	114						
02:50:00 PM	0	8	2	0	1	17	3	0	1	0	0	0	0	1	1	0	104						
02:55:00 PM	1	10	1	0	2	20	2	0	4	0	0	0	2	0	3	0	113	412					
03:00:00 PM	0	10	0	0	3	16	2	0	3	2	1	0	4	2	1	0	123	431					
03:05:00 PM	0	17	2	0	1	14	1	0	4	3	1	0	3	0	3	0	138	457					
03:10:00 PM	1	8	1	0	2	13	0	0	2	2	0	0	3	3	2	0	130	465					
03:15:00 PM	0	12	1	0	3	11	2	0	3	2	1	0	2	1	1	0	125	472					
03:20:00 PM	0	11	2	0	2	14	1	0	0	0	0	0	5	1	4	0	116	482					
03:25:00 PM	1	15	0	0	4	15	5	0	2	0	1	0	0	2	2	0	126	492					
03:30:00 PM	0	8	1	0	1	24	1	0	4	2	1	0	1	0	1	0	131	493					
03:35:00 PM	0	10	0	0	2	26	2	0	1	0	0	0	2	0	3	0	137	495					
03:40:00 PM	0	16	0	0	1	19	2	0	0	0	0	0	0	0	1	0	129	498					
03:45:00 PM	0	16	0	0	1	10	0	0	1	1	0	0	2	2	2	0	120	499					
03:50:00 PM	0	11	0	0	2	14	0	0	2	0	0	0	2	1	2	0	108	499					
03:55:00 PM	0	12	0	0	2	18	0	0	2	1	0	0	0	1	2	0	107	492					
04:00:00 PM	0	14	0	0	1	12	1	0	1	0	1	0	2	1	1	0	106	482					
04:05:00 PM	0	12	0	0	1	28	2	0	0	1	0	0	2	1	0	0	119	480					
04:10:00 PM	1	11	2	0	1	18	1	0	0	0	0	0	1	0	0	0	116	478					
04:15:00 PM	2	11	0	0	0	12	0	0	1	2	2	0	1	2	0	0	115	472					
04:20:00 PM	0	9	0	0	1	20	1	0	2	0	0	0	1	3	3	0	108	472					
04:25:00 PM	1	9	0	0	0	20	3	0	3	0	0	0	0	1	1	0	111	463					
04:30:00 PM	0	16	0	0	1	16	2	0	1	0	1	0	0	0	0	0	115	456					
04:35:00 PM	0	21	1	0	0	30	2	0	2	1	0	0	1	0	1	0	134	469					
04:40:00 PM	0	12	0	0	1	19	1	0	1	1	1	0	1	2	3	0	138	472					
04:45:00 PM	0	12	0	0	0	17	3	0	1	0	0	0	2	0	1	0	137	473					
04:50:00 PM	0	9	0	0	0	19	0	0	1	0	1	0	1	1	0	0	110	471					
04:55:00 PM	0	9	0	0	0	15	3	0	3	1	0	0	2	0	0	0	101	466					
05:00:00 PM	0	16	0	0	0	16	2	0	4	0	1	0	1	0	1	0	106	473					
05:05:00 PM	2	12	0	0	1	23	2	0	5	0	0	0	2	0	0	0	121	473					
05:10:00 PM	0	10	0	0	1	17	2	0	1	0	1	0	0	0	0	0	120	470					
05:15:00 PM	0	7	1	0	0	27	0	0	3	1	1	0	0	0	1	0	120	478					
05:20:00 PM	1	15	0	0	0	15	2	0	1	0	1	0	1	0	1	0	110	475					
05:25:00 PM	3	7	0	0	0	16	5	0	0	0	0	0	1	0	0	0	110	469					
05:30:00 PM	0	9	0	0	1	13	1	0	8	1	1	0	0	0	0	0	103	466					
05:35:00 PM	0	6	0	0	0	13	0	0	3	1	0	0	1	0	0	0	90	431					
05:40:00 PM	1	14	1	0	0	7	1	0	3	0	1	1	0	0	0	0	87	418					
05:45:00 PM	1	9	0	0	2	6	2	0	1	0	0	0	0	0	1	0	75	404					
05:50:00 PM	0	6	1	0	0	10	0	0	2	0	1	0	0	0	1	0	72	393					
05:55:00 PM	0	7	0	0	1	10	0	0	2	0	0	0	0	1	0	0	64	381					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 6th St
E/W street	SW Evergreen Ave
City, State	Redmond OR
Site Notes	
Location	44.27256 - -121.174282
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	02:10:00 PM
Peak 15 Min Start	02:20:00 PM
PHF (15-Min Int)	0.91

Eastbound
SW Evergreen Ave
Heavy Vehicle 8.2%

In 72 Out 103

U-Turn 0
Left 0
Thru 54
Right 18
Bicycles 1

Peds 27

36 Evergreen at 6th

Peak Hour Summary

02:10 PM to 03:10 PM

U-Turn 0 Left 0 Thru 0 Right 0 Bicycles 0

In 0 Out 769

Heavy Vehicle NaN
SW 6th St
Northbound

Southbound
SW 6th St
Heavy Vehicle 2.4%

In 790 Out 0
Bicycles Right Thru Left U-Turn

0 36 657 97 0

Peds 12

Bicycles 0

Right 0

Thru 67

Left 94

U-Turn 0

Peds 7

Peds 18

In 161

Out 151

Westbound
SW Evergreen Ave
Heavy Vehicle 2.5%

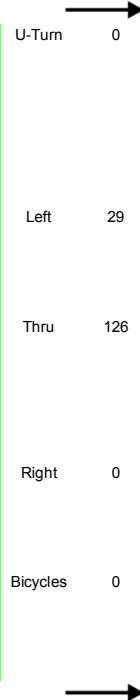
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	97	657	36	0	0	54	18	0	94	67	0	0	0	790	72	161	769	0	103	151
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	4.1%	2.1%	2.8%	0.0%	0.0%	11.1%	0.0%	0.0%	1.1%	4.5%	0.0%	0.0%	#DIV/0!	2.4%	8.3%	2.5%	2.0%	0.0%	3.9%	6.6%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0		1	7	12	27	18		
All Vehicle Volumes																							
Time	Northbound SW 6th St				Southbound SW 6th St				Eastbound SW Evergreen Ave				Westbound SW Evergreen Ave				15 Min		1 HR				
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0	0	0	0	3	72	3	0	0	3	1	0	11	7	0	0							
02:05:00 PM	0	0	0	0	7	45	2	0	0	7	1	0	8	9	0	0							
02:10:00 PM	0	0	0	0	11	47	1	0	0	5	0	0	8	4	0	0	255						
02:15:00 PM	0	0	0	0	12	52	0	0	0	6	3	0	3	6	0	0	237						
02:20:00 PM	0	0	0	0	7	62	3	0	0	3	1	0	8	3	0	0	245						
02:25:00 PM	0	0	0	0	4	62	6	0	0	5	4	0	12	4	0	0	266						
02:30:00 PM	0	0	0	0	6	66	6	0	0	4	0	0	9	7	0	0	282						
02:35:00 PM	0	0	0	0	2	51	1	0	0	5	1	0	7	8	0	0	270						
02:40:00 PM	0	0	0	0	11	52	2	0	0	5	2	0	9	6	0	0	260						
02:45:00 PM	0	0	0	0	8	47	2	0	0	5	1	0	7	7	0	0	239						
02:50:00 PM	0	0	0	0	14	56	7	0	0	1	1	0	6	6	0	0	255						
02:55:00 PM	0	0	0	0	9	39	3	0	0	6	1	0	8	7	0	0	241	1022					
03:00:00 PM	0	0	0	0	7	63	2	0	0	7	2	0	6	4	0	0	255	1013					
03:05:00 PM	0	0	0	0	6	60	3	0	0	2	2	0	11	5	0	0	253	1023					
03:10:00 PM	0	0	0	0	4	46	3	0	0	7	0	0	6	6	0	0	252	1019					
03:15:00 PM	0	0	0	0	4	34	1	0	0	7	3	0	13	5	0	0	228	1004					
03:20:00 PM	0	0	0	0	8	50	3	0	0	3	1	0	5	6	0	0	215	993					
03:25:00 PM	0	0	0	0	6	46	1	0	0	6	1	0	5	5	0	0	213	966					
03:30:00 PM	0	0	0	0	6	46	2	0	0	3	2	0	17	7	0	0	229	951					
03:35:00 PM	0	0	0	0	7	50	3	0	0	4	1	0	6	3	0	0	227	950					
03:40:00 PM	0	0	0	0	5	35	0	0	0	2	0	0	6	7	0	0	212	918					
03:45:00 PM	0	0	0	0	5	53	2	0	0	6	3	0	5	4	0	0	207	919					
03:50:00 PM	0	0	0	0	4	55	4	0	0	5	2	0	8	4	0	0	215	910					
03:55:00 PM	0	0	0	0	6	50	4	0	0	3	0	0	9	6	0	0	238	915					
04:00:00 PM	0	0	0	0	7	52	3	0	0	6	5	0	3	6	0	0	242	906					
04:05:00 PM	0	0	0	0	6	54	0	0	0	4	1	0	11	10	0	0	246	903					
04:10:00 PM	0	0	0	0	9	58	0	0	0	8	1	0	6	6	0	0	256	919					
04:15:00 PM	0	0	0	0	11	47	5	0	0	2	0	0	7	4	0	0	250	928					
04:20:00 PM	0	0	0	0	9	49	2	0	0	3	2	0	3	2	0	0	234	922					
04:25:00 PM	0	0	0	0	12	52	1	0	0	5	0	0	9	6	0	0	231	937					
04:30:00 PM	0	0	0	0	7	54	7	0	0	6	2	0	2	5	0	0	238	937					
04:35:00 PM	0	0	0	0	10	64	2	0	0	5	2	0	12	5	0	0	268	963					
04:40:00 PM	0	0	0	0	5	53	3	0	0	2	2	0	12	8	0	0	268	993					
04:45:00 PM	0	0	0	0	8	49	4	0	0	10	2	0	6	5	0	0	269	999					
04:50:00 PM	0	0	0	0	13	43	0	0	0	2	0	0	12	7	0	0	246	994					
04:55:00 PM	0	0	0	0	6	50	1	0	0	4	0	0	4	4	0	0	230	985					
05:00:00 PM	0	0	0	0	9	59	1	0	0	4	0	0	10	3	0	0	232	989					
05:05:00 PM	0	0	0	0	5	52	2	0	0	6	1	0	6	3	0	0	230	978					
05:10:00 PM	0	0	0	0	4	50	1	0	0	8	1	0	5	3	0	0	233	962					
05:15:00 PM	0	0	0	0	6	47	3	0	0	3	1	0	8	4	0	0	219	958					
05:20:00 PM	0	0	0	0	5	48	1	0	0	2	3	0	7	3	0	0	213	957					
05:25:00 PM	0	0	0	0	8	52	4	0	0	2	1	0	10	9	0	0	227	958					
05:30:00 PM	0	0	0	0	6	27	1	0	0	9	5	0	4	4	0	0	211	931					
05:35:00 PM	0	0	0	0	11	45	6	0	0	3	1	0	1	9	0	0	218	907					
05:40:00 PM	0	0	0	0	11	36	3	0	0	6	2	0	7	6	0	0	203	893					
05:45:00 PM	0	0	0	0	4	38	5	0	0	7	2	0	10	2	0	0	215	877					
05:50:00 PM	0	0	0	0	7	42	5	0	0	3	1	0	7	6	0	0	210	871					
05:55:00 PM	0	0	0	0	7	43	1	0	0	6	0	0	3	4	0	0	203	866					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 5th St
E/W street	SW Evergreen Ave
City, State	Redmond OR
Site Notes	
Location	44.272561 - -121.173206
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	03:55:00 PM
Peak 15 Min Start	03:55:00 PM
PHF (15-Min Int)	0.96

Eastbound
SW Evergreen Ave
Heavy Vehicle 3.9%

In 155
Out 163



Southbound SW 5th St Heavy Vehicle 0.0%				
In	0	Out	927	
Bicycles		Right	Thru	Left
				U-Turn

0	0	0	0	0
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35 5th at Evergreen

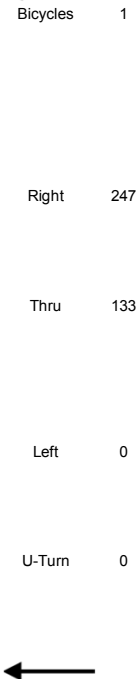
Peak Hour Summary

03:55 PM to 04:55 PM

U-Turn	Left	Thru	Right	Bicycles
0	30	650	30	0

In	710	Out	0
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Heavy Vehicle 1.3%
SW 5th St
Northbound



In 380
Out 156

Westbound
SW Evergreen Ave
Heavy Vehicle 1.6%

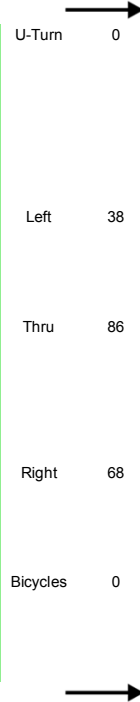
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
30	650	30	0	0	0	0	0	29	126	0	0	0	133	247	0	710	0	155	380	0	926	163	156
Percent Heavy Vehicles																							
3.3%	1.1%	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%	3.4%	4.0%	0.0%	0.0%	0.0%	2.3%	1.2%	0.0%	1.3%	0.0%	3.9%	1.6%	#DIV/0!	1.2%	2.5%	3.8%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk				Sum		
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1			
All Vehicle Volumes																							
Time	Northbound SW 5th St				Southbound SW 5th St				Eastbound SW Evergreen Ave				Westbound SW Evergreen Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	6	51	3	0	0	0	0	0	4	7	0	0	0	11	14	0							
02:05:00 PM	7	47	2	0	0	0	0	0	3	11	0	0	0	8	31	0							
02:10:00 PM	2	56	0	0	0	0	0	0	0	15	0	0	0	10	17	0	305						
02:15:00 PM	1	42	1	0	0	0	0	0	3	13	0	0	0	8	23	0	300						
02:20:00 PM	3	50	4	0	0	0	0	0	2	11	0	0	0	7	10	0	278						
02:25:00 PM	1	38	2	0	0	0	0	0	2	11	0	0	0	15	14	0	261						
02:30:00 PM	2	45	6	0	0	0	0	0	1	8	0	0	0	16	14	0	262						
02:35:00 PM	1	49	1	0	0	0	0	0	2	5	0	0	0	13	13	0	259						
02:40:00 PM	3	71	5	0	0	0	0	0	2	14	0	0	0	12	17	0	300						
02:45:00 PM	1	64	2	0	0	0	0	0	2	13	0	0	0	12	19	0	321						
02:50:00 PM	1	55	4	0	0	0	0	0	3	12	0	0	0	11	11	0	334						
02:55:00 PM	3	59	0	0	0	0	0	0	2	12	0	0	0	11	17	0	314	1180					
03:00:00 PM	0	52	1	0	0	0	0	0	4	10	0	0	0	10	15	0	293	1176					
03:05:00 PM	4	46	3	0	0	0	0	0	1	8	0	0	0	12	22	0	292	1163					
03:10:00 PM	0	51	2	0	0	0	0	0	2	9	0	0	0	9	18	0	279	1154					
03:15:00 PM	3	50	4	0	0	0	0	0	2	7	0	0	0	14	23	0	290	1166					
03:20:00 PM	2	37	3	0	0	0	0	0	0	12	0	0	0	8	15	0	271	1156					
03:25:00 PM	1	59	2	0	0	0	0	0	2	9	0	0	0	10	28	0	291	1184					
03:30:00 PM	5	50	0	0	0	0	0	0	1	9	0	0	0	17	16	0	286	1190					
03:35:00 PM	2	58	5	0	0	0	0	0	4	5	0	0	0	6	13	0	302	1199					
03:40:00 PM	3	61	3	0	0	0	0	0	2	7	0	0	0	11	16	0	294	1178					
03:45:00 PM	3	50	2	0	0	0	0	0	1	9	0	0	0	6	17	0	284	1153					
03:50:00 PM	4	45	3	0	0	0	0	0	1	8	0	0	0	9	17	0	278	1143					
03:55:00 PM	3	71	2	0	0	0	0	0	1	10	0	0	0	13	24	0	299	1163					
04:00:00 PM	3	59	3	0	0	0	0	0	1	10	0	0	0	7	19	0	313	1173					
04:05:00 PM	1	42	0	0	0	0	0	0	4	8	0	0	0	20	22	0	323	1174					
04:10:00 PM	0	53	3	0	0	0	0	0	0	11	0	0	0	13	23	0	302	1186					
04:15:00 PM	2	55	4	0	0	0	0	0	2	13	0	0	0	9	20	0	305	1188					
04:20:00 PM	3	51	0	0	0	0	0	0	1	9	0	0	0	4	21	0	297	1200					
04:25:00 PM	1	60	7	0	0	0	0	0	2	14	0	0	0	12	17	0	307	1202					
04:30:00 PM	4	56	1	0	0	0	0	0	3	12	0	0	0	5	15	0	298	1200					
04:35:00 PM	4	52	4	0	0	0	0	0	3	9	0	0	0	14	24	0	319	1217					
04:40:00 PM	5	35	0	0	0	0	0	0	3	7	0	0	0	13	35	0	304	1212					
04:45:00 PM	3	50	3	0	0	0	0	0	6	11	0	0	0	7	11	0	299	1215					
04:50:00 PM	1	66	3	0	0	0	0	0	3	12	0	0	0	16	16	0	306	1245					
04:55:00 PM	1	55	2	0	0	0	0	0	4	7	0	0	0	7	22	0	306	1219					
05:00:00 PM	3	68	3	0	0	0	0	0	3	9	0	0	0	10	23	0	334	1236					
05:05:00 PM	0	46	2	0	0	0	0	0	0	8	0	0	0	9	22	0	304	1226					
05:10:00 PM	0	44	2	0	0	0	0	0	4	11	0	0	0	8	26	0	301	1218					
05:15:00 PM	1	62	2	0	0	0	0	0	2	9	0	0	0	8	11	0	277	1208					
05:20:00 PM	4	61	6	0	0	0	0	0	1	7	0	0	0	7	13	0	289	1218					
05:25:00 PM	2	50	0	0	0	0	0	0	3	6	0	0	0	17	17	0	289	1200					
05:30:00 PM	0	42	1	0	0	0	0	0	5	8	0	0	0	10	24	0	284	1194					
05:35:00 PM	2	55	3	0	0	0	0	0	2	13	0	0	0	9	15	0	284	1183					
05:40:00 PM	0	46	1	0	0	0	0	0	5	7	0	0	0	14	13	0	275	1171					
05:45:00 PM	2	27	6	0	0	0	0	0	2	10	0	0	0	9	23	0	264	1159					
05:50:00 PM	1	58	2	0	0	0	0	0	4	9	0	0	0	10	10	0	259	1136					
05:55:00 PM	0	46	1	0	0	0	0	0	2	10	0	0	0	6	14	0	252	1117					



Data Provided by K-D-N.com 503-594-4224	
N/S street	US-97
E/W street	SW Evergreen Ave
City, State	Redmond OR
Site Notes	
Location	44.272584 - -121.169952
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	5
Peak Hour Start	03:50:00 PM
Peak 15 Min Start	04:35:00 PM
PHF (15-Min Int)	0.94

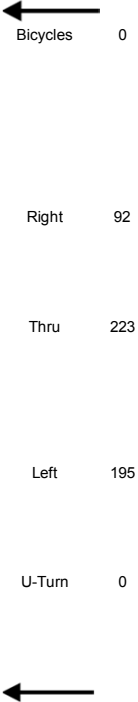
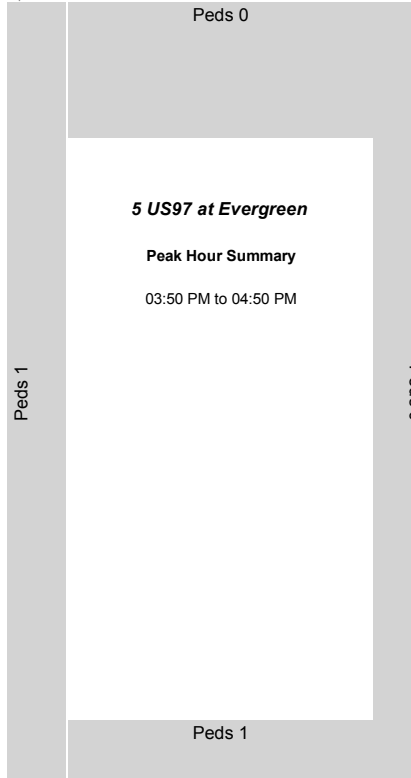
Eastbound
SW Evergreen Ave
Heavy Vehicle 3.6%

In 192
Out 491



Southbound US-97 Heavy Vehicle 8.1%					
In	965	Out	1078		
Bicycles		Right	Thru	Left	U-Turn

0	37	842	85	1
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In 510
Out 347

Westbound
SE Evergreen Ave
Heavy Vehicle 3.5%

U-Turn	Left	Thru	Right	Bicycles
0	231	947	176	0

In	1354	Out	1105
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Heavy Vehicle 6.3%
US-97
Northbound

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
231	947	176	0	85	842	37	1	38	86	68	0	195	223	92	0	1354	965	192	510	1105	1078	491	347
Percent Heavy Vehicles																							
0.9%	6.5%	11.9%	0.0%	4.7%	8.8%	0.0%	0.0%	5.3%	2.3%	4.4%	0.0%	4.6%	1.8%	5.4%	0.0%	6.3%	8.1%	3.6%	3.5%	7.8%	6.4%	1.2%	7.8%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2		
All Vehicle Volumes																							
Time	Northbound US-97				Southbound US-97				Eastbound SW Evergreen Ave				Westbound SE Evergreen Ave				15 Min 1 HR						
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	11	60	14	0	4	76	5	0	5	7	5	0	11	12	3	0							
02:05:00 PM	26	56	14	0	2	50	3	0	3	6	7	0	15	24	6	0							
02:10:00 PM	13	87	14	0	10	70	2	0	2	7	6	0	10	12	2	0	660						
02:15:00 PM	22	55	13	0	3	46	4	0	3	11	5	0	13	16	7	0	645						
02:20:00 PM	10	86	11	0	9	68	1	0	3	10	4	0	11	7	2	0	655						
02:25:00 PM	19	57	14	0	8	48	0	0	4	9	1	0	11	26	7	0	624						
02:30:00 PM	7	90	18	0	3	68	0	0	3	4	4	0	17	11	1	0	652						
02:35:00 PM	18	55	14	0	0	59	3	0	3	0	4	0	18	14	4	0	622						
02:40:00 PM	8	62	16	0	12	75	2	0	4	11	8	0	16	22	11	0	665						
02:45:00 PM	16	48	13	0	13	48	5	0	7	7	7	0	14	22	0	0	639						
02:50:00 PM	14	81	19	0	5	84	4	0	4	6	9	0	13	8	3	0	697						
02:55:00 PM	23	49	14	0	11	60	4	0	0	9	8	0	14	12	6	0	660	2609					
03:00:00 PM	19	69	12	0	7	81	1	0	6	1	4	0	16	10	7	0	693	2629					
03:05:00 PM	14	79	25	0	2	59	5	0	4	11	5	0	13	12	3	0	675	2649					
03:10:00 PM	23	63	9	0	2	82	0	0	2	6	4	0	13	19	5	0	693	2642					
03:15:00 PM	13	91	15	0	9	67	3	0	2	5	4	0	9	13	7	0	698	2682					
03:20:00 PM	10	69	21	0	4	42	3	0	6	13	6	0	13	18	6	0	677	2671					
03:25:00 PM	23	62	10	0	5	68	3	0	5	5	2	0	15	26	1	0	674	2692					
03:30:00 PM	12	87	6	0	10	82	6	0	1	6	6	0	17	19	7	0	695	2725					
03:35:00 PM	12	68	14	0	5	57	2	1	0	6	6	0	30	26	13	0	724	2773					
03:40:00 PM	7	36	18	0	8	56	4	0	2	12	4	0	25	18	7	0	696	2723					
03:45:00 PM	16	102	12	0	5	88	4	0	1	3	6	0	16	9	7	0	706	2792					
03:50:00 PM	23	70	13	0	5	54	3	0	6	4	3	0	13	24	4	0	688	2764					
03:55:00 PM	14	72	23	0	13	75	4	0	2	8	4	0	16	13	11	0	746	2809					
04:00:00 PM	19	75	18	0	10	89	6	0	1	3	6	0	13	16	6	0	739	2838					
04:05:00 PM	28	58	18	0	5	60	5	0	4	7	6	0	26	33	5	0	772	2861					
04:10:00 PM	17	96	16	0	7	81	3	0	3	10	4	0	14	16	7	0	791	2907					
04:15:00 PM	16	65	10	0	8	73	0	0	4	7	5	0	17	20	6	0	760	2900					
04:20:00 PM	26	68	13	0	3	55	2	0	3	5	6	0	18	22	4	0	730	2914					
04:25:00 PM	8	111	11	0	10	86	3	0	4	7	7	0	8	10	5	0	726	2959					
04:30:00 PM	24	68	15	0	5	40	3	0	1	12	7	0	22	15	11	0	718	2923					
04:35:00 PM	9	97	17	0	3	95	2	0	2	10	8	0	16	21	13	0	786	2976					
04:40:00 PM	35	53	6	0	12	54	4	1	4	8	6	0	18	25	13	0	755	3018					
04:45:00 PM	12	114	16	0	4	80	2	0	4	5	6	0	14	8	7	0	804	3021					
04:50:00 PM	25	56	12	0	3	49	1	0	2	7	8	0	27	20	8	0	729	3017					
04:55:00 PM	12	79	13	0	12	57	2	0	6	7	2	0	12	19	4	0	715	2987					
05:00:00 PM	22	60	10	0	9	58	0	0	3	6	3	0	22	19	6	0	661	2943					
05:05:00 PM	16	104	24	0	5	78	2	0	4	8	7	0	19	15	8	0	733	2978					
05:10:00 PM	22	84	8	0	6	61	4	0	7	3	5	0	24	20	8	0	760	2956					
05:15:00 PM	11	76	12	0	2	76	1	0	3	6	4	0	25	10	5	0	773	2956					
05:20:00 PM	13	60	19	0	9	72	1	0	5	4	6	0	11	15	5	0	703	2951					
05:25:00 PM	21	81	12	0	5	96	3	0	3	1	5	0	22	19	5	0	724	2954					
05:30:00 PM	16	79	19	0	10	55	2	0	0	1	5	0	15	18	7	0	720	2958					
05:35:00 PM	25	81	9	0	4	61	3	0	7	6	6	0	17	11	2	0	732	2897					
05:40:00 PM	15	93	11	0	9	54	3	0	2	4	3	0	18	9	2	0	682	2881					
05:45:00 PM	20	73	12	0	6	56	1	0	2	7	13	0	8	13	4	0	670	2824					
05:50:00 PM	15	69	9	0	5	67	2	0	3	6	5	0	6	6	3	0	634	2802					
05:55:00 PM	14	72	13	0	2	62	0	0	6	4	4	0	17	6	1	0	612	2778					

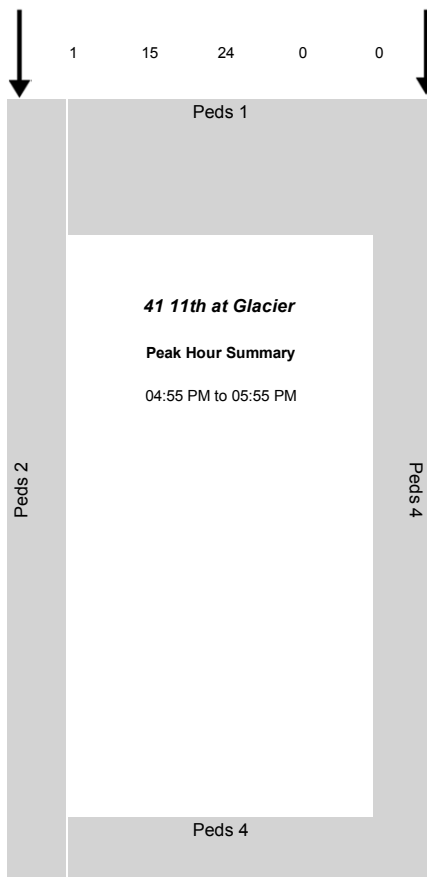


Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 11th St
E/W street	SW Glacier Ave
City, State	Redmond OR
Site Notes	
Location	44.270579 - -121.179634
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	41
Peak Hour Start	04:55:00 PM
Peak 15 Min Start	05:00:00 PM
PHF (15-Min Int)	0.90

Eastbound
SW Glacier Ave
Heavy Vehicle NaN

Out 982
In 0

U-Turn	0
Left	0
Thru	0
Right	0
Bicycles	0



U-Turn	Left	Thru	Right	Bicycles
0	1	0	0	0

In	1	Out	70
----	---	-----	----

Heavy Vehicle 0.0%
SW 11th St
Northbound

Southbound SW 11th St Heavy Vehicle 0.0%				
In		Out		
40		0		
Bicycles	Right	Thru	Left	U-Turn

Southbound
SW 11th St
Heavy Vehicle 0.0%

Bicycles	0
Right	0
Thru	966
Left	46
U-Turn	0

In 1012
Out 0

Westbound
SW Glacier Ave
Heavy Vehicle 2.0%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
1	0	0	0	0	0	24	15	0	0	0	0	0	0	0	0	1	39	0	1012	70	0	982	0
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%	0.0%	#DIV/0!	2.0%	0.0%	0.0%	2.0%	0.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	4	1	2	4	11		
All Vehicle Volumes																							
Time	Northbound SW 11th St				Southbound SW 11th St				Eastbound SW Glacier Ave				Westbound SW Glacier Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	82	0	0							
02:05:00 PM	0	0	0	0	0	1	2	0	0	0	0	0	4	64	0	0							
02:10:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	5	65	0	0	226						
02:15:00 PM	0	0	0	0	0	3	2	0	0	0	0	0	9	61	0	0	217						
02:20:00 PM	0	0	0	0	0	1	2	0	0	0	0	0	4	57	0	0	210						
02:25:00 PM	0	0	0	0	0	6	1	0	0	0	0	0	5	63	0	0	214						
02:30:00 PM	0	0	0	0	0	4	0	0	0	0	0	0	3	66	0	0	212						
02:35:00 PM	0	0	0	0	0	4	2	0	0	0	0	0	5	71	0	0	230						
02:40:00 PM	0	0	0	0	0	2	2	0	0	0	0	0	4	62	0	0	225						
02:45:00 PM	0	0	0	0	0	3	1	0	0	0	0	0	3	48	0	0	207						
02:50:00 PM	0	0	0	0	0	2	1	0	0	0	0	0	6	65	0	0	199						
02:55:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	4	66	0	0	200	865					
03:00:00 PM	0	0	0	0	0	2	2	0	0	0	0	0	6	70	0	0	225	861					
03:05:00 PM	0	0	0	0	0	4	1	0	0	0	0	0	7	63	0	0	226	865					
03:10:00 PM	0	0	0	0	0	7	1	0	0	0	0	0	6	56	0	0	225	864					
03:15:00 PM	0	0	0	0	0	5	1	0	0	0	0	0	10	55	0	0	216	860					
03:20:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	4	67	0	0	214	869					
03:25:00 PM	0	0	0	0	0	6	2	0	0	0	0	0	8	58	0	0	218	868					
03:30:00 PM	0	0	0	0	0	4	2	0	0	0	0	0	3	67	0	0	223	871					
03:35:00 PM	0	0	0	0	0	2	1	0	0	0	0	0	7	87	0	0	247	886					
03:40:00 PM	0	0	0	0	0	3	2	0	0	0	0	0	2	64	0	0	244	887					
03:45:00 PM	0	0	0	0	0	3	1	0	0	0	0	0	2	80	0	0	254	918					
03:50:00 PM	0	0	0	0	0	1	1	0	0	0	0	0	3	59	0	0	221	908					
03:55:00 PM	0	0	0	0	0	6	1	0	0	0	0	0	4	66	0	0	227	914					
04:00:00 PM	0	0	0	0	0	1	1	0	0	0	0	0	4	75	0	0	222	915					
04:05:00 PM	0	0	0	0	0	4	0	0	0	0	0	0	7	81	0	0	250	932					
04:10:00 PM	0	0	0	0	0	4	0	0	0	0	0	0	6	77	0	0	260	949					
04:15:00 PM	0	0	0	0	0	3	0	0	0	0	0	0	7	64	0	0	253	952					
04:20:00 PM	0	0	0	0	0	7	0	0	0	0	0	0	4	63	0	0	235	953					
04:25:00 PM	0	0	0	0	0	9	2	0	0	0	0	0	7	64	0	0	230	961					
04:30:00 PM	0	0	0	0	0	3	0	0	0	0	0	0	3	77	0	0	239	968					
04:35:00 PM	0	0	0	0	0	3	1	0	0	0	0	0	2	83	0	0	254	960					
04:40:00 PM	0	0	0	0	0	2	2	0	0	0	0	0	6	57	0	0	239	956					
04:45:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	5	70	0	0	233	947					
04:50:00 PM	0	0	0	0	0	3	1	0	0	0	0	0	3	74	0	0	225	964					
04:55:00 PM	0	0	0	0	0	1	1	0	0	0	0	0	3	73	0	0	236	965					
05:00:00 PM	0	0	0	0	0	1	4	0	0	0	0	0	4	86	0	0	254	979					
05:05:00 PM	0	0	0	0	0	4	0	0	0	0	0	0	5	83	0	0	265	979					
05:10:00 PM	0	0	0	0	0	1	1	0	0	0	0	0	7	97	0	0	293	998					
05:15:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	80	0	0	280	1006					
05:20:00 PM	0	0	0	0	0	1	2	0	0	0	0	0	8	73	0	0	272	1016					
05:25:00 PM	0	0	0	0	0	1	2	0	0	0	0	0	4	79	0	0	252	1020					
05:30:00 PM	1	0	0	0	0	1	2	0	0	0	0	0	3	68	0	0	245	1012					
05:35:00 PM	0	0	0	0	0	3	0	0	0	0	0	0	3	79	0	0	246	1008					
05:40:00 PM	0	0	0	0	0	3	2	0	0	0	0	0	4	77	0	0	246	1027					
05:45:00 PM	0	0	0	0	0	4	1	0	0	0	0	0	2	77	0	0	255	1034					
05:50:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	3	94	0	0	269	1052					
05:55:00 PM	0	0	0	0	0	4	0	0	0	0	0	0	2	66	0	0	255	1046					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 9th St
E/W street	SW Glacier Ave
City, State	Redmond OR
Site Notes	
Location	44.27058 - -121.177472
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:55:00 PM
Peak 15 Min Start	05:00:00 PM
PHF (15-Min Int)	0.86

Eastbound
SW Glacier Ave
Heavy Vehicle NaN

In 0
Out 974

U-Turn	0
Left	0
Thru	0
Right	0
Bicycles	0

Peds 0

U-Turn	Left	Thru	Right	Bicycles
0	310	105	0	0

In 415
Out 0

Heavy Vehicle 1.0%
SW 9th St
Northbound

Southbound
SW 9th St
Heavy Vehicle 0.0%

In 0
Out 117

Bicycles Right Thru Left U-Turn

0 0 0 0 0

Peds 0

15 9th at Glacier

Peak Hour Summary

04:55 PM to 05:55 PM

Bicycles	0
----------	---

Right 12

Thru 664

Left 0

U-Turn 0

Peds 1

Peds 3

In 676
Out 0

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
310	105	0	0	0	0	0	0	0	0	0	0	0	664	12	0	415	0	0	676	0	117	974	0
Percent Heavy Vehicles																							
1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%	0.0%	1.0%	0.0%	#DIV/0!	1.9%	#DIV/0!	0.9%	1.6%	0.0%

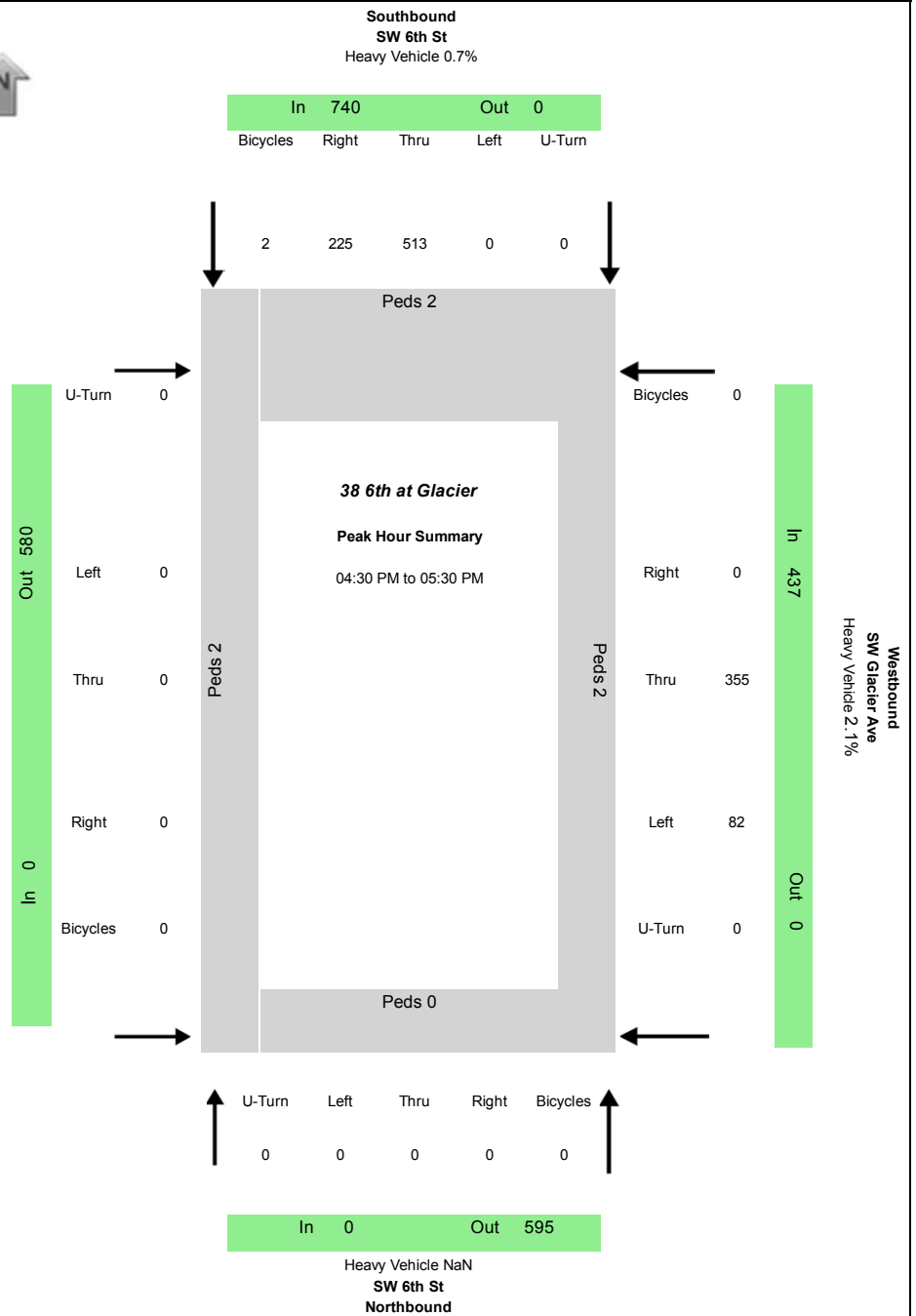
PHV- Bicycles																PHV - Pedestrians					
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	4

All Vehicle Volumes																		
Time	Northbound SW 9th St				Southbound SW 9th St				Eastbound SW Glacier Ave				Westbound SW Glacier Ave				15 Min	1 HR
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
02:00:00 PM	25	9	0	0	0	0	0	0	0	0	0	0	0	54	1	0		
02:05:00 PM	25	5	0	0	0	0	0	0	0	0	0	0	0	42	0	0		
02:10:00 PM	29	13	0	0	0	0	0	0	0	0	0	0	0	44	0	0	247	
02:15:00 PM	23	9	0	0	0	0	0	0	0	0	0	0	0	43	2	0	235	
02:20:00 PM	17	6	0	0	0	0	0	0	0	0	0	0	0	47	0	0	233	
02:25:00 PM	13	6	0	0	0	0	0	0	0	0	0	0	0	60	0	0	226	
02:30:00 PM	25	8	0	0	0	0	0	0	0	0	0	0	0	45	0	0	227	
02:35:00 PM	20	8	0	0	0	0	0	0	0	0	0	0	0	52	0	0	237	
02:40:00 PM	25	15	0	0	0	0	0	0	0	0	0	0	0	44	0	0	242	
02:45:00 PM	13	6	0	0	0	0	0	0	0	0	0	0	0	33	0	0	216	
02:50:00 PM	26	7	0	0	0	0	0	0	0	0	0	0	0	44	0	0	213	
02:55:00 PM	21	6	0	0	0	0	0	0	0	0	0	0	0	48	0	0	204	919
03:00:00 PM	20	7	0	0	0	0	0	0	0	0	0	0	0	51	0	0	230	908
03:05:00 PM	18	8	0	0	0	0	0	0	0	0	0	0	0	57	0	0	236	919
03:10:00 PM	20	10	0	0	0	0	0	0	0	0	0	0	0	41	1	0	233	905
03:15:00 PM	25	5	0	0	0	0	0	0	0	0	0	0	0	43	1	0	229	902
03:20:00 PM	43	4	0	0	0	0	0	0	0	0	0	0	0	34	0	0	227	913
03:25:00 PM	24	10	0	0	0	0	0	0	0	0	0	0	0	41	2	0	232	911
03:30:00 PM	22	6	0	0	0	0	0	0	0	0	0	0	0	45	0	0	231	906
03:35:00 PM	28	9	0	0	0	0	0	0	0	0	0	0	0	64	0	0	251	927
03:40:00 PM	22	3	0	0	0	0	0	0	0	0	0	0	0	41	0	0	240	909
03:45:00 PM	32	7	0	0	0	0	0	0	0	0	0	0	0	48	0	0	254	944
03:50:00 PM	16	7	0	0	0	0	0	0	0	0	0	0	0	50	0	0	226	940
03:55:00 PM	22	9	0	0	0	0	0	0	0	0	0	0	0	46	0	0	237	942
04:00:00 PM	27	3	0	0	0	0	0	0	0	0	0	0	0	51	2	0	233	947
04:05:00 PM	29	5	0	0	1	0	0	0	0	0	0	0	0	56	1	0	252	956
04:10:00 PM	32	13	0	0	0	0	0	0	0	0	0	0	0	56	0	0	276	985
04:15:00 PM	21	12	0	0	0	0	0	0	0	0	0	0	0	44	1	0	271	989
04:20:00 PM	30	8	0	0	0	0	0	0	0	0	0	0	0	42	0	0	259	988
04:25:00 PM	20	14	0	0	0	0	0	0	0	0	0	0	0	43	0	0	235	988
04:30:00 PM	24	4	0	0	0	0	0	0	0	0	0	0	0	57	0	0	242	1000
04:35:00 PM	29	9	0	0	0	0	0	0	0	0	0	0	0	57	0	0	257	994
04:40:00 PM	24	8	0	0	0	0	0	0	0	0	0	0	0	36	0	0	248	996
04:45:00 PM	24	5	0	0	0	0	0	0	0	0	0	0	0	53	1	0	246	992
04:50:00 PM	30	11	0	0	0	0	0	0	0	0	0	0	0	47	0	0	239	1007
04:55:00 PM	23	12	0	0	0	0	0	0	0	0	0	0	0	49	1	0	256	1015
05:00:00 PM	27	9	0	0	0	0	0	0	0	0	0	0	0	58	0	0	267	1026
05:05:00 PM	32	18	0	0	0	0	0	0	0	0	0	0	0	57	3	0	289	1044
05:10:00 PM	33	9	0	0	0	0	0	0	0	0	0	0	0	69	4	0	319	1058
05:15:00 PM	23	7	0	0	0	0	0	0	0	0	0	0	0	48	1	0	304	1059
05:20:00 PM	24	5	0	0	0	0	0	0	0	0	0	0	0	52	1	0	276	1061
05:25:00 PM	20	6	0	0	0	0	0	0	0	0	0	0	0	62	0	0	249	1072
05:30:00 PM	20	7	0	0	0	0	0	0	0	0	0	0	0	50	0	0	247	1064
05:35:00 PM	26	8	0	0	0	0	0	0	0	0	0	0	0	65	1	0	265	1069
05:40:00 PM	25	7	0	0	0	0	0	0	0	0	0	0	0	44	1	0	254	1078
05:45:00 PM	22	9	0	0	0	0	0	0	0	0	0	0	0	57	0	0	265	1083
05:50:00 PM	35	8	0	0	0	0	0	0	0	0	0	0	0	53	0	0	261	1091
05:55:00 PM	22	8	0	0	0	0	0	0	0	0	0	0	0	41	0	0	255	1077



Data Provided by K-D-N.com 503-594-4224		
N/S street	SW 6th St	
E/W street	SW Glacier Ave	
City, State	Redmond OR	
Site Notes		
Location	44.270592 - -121.174265	
Start Date	Wednesday, April 19, 2017	
Start Time	02:00:00 PM	
Weather		
Study ID #	38	
Peak Hour Start	04:30:00 PM	
Peak 15 Min Start	05:00:00 PM	
PHF (15-Min Int)	0.93	

Eastbound
SW Glacier Ave
Heavy Vehicle NaN



Peak-Hour Volumes (PHV)																									
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB		
0	0	0	0	0	513	225	0	0	0	0	0	82	355	0	0	0	738	0	437	595	0	580	0		
Percent Heavy Vehicles																									
0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	#DIV/0!	0.7%	#DIV/0!	2.1%	0.7%	0.0%	1.7%	0.0%		
PHV- Bicycles																PHV - Pedestrians									
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB					
0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0		2	0	2	2	2		6		
All Vehicle Volumes																				15 Min Sum				1 HR Sum	
Time	Northbound SW 6th St				Southbound SW 6th St				Eastbound SW Glacier Ave				Westbound SW Glacier Ave												
02:00:00 PM	0	0	0	0	0	49	18	0	0	0	0	0	3	25	0	0									
02:05:00 PM	0	0	0	0	0	41	14	0	0	0	0	0	7	23	0	0									
02:10:00 PM	0	0	0	0	0	39	16	0	0	0	0	0	6	22	0	0					263				
02:15:00 PM	0	0	0	0	0	49	14	0	0	0	0	0	6	20	0	0					257				
02:20:00 PM	0	0	0	0	0	53	18	0	0	0	0	0	5	27	0	0					275				
02:25:00 PM	0	0	0	0	0	49	24	0	0	0	0	0	6	24	0	0					295				
02:30:00 PM	0	0	0	0	0	53	25	0	0	0	0	0	7	16	0	0					307				
02:35:00 PM	0	0	0	0	0	43	18	0	0	0	0	0	5	21	0	0					291				
02:40:00 PM	0	0	0	0	0	43	17	0	0	0	0	0	5	23	0	0					276				
02:45:00 PM	0	0	0	0	0	45	13	0	0	0	0	0	5	14	0	0					252				
02:50:00 PM	0	0	0	0	0	50	22	0	0	0	0	0	4	20	0	0					261				
02:55:00 PM	0	0	0	0	0	32	15	0	0	0	0	0	5	29	0	0					254 1088				
03:00:00 PM	0	0	0	0	0	51	19	0	0	0	0	0	4	27	0	0					278 1094				
03:05:00 PM	0	0	0	0	0	42	32	0	0	0	0	0	6	23	0	0					285 1112				
03:10:00 PM	0	0	0	0	0	46	17	0	0	0	0	0	7	20	0	0					294 1119				
03:15:00 PM	0	0	0	0	0	32	15	0	0	0	0	0	9	16	0	0					265 1102				
03:20:00 PM	0	0	0	0	0	41	13	0	0	0	0	0	8	14	0	0					238 1075				
03:25:00 PM	0	0	0	0	0	44	19	0	0	0	0	0	3	25	0	0					239 1063				
03:30:00 PM	0	0	0	0	0	36	21	0	0	0	0	0	7	24	0	0					255 1050				
03:35:00 PM	0	0	0	0	0	37	27	0	0	0	0	0	5	27	0	0					275 1059				
03:40:00 PM	0	0	0	0	0	27	18	0	0	0	0	0	9	23	0	0					261 1048				
03:45:00 PM	0	0	0	0	0	44	13	0	0	0	0	0	7	24	0	0					261 1059				
03:50:00 PM	0	0	0	0	0	48	15	0	0	0	0	0	8	28	0	0					264 1062				
03:55:00 PM	0	0	0	0	0	37	20	0	0	0	0	0	3	26	0	0					273 1067				
04:00:00 PM	0	0	0	0	0	43	18	0	0	0	0	0	5	28	0	0					279 1060				
04:05:00 PM	0	0	0	0	0	49	20	0	0	0	0	0	7	25	0	0					281 1058				
04:10:00 PM	0	0	0	0	0	46	21	0	0	0	0	0	8	30	0	0					300 1073				
04:15:00 PM	0	0	0	0	0	33	23	0	0	0	0	0	8	21	0	0					291 1086				
04:20:00 PM	0	0	0	0	0	49	9	0	0	0	0	0	11	19	0	0					278 1098				
04:25:00 PM	0	0	0	0	0	33	17	0	0	0	0	0	4	25	0	0					252 1086				
04:30:00 PM	0	0	0	0	0	39	22	0	0	0	0	0	7	20	0	0					255 1086				
04:35:00 PM	0	0	0	0	0	49	22	0	0	0	0	0	8	31	0	0					277 1100				
04:40:00 PM	0	0	0	0	0	53	11	0	0	0	0	0	7	23	0	0					292 1117				
04:45:00 PM	0	0	0	0	0	44	15	0	0	0	0	0	1	35	0	0					299 1124				
04:50:00 PM	0	0	0	0	0	35	22	0	0	0	0	0	8	16	0	0					270 1106				
04:55:00 PM	0	0	0	0	0	39	11	0	0	0	0	0	5	34	0	0					265 1109				
05:00:00 PM	0	0	0	0	0	46	25	0	0	0	0	0	8	28	0	0					277 1122				
05:05:00 PM	0	0	0	0	0	48	17	0	0	0	0	0	7	33	0	0					301 1126				
05:10:00 PM	0	0	0	0	0	35	25	0	0	0	0	0	7	36	0	0					315 1124				
05:15:00 PM	0	0	0	0	0	38	19	0	0	0	0	0	6	32	0	0					303 1134				
05:20:00 PM	0	0	0	0	0	44	16	0	0	0	0	0	8	27	0	0					293 1141				
05:25:00 PM	0	0	0	0	0	43	20	0	0	0	0	0	10	40	0	0					303 1175				
05:30:00 PM	0	0	0	0	0	19	19	0	0	0	0	0	5	23	0	0					274 1153				
05:35:00 PM	0	0	0	0	0	31	23	0	0	0	0	0	6	35	0	0					274 1138				
05:40:00 PM	0	0	0	0	0	23	19	0	0	0	0	0	6	20	0	0					229 1112				
05:45:00 PM	0	0	0	0	0	29	25	0	0	0	0	0	2	35	0	0					254 1108				
05:50:00 PM	0	0	0	0	0	34	15	0	0	0	0	0	5	33	0	0					246 1114				
05:55:00 PM	0	0	0	0	0	34	10	0	0	0	0	0	9	24	0	0					255 1102				



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 5th St
E/W street	SW Glacier Ave
City, State	Redmond OR
Site Notes	
Location	44.270603 - -121.173197
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	37
Peak Hour Start	04:25:00 PM
Peak 15 Min Start	04:50:00 PM
PHF (15-Min Int)	0.92

Eastbound
SW Glacier Ave
Heavy Vehicle NaN

In	0
Out	405
U-Turn	0
Left	0
Thru	0
Right	0
Bicycles	0

Southbound SW 5th St Heavy Vehicle 0.0%				
In	0	Out	693	
Bicycles		Right	Thru	Left
				U-Turn

0	0	0	0	0
Peds 0				
U-Turn	0			
Left	0			
Thru	0			
Right	0			
Bicycles	0			
U-Turn	0			
Left	39	491	0	0
Thru				
Right				
Bicycles				

In	530	Out	0
Heavy Vehicle 0.4% SW 5th St Northbound			

37 5th at Glacier

Peak Hour Summary

04:25 PM to 05:25 PM

In	568
Out	0
U-Turn	0
Left	0
Thru	366
Right	202
Bicycles	0

Westbound
SW Glacier Ave
Heavy Vehicle 2.5%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
39	491	0	0	0	0	0	0	0	0	0	0	0	366	202	0	530	0	0	568	0	693	405	0
Percent Heavy Vehicles																							
0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%	2.0%	0.0%	0.4%	0.0%	#DIV/0!	2.5%	#DIV/0!	0.9%	2.5%	0.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	4	0	4	0		
All Vehicle Volumes																							
Time	Northbound SW 5th St				Southbound SW 5th St				Eastbound SW Glacier Ave				Westbound SW Glacier Ave				15 Min		1 HR				
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum		Sum				
02:00:00 PM	3	40	0	0	0	0	0	0	0	0	0	0	0	22	12	0							
02:05:00 PM	4	44	0	0	0	0	0	0	0	0	0	0	0	24	12	0							
02:10:00 PM	3	44	0	0	0	0	0	0	0	0	0	0	0	24	10	0				242			
02:15:00 PM	4	34	0	0	0	0	0	0	0	0	0	0	0	22	10	0				235			
02:20:00 PM	5	44	0	0	0	0	0	0	0	0	0	0	0	22	10	0				232			
02:25:00 PM	2	29	0	0	0	0	0	0	0	0	0	0	0	29	10	0				221			
02:30:00 PM	3	35	0	0	0	0	0	0	0	0	0	0	0	19	14	0				222			
02:35:00 PM	5	39	0	0	0	0	0	0	0	0	0	0	0	19	14	0				218			
02:40:00 PM	2	65	0	0	0	0	0	0	0	0	0	0	0	22	17	0				254			
02:45:00 PM	1	48	0	0	0	0	0	0	0	0	0	0	0	22	23	0				277			
02:50:00 PM	6	41	0	0	0	0	0	0	0	0	0	0	0	18	10	0				275			
02:55:00 PM	1	50	0	0	0	0	0	0	0	0	0	0	0	32	23	0				275 992			
03:00:00 PM	3	30	0	0	0	0	0	0	0	0	0	0	0	26	9	0				249 983			
03:05:00 PM	4	41	0	0	0	0	0	0	0	0	0	0	0	28	17	0				264 989			
03:10:00 PM	7	44	0	0	0	0	0	0	0	0	0	0	0	14	7	0				230 980			
03:15:00 PM	2	40	0	0	0	0	0	0	0	0	0	0	0	23	12	0				239 987			
03:20:00 PM	2	31	0	0	0	0	0	0	0	0	0	0	0	27	19	0				228 985			
03:25:00 PM	2	45	0	0	0	0	0	0	0	0	0	0	0	17	11	0				231 990			
03:30:00 PM	1	40	0	0	0	0	0	0	0	0	0	0	0	31	18	0				244 1009			
03:35:00 PM	5	41	0	0	0	0	0	0	0	0	0	0	0	27	18	0				256 1023			
03:40:00 PM	4	51	0	0	0	0	0	0	0	0	0	0	0	32	19	0				287 1023			
03:45:00 PM	5	34	0	0	0	0	0	0	0	0	0	0	0	22	12	0				270 1002			
03:50:00 PM	6	42	0	0	0	0	0	0	0	0	0	0	0	31	14	0				272 1020			
03:55:00 PM	1	43	0	0	0	0	0	0	0	0	0	0	0	30	38	0				278 1026			
04:00:00 PM	3	42	0	0	0	0	0	0	0	0	0	0	0	25	12	0				287 1040			
04:05:00 PM	3	34	0	0	0	0	0	0	0	0	0	0	0	23	12	0				266 1022			
04:10:00 PM	4	40	0	0	0	0	0	0	0	0	0	0	0	35	18	0				251 1047			
04:15:00 PM	0	43	0	0	0	0	0	0	0	0	0	0	0	25	13	0				250 1051			
04:20:00 PM	5	32	0	0	0	0	0	0	0	0	0	0	0	32	25	0				272 1066			
04:25:00 PM	1	41	0	0	0	0	0	0	0	0	0	0	0	22	27	0				266 1082			
04:30:00 PM	2	40	0	0	0	0	0	0	0	0	0	0	0	21	18	0				266 1073			
04:35:00 PM	6	53	0	0	0	0	0	0	0	0	0	0	0	38	13	0				282 1092			
04:40:00 PM	3	23	0	0	0	0	0	0	0	0	0	0	0	21	18	0				256 1051			
04:45:00 PM	4	38	0	0	0	0	0	0	0	0	0	0	0	26	12	0				255 1058			
04:50:00 PM	5	50	0	0	0	0	0	0	0	0	0	0	0	24	14	0				238 1058			
04:55:00 PM	3	38	0	0	0	0	0	0	0	0	0	0	0	38	22	0				274 1047			
05:00:00 PM	2	56	0	0	0	0	0	0	0	0	0	0	0	34	14	0				300 1071			
05:05:00 PM	6	27	0	0	0	0	0	0	0	0	0	0	0	28	14	0				282 1074			
05:10:00 PM	3	30	0	0	0	0	0	0	0	0	0	0	0	43	18	0				275 1071			
05:15:00 PM	1	44	0	0	0	0	0	0	0	0	0	0	0	32	18	0				264 1085			
05:20:00 PM	3	51	0	0	0	0	0	0	0	0	0	0	0	39	14	0				296 1098			
05:25:00 PM	10	39	0	0	0	0	0	0	0	0	0	0	0	29	13	0				293 1098			
05:30:00 PM	1	27	0	0	0	0	0	0	0	0	0	0	0	33	14	0				273 1092			
05:35:00 PM	4	35	0	0	0	0	0	0	0	0	0	0	0	29	10	0				244 1060			
05:40:00 PM	3	32	0	0	0	0	0	0	0	0	0	0	0	23	16	0				227 1069			
05:45:00 PM	3	22	0	0	0	0	0	0	0	0	0	0	0	35	17	0				229 1066			
05:50:00 PM	4	45	0	0	0	0	0	0	0	0	0	0	0	35	13	0				248 1070			
05:55:00 PM	6	32	0	0	0	0	0	0	0	0	0	0	0	21	9	0				242 1037			



Data Provided by K-D-N.com 503-594-4224	
N/S street	US97
E/W street	Glacier Highland Ave
City, State	Redmond OR
Site Notes	
Location	44.270985 - -121.170617
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	03:45:00 PM
Peak 15 Min Start	04:25:00 PM
PHF (15-Min Int)	0.96

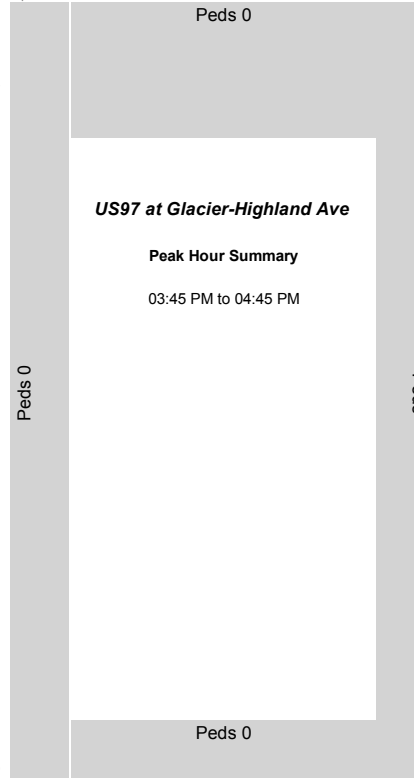
Eastbound
Glacier Highland Ave
Heavy Vehicle 4.1%

In 484 Out 564

U-Turn	0
Left	294
Thru	0
Right	190
Bicycles	0

Southbound US97 Heavy Vehicle 7.5%				
In	1135	Out	1650	
Bicycles				
Right				
Thru				
Left				
U-Turn				

0	207	928	0	0
---	-----	-----	---	---



U-Turn	Left	Thru	Right	Bicycles
3	357	1356	0	0

In	1716	Out	1121
----	------	-----	------

Heavy Vehicle 4.7%
US97
Northbound

Westbound
Heavy Vehicle 0.0%

In 0 Out 0

Bicycles	0
Right	0
Thru	0
Left	0
U-Turn	0

0	0
---	---



U-Turn	Left	Thru	Right	Bicycles
3	357	1356	0	0

In	1716	Out	1121
----	------	-----	------

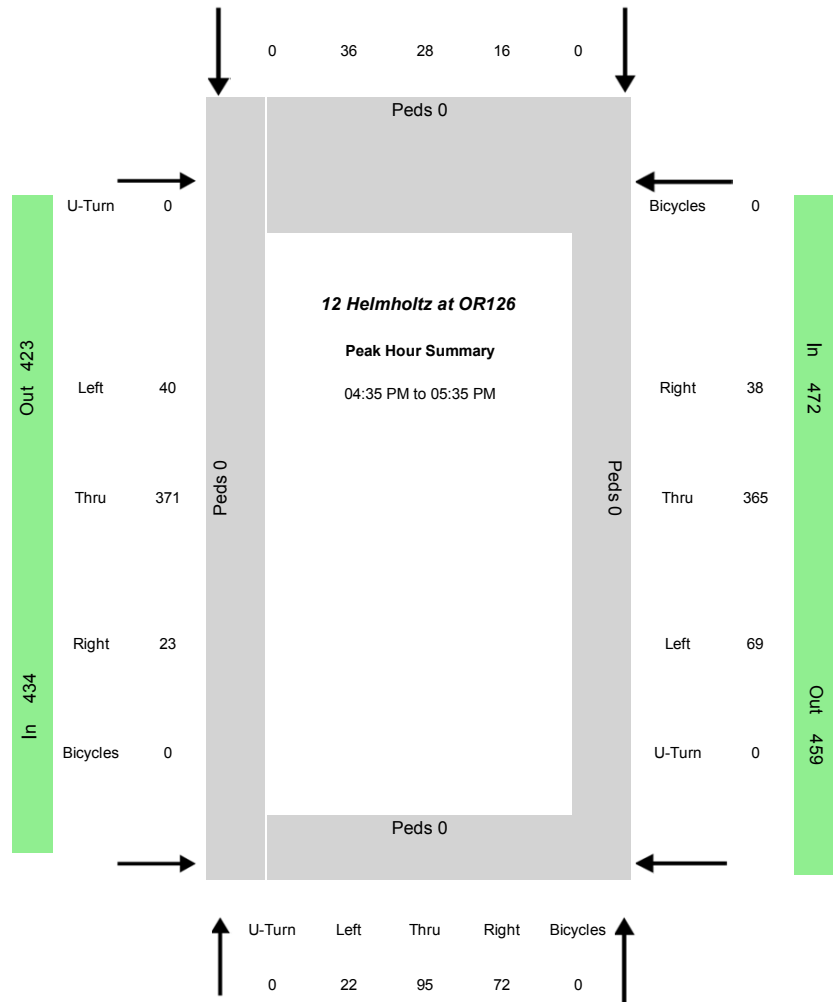
Heavy Vehicle 4.7%
US97
Northbound

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
357	1356	0	3	0	928	207	0	294	0	190	0	0	0	0	0	1716	1135	484	0	1121	1650	564	0
Percent Heavy Vehicles																							
2.2%	5.4%	0.0%	0.0%	0.0%	8.5%	2.9%	0.0%	5.8%	0.0%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	4.7%	7.5%	4.1%	0.0%	7.3%	5.5%	2.5%	0.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk				Sum		
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0		0	0	0	0	0	0		0	0	0					0	0	0			0	
All Vehicle Volumes																							
Time	Northbound US97				Southbound US97				Eastbound Glacier Highland Ave				Westbound				15 Min		1 HR				
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	29	98		0		71	13	0	27		18	0											
02:05:00 PM	25	105		2		55	9	0	29		18	0											
02:10:00 PM	32	103		0		88	7	0	18		10	0					757						
02:15:00 PM	19	89		1		58	11	0	13		16	0					708						
02:20:00 PM	36	111		0		72	17	0	17		20	0					738						
02:25:00 PM	22	95		1		44	15	0	25		21	0					703						
02:30:00 PM	24	106		0		89	10	0	21		16	0					762						
02:35:00 PM	19	97		0		60	15	0	28		22	0					730						
02:40:00 PM	33	89		0		90	13	0	25		17	0					774						
02:45:00 PM	20	84		0		62	12	0	17		28	1					732						
02:50:00 PM	30	115		0		87	9	0	21		19	0					772						
02:55:00 PM	21	81		0		76	21	0	22		16	0					742	2976					
03:00:00 PM	27	103		0		70	16	0	26		25	0					785	2987					
03:05:00 PM	26	113		1		79	19	0	34		12	0					788	3028					
03:10:00 PM	13	99		0		67	13	0	31		18	0					792	3011					
03:15:00 PM	25	114		0		70	14	0	33		15	0					796	3075					
03:20:00 PM	26	92		0		57	15	0	20		8	0					730	3020					
03:25:00 PM	28	115		0		62	10	0	22		19	0					745	3053					
03:30:00 PM	33	98		0		105	14	0	15		16	0					755	3068					
03:35:00 PM	24	103		0		49	25	0	39		23	0					800	3090					
03:40:00 PM	24	81		1		75	14	0	12		16	0					767	3046					
03:45:00 PM	33	116		0		98	16	0	25		15	0					789	3125					
03:50:00 PM	25	101		0		47	19	0	25		14	0					757	3075					
03:55:00 PM	51	112		0		94	15	0	19		13	0					838	3142					
04:00:00 PM	26	128		0		78	17	0	31		19	0					834	3174					
04:05:00 PM	19	96		0		70	21	0	25		14	0					848	3135					
04:10:00 PM	31	134		1		100	20	0	21		12	0					863	3213					
04:15:00 PM	24	95		0		54	18	0	17		27	0					799	3177					
04:20:00 PM	33	107		0		89	17	0	14		19	0					833	3238					
04:25:00 PM	39	124		0		78	13	0	30		14	0					812	3280					
04:30:00 PM	22	112		1		52	16	0	29		12	0					821	3243					
04:35:00 PM	26	135		0		101	24	0	27		15	0					870	3308					
04:40:00 PM	28	96		1		67	11	0	31		16	0					822	3335					
04:45:00 PM	32	124		0		87	13	0	24		13	0					871	3325					
04:50:00 PM	24	105		0		64	12	0	21		15	0					784	3335					
04:55:00 PM	45	110		0		77	17	0	26		19	0					828	3325					
05:00:00 PM	24	100		0		51	14	0	27		17	0					768	3259					
05:05:00 PM	27	137		0		85	25	0	31		14	0					846	3333					
05:10:00 PM	35	107		0		75	22	0	17		17	0					825	3287					
05:15:00 PM	33	109		0		76	19	0	29		16	0					874	3334					
05:20:00 PM	27	107		1		89	24	0	12		15	0					830	3330					
05:25:00 PM	26	112		0		84	20	0	21		19	0					839	3314					
05:30:00 PM	25	118		1		73	11	0	21		11	0					817	3330					
05:35:00 PM	32	107		0		58	18	0	23		12	0					792	3252					
05:40:00 PM	25	118		0		64	15	0	22		7	0					761	3253					
05:45:00 PM	37	93		0		73	15	0	18		9	0					746	3205					
05:50:00 PM	14	90		0		58	18	0	10		13	0					699	3167					
05:55:00 PM	25	107		0		58	15	0	30		24	0					707	3132					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW Helmholtz Way
E/W street	SW Highland Ave
City, State	Redmond OR
Site Notes	
Location	44.269211 - -121.219527
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:20:00 PM
PHF (15-Min Int)	0.92

Eastbound
SW Highland Ave
Heavy Vehicle 3.7%

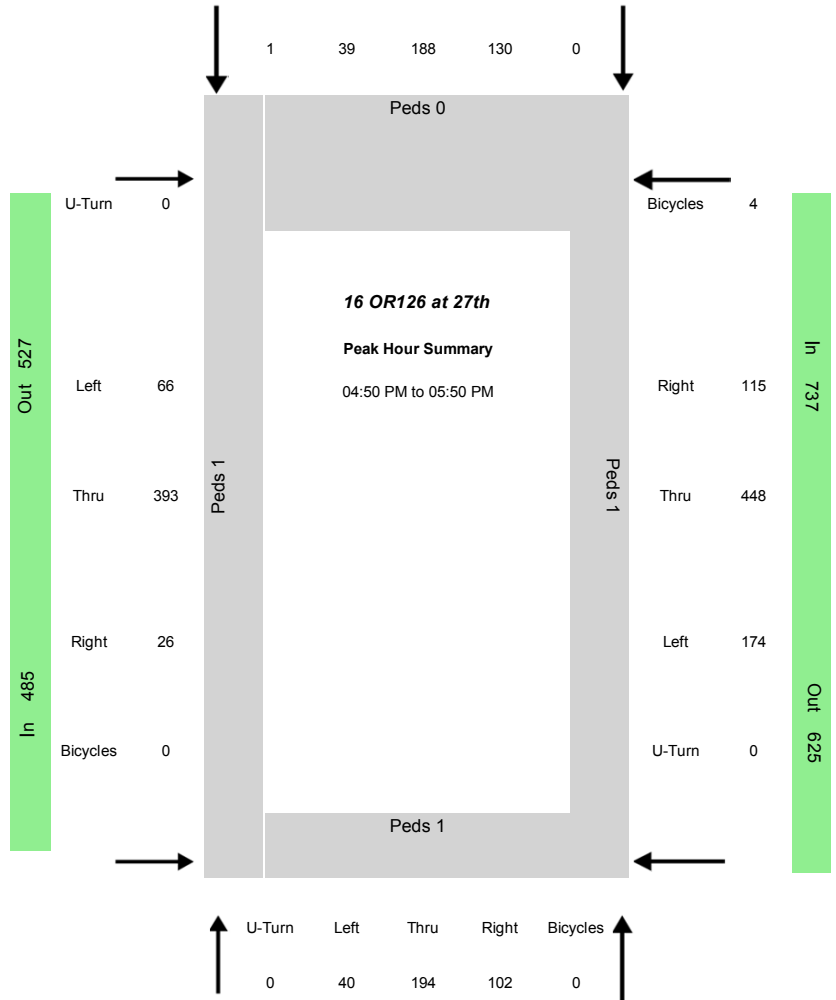


Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
22	95	72	0	16	28	36	0	40	371	23	0	69	365	38	0	189	80	434	472	120	173	423	459
Percent Heavy Vehicles																							
0.0%	0.0%	1.4%	0.0%	0.0%	7.1%	0.0%	0.0%	0.0%	4.0%	4.3%	0.0%	2.9%	2.7%	0.0%	0.0%	0.5%	2.5%	3.7%	2.5%	4.2%	0.0%	2.4%	3.5%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
All Vehicle Volumes																							
Time	Northbound SW Helmholtz Way				Southbound SW Helmholtz Way				Eastbound SW Highland Ave				Westbound SW Highland Ave										
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	1	0	2	0	3	3	1	0	3	26	2	0	1	24	1	0							
02:05:00 PM	0	1	6	0	4	2	1	0	3	24	2	0	3	21	1	0							
02:10:00 PM	1	3	6	0	0	5	3	0	0	32	4	0	5	36	0	0	230						
02:15:00 PM	0	1	4	0	0	2	3	0	2	30	2	0	8	32	0	0	247						
02:20:00 PM	1	2	2	0	1	1	2	0	2	21	1	0	4	21	2	0	239						
02:25:00 PM	0	2	2	0	1	2	7	0	1	26	1	0	5	20	1	0	212						
02:30:00 PM	2	3	6	0	1	1	1	0	4	26	0	0	5	27	5	0	209						
02:35:00 PM	1	3	9	0	2	1	4	0	2	31	1	0	10	28	5	0	246						
02:40:00 PM	1	8	13	0	2	1	0	0	0	25	3	0	3	18	2	0	254						
02:45:00 PM	1	10	9	0	2	1	2	0	2	26	1	0	5	38	2	0	272						
02:50:00 PM	4	3	3	0	1	2	3	0	3	32	0	0	4	25	2	0	257						
02:55:00 PM	2	6	3	0	1	2	2	0	2	35	9	0	6	23	3	0	275	971					
03:00:00 PM	2	4	2	0	0	4	0	0	3	23	3	0	7	24	2	0	250	978					
03:05:00 PM	2	0	1	0	0	0	7	0	4	30	1	0	6	22	0	0	241	983					
03:10:00 PM	3	1	5	0	2	3	2	0	4	30	4	0	7	40	2	0	250	991					
03:15:00 PM	1	6	6	0	1	0	1	0	4	31	1	0	7	36	5	0	275	1006					
03:20:00 PM	0	7	8	0	2	4	4	0	4	31	1	0	4	30	1	0	298	1042					
03:25:00 PM	2	4	1	0	1	1	0	0	2	26	2	0	6	36	2	0	278	1057					
03:30:00 PM	1	2	5	0	0	2	4	0	4	32	0	0	10	34	1	0	274	1071					
03:35:00 PM	3	2	4	0	1	1	3	0	2	36	0	0	4	29	1	0	264	1060					
03:40:00 PM	0	4	5	0	0	4	0	0	2	29	2	0	6	32	4	0	269	1072					
03:45:00 PM	5	2	10	0	0	1	6	0	2	30	2	0	7	34	4	0	277	1076					
03:50:00 PM	2	7	2	0	0	5	4	0	1	29	2	0	9	40	2	0	294	1097					
03:55:00 PM	4	5	7	0	0	7	3	0	2	29	1	0	3	33	5	0	305	1102					
04:00:00 PM	3	12	4	0	1	2	3	0	2	29	6	0	3	32	1	0	300	1126					
04:05:00 PM	1	4	0	0	0	3	3	0	5	28	5	0	5	22	2	0	275	1131					
04:10:00 PM	2	7	6	0	1	1	2	0	3	19	0	0	4	24	1	0	246	1098					
04:15:00 PM	0	9	9	0	0	1	1	0	3	28	1	0	5	46	5	0	256	1107					
04:20:00 PM	0	4	3	0	1	5	2	0	3	27	4	0	9	35	2	0	273	1106					
04:25:00 PM	3	12	8	0	0	1	1	0	5	37	2	0	3	26	2	0	303	1123					
04:30:00 PM	0	10	9	0	0	1	4	0	5	32	1	0	5	25	2	0	289	1122					
04:35:00 PM	0	10	3	0	1	2	2	0	1	37	2	0	5	34	3	0	294	1136					
04:40:00 PM	2	1	8	0	3	2	3	0	0	23	0	0	5	21	3	0	265	1119					
04:45:00 PM	3	9	4	0	2	4	1	0	6	33	0	0	5	27	4	0	269	1114					
04:50:00 PM	1	12	11	0	2	0	1	0	5	33	1	0	6	34	2	0	277	1119					
04:55:00 PM	0	8	4	0	1	3	2	0	2	30	3	0	3	30	2	0	294	1108					
05:00:00 PM	1	5	4	0	1	2	1	0	3	22	3	0	3	36	2	0	279	1093					
05:05:00 PM	1	9	9	0	1	3	3	0	3	27	4	0	6	39	3	0	279	1123					
05:10:00 PM	4	3	2	0	2	3	7	0	8	30	2	0	8	34	5	0	299	1161					
05:15:00 PM	1	8	3	0	0	4	4	0	1	31	1	0	7	29	2	0	307	1144					
05:20:00 PM	4	7	8	0	1	0	2	0	4	36	1	0	8	25	3	0	298	1148					
05:25:00 PM	1	13	9	0	2	2	5	0	6	33	3	0	4	25	3	0	296	1154					
05:30:00 PM	4	10	7	0	0	3	5	0	1	36	3	0	9	31	6	0	320	1175					
05:35:00 PM	3	1	8	0	0	2	1	0	3	21	3	0	7	21	2	0	293	1147					
05:40:00 PM	2	6	9	0	1	3	5	0	0	22	3	0	5	31	1	0	275	1164					
05:45:00 PM	2	5	16	0	4	2	3	0	3	24	3	0	5	34	2	0	263	1169					
05:50:00 PM	1	6	7	0	2	4	1	0	2	20	3	0	6	30	6	0	279	1149					
05:55:00 PM	1	5	8	0	0	1	3	0	3	23	1	0	6	19	4	0	265	1135					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 27th St
E/W street	OR-126
City, State	Redmond OR
Site Notes	
Location	44.269237 - -121.199367
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:50:00 PM
Peak 15 Min Start	05:35:00 PM
PHF (15-Min Int)	0.97

Eastbound
OR-126
Heavy Vehicle 1.9%

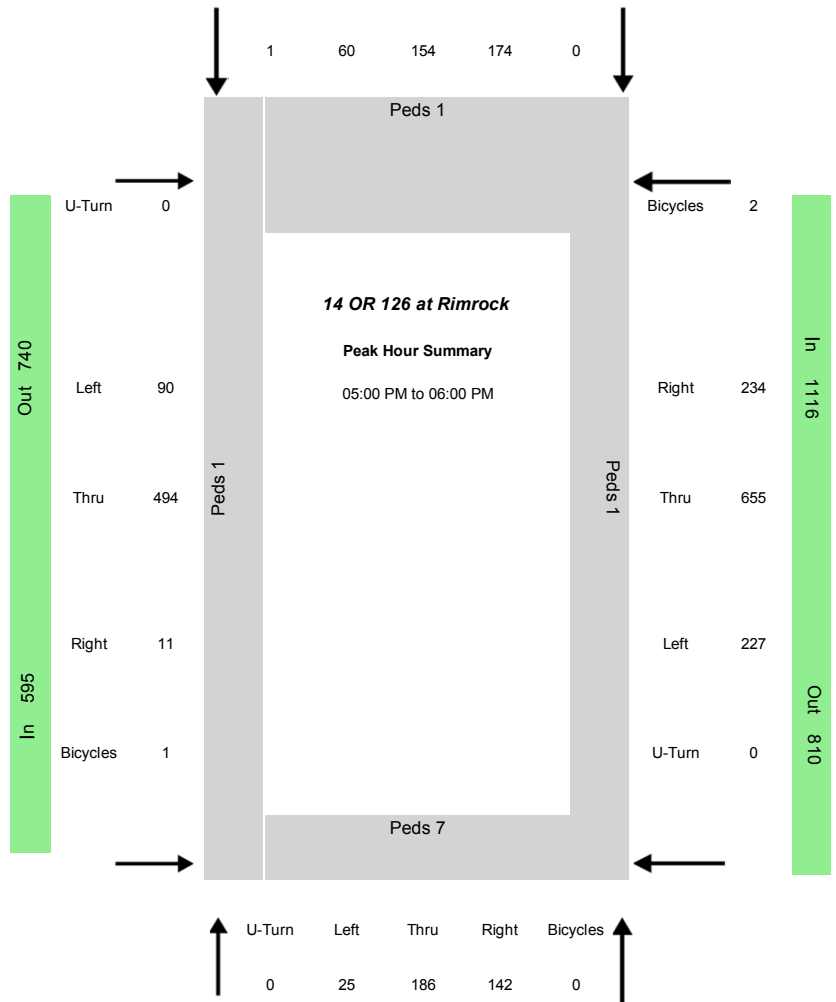


Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
40	194	102	0	130	188	39	0	66	393	26	0	174	448	115	0	336	357	485	737	388	375	527	625
Percent Heavy Vehicles																							
5.0%	1.0%	2.0%	0.0%	0.8%	0.5%	2.6%	0.0%	0.0%	2.3%	0.0%	0.0%	0.6%	2.2%	0.0%	0.0%	1.8%	0.8%	1.9%	1.5%	0.5%	0.5%	2.5%	1.9%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	5	1	0	1	1	3		
All Vehicle Volumes																							
Time	Northbound SW 27th St				Southbound SW 27th St				Eastbound OR-126				Westbound OR-126				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	3	10	5	0	4	4	1	0	1	30	0	0	6	25	5	0							
02:05:00 PM	4	6	3	0	9	8	4	0	4	32	1	0	6	18	4	0							
02:10:00 PM	2	7	6	0	5	4	1	0	3	44	2	0	7	53	8	0	335						
02:15:00 PM	4	6	8	0	9	8	1	0	2	28	2	0	7	29	3	0	348						
02:20:00 PM	2	10	12	0	7	13	0	0	2	24	1	0	9	24	7	0	360						
02:25:00 PM	3	4	11	0	10	4	0	0	2	29	4	0	13	33	6	0	337						
02:30:00 PM	4	7	7	0	4	7	1	0	5	22	3	0	5	27	2	0	324						
02:35:00 PM	2	7	7	0	9	3	4	0	4	35	3	0	8	37	4	0	336						
02:40:00 PM	0	9	4	0	7	8	2	0	5	40	3	0	14	33	9	0	351						
02:45:00 PM	1	6	8	0	7	14	5	0	7	36	6	0	14	38	7	0	406						
02:50:00 PM	2	8	11	0	11	10	3	0	5	31	5	0	13	24	7	0	413						
02:55:00 PM	3	13	8	0	10	4	1	0	4	25	3	0	6	35	7	0	398	1421					
03:00:00 PM	0	13	12	0	8	9	2	0	3	38	2	0	9	34	12	0	391	1469					
03:05:00 PM	3	9	5	0	9	10	0	0	5	36	7	0	12	40	4	0	401	1510					
03:10:00 PM	6	13	12	0	9	6	0	0	3	27	4	0	9	40	4	0	415	1501					
03:15:00 PM	1	9	6	0	18	11	2	0	3	22	3	0	11	44	9	0	412	1533					
03:20:00 PM	4	18	7	0	5	16	1	0	3	48	0	0	9	37	11	0	431	1581					
03:25:00 PM	5	6	4	0	8	13	2	0	3	33	3	0	8	42	4	0	429	1593					
03:30:00 PM	1	12	9	0	11	11	1	0	5	34	1	0	8	32	7	0	422	1631					
03:35:00 PM	3	11	7	0	7	12	2	0	3	33	4	0	11	29	3	0	388	1633					
03:40:00 PM	4	22	11	0	7	11	0	0	3	42	2	0	10	38	11	0	418	1660					
03:45:00 PM	3	11	9	0	3	13	0	0	5	35	4	0	13	34	9	0	425	1650					
03:50:00 PM	2	11	9	0	6	11	2	0	3	41	0	0	19	44	10	0	458	1678					
03:55:00 PM	5	13	13	0	8	8	2	0	3	29	0	0	17	41	5	0	441	1703					
04:00:00 PM	2	7	11	0	4	12	0	0	3	40	6	0	11	38	11	0	447	1706					
04:05:00 PM	2	12	5	0	9	6	1	0	4	37	1	0	14	31	11	0	422	1699					
04:10:00 PM	1	12	9	0	3	7	1	0	1	25	1	0	7	36	9	0	390	1678					
04:15:00 PM	8	10	5	0	9	7	4	0	4	34	2	0	14	37	10	0	389	1683					
04:20:00 PM	3	15	2	0	13	9	1	0	6	31	1	0	10	47	8	0	402	1670					
04:25:00 PM	5	10	7	0	7	19	0	0	7	37	1	0	6	32	9	0	430	1679					
04:30:00 PM	2	12	8	0	8	14	1	0	5	42	3	0	17	38	3	0	439	1700					
04:35:00 PM	4	9	8	0	6	8	1	0	4	37	5	0	26	38	8	0	447	1729					
04:40:00 PM	1	15	9	0	7	11	0	0	0	29	1	0	11	37	13	0	441	1702					
04:45:00 PM	5	14	7	0	5	9	1	0	12	40	4	0	15	35	10	0	445	1720					
04:50:00 PM	1	18	9	0	14	15	2	0	5	33	2	0	9	44	7	0	450	1721					
04:55:00 PM	1	14	4	0	14	15	3	0	5	37	2	0	10	36	9	0	466	1727					
05:00:00 PM	6	18	8	0	13	13	1	0	5	29	4	0	12	35	5	0	458	1731					
05:05:00 PM	6	16	13	0	7	18	3	0	3	33	2	0	12	45	12	0	469	1768					
05:10:00 PM	3	11	8	0	14	19	7	0	3	23	0	0	19	43	6	0	475	1812					
05:15:00 PM	6	18	8	0	13	14	3	0	4	30	1	0	10	34	13	0	480	1822					
05:20:00 PM	2	10	9	0	7	21	6	0	8	36	3	0	20	45	11	0	488	1854					
05:25:00 PM	3	12	6	0	6	12	1	0	9	43	3	0	16	25	11	0	479	1861					
05:30:00 PM	4	15	7	0	9	12	1	0	5	40	2	0	19	35	8	0	482	1865					
05:35:00 PM	3	16	9	0	13	16	6	0	5	29	1	0	14	38	12	0	466	1873					
05:40:00 PM	1	24	7	0	10	18	2	0	7	35	4	0	15	35	9	0	486	1906					
05:45:00 PM	4	22	14	0	10	15	4	0	7	25	2	0	18	33	12	0	495	1915					
05:50:00 PM	1	6	8	0	11	14	4	0	5	36	1	0	11	44	14	0	488	1911					
05:55:00 PM	1	7	4	0	8	7	3	0	4	32	0	0	12	31	12	0	442	1882					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW Rimrock Dr
E/W street	OR-126
City, State	Redmond OR
Site Notes	
Location	44.269288 - -121.191311
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	05:00:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.97

Eastbound
OR-126
Heavy Vehicle 1.2%



Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
25	186	142	0	174	154	60	0	90	494	11	0	227	655	234	0	353	388	595	1116	392	510	740	810
Percent Heavy Vehicles																							
0.0%	1.1%	0.0%	0.0%	0.0%	1.3%	0.0%	0.0%	1.1%	1.2%	0.0%	0.0%	0.4%	1.7%	0.9%	0.0%	0.6%	0.5%	1.2%	1.3%	0.8%	1.0%	1.5%	0.7%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk				Sum		
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	1	0	0	1	0	0	0	0	2	0	0	4	7	1	1	1	10		
All Vehicle Volumes																							
Time	Northbound SW Rimrock Dr				Southbound SW Rimrock Dr				Eastbound OR-126				Westbound OR-126				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	1	5	11	0	7	4	2	0	5	29	0	0	6	35	14	0							
02:05:00 PM	2	8	9	0	17	5	5	0	7	36	2	0	13	30	9	0							
02:10:00 PM	0	10	11	0	6	8	0	0	6	36	0	0	10	43	17	0	409						
02:15:00 PM	1	4	13	0	10	2	0	0	6	48	1	0	9	43	13	0	440						
02:20:00 PM	1	7	13	0	15	13	0	0	3	37	0	0	15	41	14	0	456						
02:25:00 PM	2	8	11	0	10	6	2	0	4	35	2	0	21	31	9	0	450						
02:30:00 PM	1	7	14	0	17	12	7	0	5	33	0	0	11	39	10	0	456						
02:35:00 PM	0	8	21	0	28	21	22	0	5	39	0	0	17	40	17	0	515						
02:40:00 PM	1	11	20	0	31	11	12	0	4	37	1	0	16	39	15	0	572						
02:45:00 PM	3	13	7	0	21	21	9	0	10	27	2	0	13	40	12	0	594						
02:50:00 PM	0	15	11	0	12	14	7	0	8	42	2	0	10	36	18	0	551						
02:55:00 PM	2	6	13	0	13	17	1	0	5	43	1	0	21	57	13	0	545	1976					
03:00:00 PM	2	17	18	0	14	10	1	0	6	49	0	0	17	51	14	0	566	2056					
03:05:00 PM	1	9	13	0	18	13	5	0	9	36	1	0	15	43	10	0	564	2086					
03:10:00 PM	1	12	11	0	7	7	4	0	3	41	0	0	20	49	16	0	543	2110					
03:15:00 PM	1	8	20	0	4	12	5	0	5	49	0	0	13	59	6	0	526	2142					
03:20:00 PM	2	16	13	0	15	21	5	0	4	49	1	0	13	46	16	0	554	2184					
03:25:00 PM	3	8	11	0	19	7	3	0	6	37	1	0	17	32	9	0	536	2196					
03:30:00 PM	3	8	14	0	19	12	1	0	3	41	2	0	12	45	16	0	530	2216					
03:35:00 PM	1	8	14	0	6	13	4	0	6	46	1	0	13	48	12	0	501	2170					
03:40:00 PM	0	6	11	0	14	12	4	0	7	53	0	0	18	61	22	0	556	2180					
03:45:00 PM	1	6	15	0	6	14	4	0	7	34	0	0	18	60	15	0	560	2182					
03:50:00 PM	1	10	11	0	12	19	5	0	9	42	3	0	17	62	12	0	591	2210					
03:55:00 PM	3	11	13	0	14	12	2	0	8	40	0	0	14	64	10	0	574	2209					
04:00:00 PM	1	14	7	0	15	15	7	0	3	44	3	0	9	42	14	0	568	2184					
04:05:00 PM	2	10	8	0	18	18	3	0	9	36	1	0	17	41	15	0	543	2189					
04:10:00 PM	0	7	8	0	16	8	5	0	3	33	0	0	12	47	25	0	516	2182					
04:15:00 PM	2	10	12	0	12	9	2	0	5	38	0	0	17	53	12	0	514	2172					
04:20:00 PM	1	11	9	0	17	13	2	0	11	39	3	0	21	52	20	0	535	2170					
04:25:00 PM	3	9	13	0	21	11	7	0	1	37	1	0	13	47	15	0	549	2195					
04:30:00 PM	0	8	7	0	11	12	2	0	11	55	0	0	14	53	18	0	568	2210					
04:35:00 PM	1	9	11	0	10	14	5	0	2	45	0	0	23	62	18	0	569	2238					
04:40:00 PM	0	9	12	0	17	9	4	0	6	37	1	0	15	53	15	0	569	2208					
04:45:00 PM	1	9	17	0	12	11	8	0	11	33	0	0	17	47	18	0	562	2212					
04:50:00 PM	0	11	8	0	12	12	5	0	11	53	1	0	13	48	19	0	555	2202					
04:55:00 PM	0	9	7	0	19	14	5	0	3	48	0	0	22	46	18	0	568	2202					
05:00:00 PM	5	16	14	0	16	6	3	0	11	26	2	0	14	66	15	0	578	2222					
05:05:00 PM	1	12	12	0	7	17	5	0	7	42	1	0	19	57	19	0	584	2243					
05:10:00 PM	1	15	19	0	9	16	3	0	7	43	1	0	30	57	23	0	617	2303					
05:15:00 PM	2	14	10	0	14	10	6	0	4	44	1	0	18	61	19	0	626	2334					
05:20:00 PM	2	19	9	0	18	10	9	0	5	39	0	0	15	59	21	0	633	2341					
05:25:00 PM	1	16	11	0	19	8	9	0	7	50	0	0	19	46	24	0	619	2373					
05:30:00 PM	3	18	11	0	17	16	4	0	12	38	1	0	18	41	17	0	612	2378					
05:35:00 PM	3	16	7	0	13	17	4	0	6	49	0	0	19	65	24	0	629	2401					
05:40:00 PM	4	14	8	0	14	10	5	0	5	42	2	0	17	67	13	0	620	2424					
05:45:00 PM	1	15	12	0	10	12	6	0	10	44	3	0	14	51	19	0	621	2437					
05:50:00 PM	0	16	14	0	19	18	3	0	9	41	0	0	19	41	24	0	602	2448					
05:55:00 PM	2	15	15	0	18	14	3	0	7	36	0	0	25	44	16	0	596	2452					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 15th St
E/W street	OR-126
City, State	Redmond OR
Site Notes	
Location	44.26959 - -121.1841
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	48
Peak Hour Start	04:55:00 PM
Peak 15 Min Start	05:00:00 PM
PHF (15-Min Int)	0.93

Eastbound
OR-126
Heavy Vehicle 2.6%

In	741
Out	1099
U-Turn	0
Left	26
Thru	674
Right	41
Bicycles	1

Southbound SW 15th St Heavy Vehicle 3.3%				
In	120	Out	122	
Bicycles		Right	Thru	Left
				U-Turn

1	66	25	28	0
Peds 7				
48 OR 126 at 15th				
Peak Hour Summary				
04:55 PM to 05:55 PM				
U-Turn	Left	Thru	Right	Bicycles
0	26	674	41	1
Peds 0				
Peds 1				
0	152	55	41	2

In	248	Out	106
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Heavy Vehicle 1.6%
SW 15th St
Northbound

In	962
Out	743
Right	41
Thru	881
Left	40
U-Turn	0
Bicycles	0

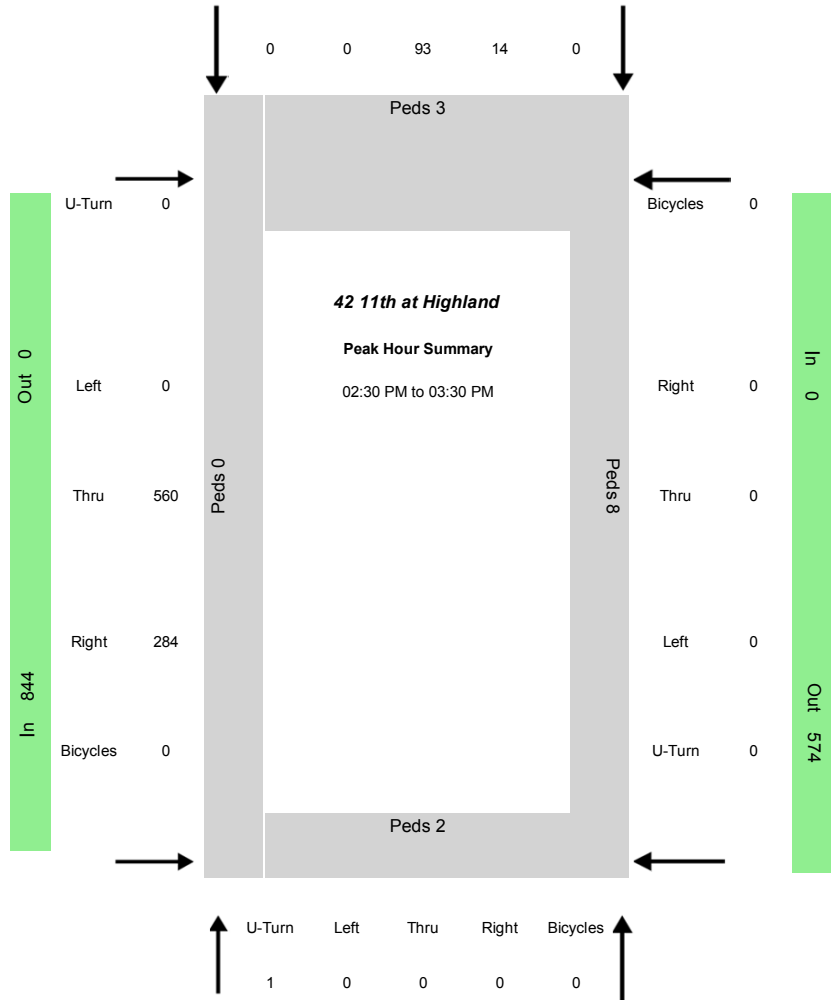
Westbound
OR-126
Heavy Vehicle 2.1%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
152	55	41	0	28	25	66	0	26	674	41	0	40	881	41	0	248	119	741	962	106	122	1099	743
Percent Heavy Vehicles																							
0.7%	3.6%	2.4%	0.0%	7.1%	0.0%	3.0%	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%	2.2%	2.4%	0.0%	1.6%	3.4%	2.6%	2.1%	0.0%	2.5%	2.0%	3.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk				Sum		
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
2	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	4	1	7	0	2	10		
All Vehicle Volumes																							
Time	Northbound SW 15th St				Southbound SW 15th St				Eastbound OR-126				Westbound OR-126				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	7	1	3	0	2	3	5	0	7	66	3	0	2	62	3	0							
02:05:00 PM	8	5	1	0	0	5	2	0	2	63	4	0	3	70	2	0							
02:10:00 PM	9	5	2	0	2	3	5	0	4	46	5	0	2	56	1	0	469						
02:15:00 PM	4	6	1	0	2	0	4	0	3	60	6	0	3	57	1	0	452						
02:20:00 PM	12	3	2	0	2	5	4	0	1	53	11	0	7	48	2	0	437						
02:25:00 PM	11	3	3	0	5	4	5	0	3	46	5	0	5	55	3	0	445						
02:30:00 PM	7	3	1	0	0	6	3	0	0	46	9	0	2	59	1	0	435						
02:35:00 PM	5	9	0	0	0	4	6	0	2	76	2	0	4	57	6	0	456						
02:40:00 PM	21	8	5	0	1	2	5	0	2	66	1	0	3	62	1	0	485						
02:45:00 PM	15	7	4	0	1	0	3	0	1	75	1	0	3	58	2	0	518						
02:50:00 PM	14	1	2	0	1	3	6	0	2	50	1	0	1	58	4	0	490						
02:55:00 PM	13	4	3	0	4	3	6	0	7	68	3	0	5	63	2	0	494	1893					
03:00:00 PM	8	2	6	0	3	4	2	0	0	57	1	0	1	55	0	0	463	1868					
03:05:00 PM	11	2	3	0	1	0	0	0	0	67	3	0	2	68	3	0	480	1863					
03:10:00 PM	8	4	0	0	1	6	4	0	4	67	2	0	4	50	2	0	451	1875					
03:15:00 PM	7	3	4	0	3	1	3	0	3	65	1	0	4	43	0	0	449	1865					
03:20:00 PM	6	4	0	0	2	0	1	0	2	57	5	0	8	48	2	0	424	1850					
03:25:00 PM	16	7	1	0	1	4	0	0	3	56	2	0	1	62	1	0	426	1856					
03:30:00 PM	10	5	1	0	0	4	1	0	2	62	2	0	6	56	2	0	440	1870					
03:35:00 PM	5	3	0	0	1	2	2	0	3	59	3	0	4	84	1	0	472	1866					
03:40:00 PM	13	3	3	0	2	3	1	0	3	43	5	0	3	56	1	0	454	1825					
03:45:00 PM	5	4	2	0	2	3	4	0	2	55	3	0	1	64	4	0	452	1804					
03:50:00 PM	5	4	4	0	2	2	4	0	2	52	2	0	1	66	0	0	429	1805					
03:55:00 PM	9	2	0	0	6	5	3	0	7	60	0	0	6	50	2	0	443	1774					
04:00:00 PM	10	5	8	0	5	4	3	0	5	55	4	0	5	64	4	0	466	1807					
04:05:00 PM	11	1	5	0	1	3	2	0	1	48	6	0	2	73	3	0	478	1803					
04:10:00 PM	5	7	2	0	0	6	4	0	2	52	3	0	6	69	3	0	487	1810					
04:15:00 PM	17	3	6	0	4	2	3	0	1	50	2	0	2	65	0	0	470	1828					
04:20:00 PM	8	6	5	0	0	2	5	0	3	55	3	0	5	59	1	0	466	1845					
04:25:00 PM	12	6	5	0	2	3	3	0	6	45	3	0	6	48	3	0	449	1833					
04:30:00 PM	10	4	3	0	7	1	4	0	5	50	3	0	3	65	2	0	451	1839					
04:35:00 PM	12	4	4	0	4	2	6	0	4	59	2	0	3	73	2	0	474	1847					
04:40:00 PM	19	6	7	0	1	2	4	0	2	48	8	0	4	48	2	0	483	1862					
04:45:00 PM	8	6	2	0	1	1	5	0	2	53	4	0	1	61	3	0	473	1860					
04:50:00 PM	18	5	4	0	2	4	2	0	0	57	4	0	3	75	1	0	473	1891					
04:55:00 PM	6	7	3	0	0	4	6	0	3	69	2	0	3	64	3	0	492	1911					
05:00:00 PM	16	6	6	0	2	1	6	0	5	53	2	0	4	76	5	0	527	1921					
05:05:00 PM	21	3	4	0	4	2	6	0	4	46	5	0	2	79	4	0	532	1945					
05:10:00 PM	8	9	4	0	3	5	10	0	3	51	1	0	8	87	4	0	555	1979					
05:15:00 PM	18	1	5	0	1	2	3	0	0	52	3	0	3	70	3	0	534	1985					
05:20:00 PM	11	9	9	0	1	1	2	0	2	59	4	0	1	71	8	0	532	2011					
05:25:00 PM	13	5	2	0	2	2	6	0	5	65	4	0	2	76	1	0	522	2052					
05:30:00 PM	17	3	2	0	5	2	5	0	0	52	4	0	3	61	2	0	517	2051					
05:35:00 PM	8	2	1	0	3	3	7	0	2	58	1	0	4	73	2	0	503	2040					
05:40:00 PM	16	4	1	0	3	1	3	0	1	55	5	0	2	65	5	0	481	2050					
05:45:00 PM	9	2	4	0	1	1	4	0	1	52	6	0	3	74	2	0	484	2062					
05:50:00 PM	9	4	0	0	3	1	8	0	0	62	4	0	5	85	2	0	503	2070					
05:55:00 PM	14	2	5	0	2	1	2	0	3	47	0	0	3	58	0	0	479	2037					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 11th St
E/W street	SW Highland Way
City, State	Redmond OR
Site Notes	
Location	44.269611 - -121.179611
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	42
Peak Hour Start	02:30:00 PM
Peak 15 Min Start	03:05:00 PM
PHF (15-Min Int)	0.90

Eastbound
SW Highland Way
Heavy Vehicle 5.0%



Westbound
SW Highland Way
Heavy Vehicle 0.0%

In	1	Out	378
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Heavy Vehicle 0.0%
SW 11th St
Northbound

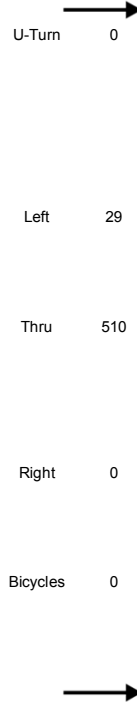
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	1	14	93	0	0	0	560	284	0	0	0	0	0	1	107	844	0	378	0	0	574
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%	0.0%	0.0%	4.3%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.8%	5.0%	0.0%	5.6%	0.0%	#DIV/0!	4.2%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	8	13		
All Vehicle Volumes																							
Time	Northbound SW 11th St				Southbound SW 11th St				Eastbound SW Highland Way				Westbound SW Highland Way				15 Min		1 HR				
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0	0	0	0	2	4	0	0	0	45	26	0	0	0	0	0							
02:05:00 PM	0	0	0	0	0	4	0	0	0	39	23	0	0	0	0	0							
02:10:00 PM	0	0	0	0	0	8	0	0	0	42	20	0	0	0	0	0	213						
02:15:00 PM	0	0	0	0	1	7	0	0	0	34	15	0	0	0	0	0	193						
02:20:00 PM	0	0	0	0	0	6	0	0	0	36	22	0	0	0	0	0	191						
02:25:00 PM	0	0	0	0	0	11	0	0	0	28	23	0	0	0	0	0	183						
02:30:00 PM	0	0	0	0	1	7	0	0	0	41	20	0	0	0	0	0	195						
02:35:00 PM	0	0	0	0	2	8	0	0	0	36	24	0	0	0	0	0	201						
02:40:00 PM	0	0	0	0	0	6	0	0	0	67	25	0	0	0	0	0	237						
02:45:00 PM	0	0	0	0	2	5	0	0	0	53	27	0	0	0	0	0	255						
02:50:00 PM	0	0	0	0	0	7	0	0	0	42	17	0	0	0	0	0	251						
02:55:00 PM	0	0	0	0	1	6	0	0	0	39	23	0	0	0	0	0	222	855					
03:00:00 PM	0	0	0	0	0	8	0	0	0	49	26	0	0	0	0	0	218	861					
03:05:00 PM	0	0	0	0	0	12	0	0	0	45	27	0	0	0	0	0	236	879					
03:10:00 PM	0	0	0	0	2	7	0	0	0	47	20	0	0	0	0	0	243	885					
03:15:00 PM	0	0	0	0	1	15	0	0	0	56	31	0	0	0	0	0	263	931					
03:20:00 PM	0	0	0	0	1	6	0	0	0	41	26	0	0	0	0	0	253	941					
03:25:00 PM	0	0	0	1	4	6	0	0	0	44	18	0	0	0	0	0	250	952					
03:30:00 PM	0	0	0	0	1	6	0	0	0	35	20	0	0	0	0	0	209	945					
03:35:00 PM	0	0	0	0	2	7	0	0	0	43	18	0	0	0	0	0	205	945					
03:40:00 PM	0	0	0	0	2	5	0	0	0	31	21	0	0	0	0	0	191	906					
03:45:00 PM	0	0	0	0	1	3	0	0	0	41	23	0	0	0	0	0	197	887					
03:50:00 PM	0	0	0	0	1	3	0	0	0	33	20	0	0	0	0	0	184	878					
03:55:00 PM	0	0	0	0	1	7	0	0	0	45	27	0	0	0	0	0	205	889					
04:00:00 PM	0	0	0	0	0	8	0	0	0	36	20	0	0	0	0	0	201	870					
04:05:00 PM	0	0	0	0	3	9	0	0	0	47	20	0	0	0	0	0	223	865					
04:10:00 PM	0	0	0	0	1	11	0	0	0	46	12	0	0	0	0	0	213	859					
04:15:00 PM	0	0	0	0	2	8	0	0	0	43	21	0	0	0	0	0	223	830					
04:20:00 PM	0	0	0	0	1	8	0	0	0	38	22	0	0	0	0	0	213	825					
04:25:00 PM	0	0	0	0	1	14	0	0	0	36	13	0	0	0	0	0	207	816					
04:30:00 PM	0	0	0	0	1	4	0	0	0	45	20	0	0	0	0	0	203	824					
04:35:00 PM	0	0	0	0	0	6	0	0	0	48	26	0	0	0	0	0	214	834					
04:40:00 PM	0	0	0	0	1	6	0	0	0	44	18	0	0	0	0	0	219	844					
04:45:00 PM	0	0	0	0	1	6	0	0	0	36	18	0	0	0	0	0	210	837					
04:50:00 PM	0	0	0	0	1	3	0	0	0	43	27	0	0	0	0	0	204	854					
04:55:00 PM	0	0	0	0	0	3	0	0	0	48	26	0	0	0	0	0	212	851					
05:00:00 PM	0	0	0	0	1	5	0	0	0	38	23	0	0	0	0	0	218	854					
05:05:00 PM	0	0	0	0	1	7	0	0	0	38	22	0	0	0	0	0	212	843					
05:10:00 PM	0	0	0	0	0	7	0	0	0	23	24	0	0	0	0	0	189	827					
05:15:00 PM	0	0	0	0	0	6	0	0	0	57	22	0	0	0	0	0	207	838					
05:20:00 PM	0	0	0	0	1	8	0	0	0	47	17	0	0	0	0	0	212	842					
05:25:00 PM	0	0	0	0	2	5	0	0	0	44	21	0	0	0	0	0	230	850					
05:30:00 PM	0	0	0	0	1	2	0	0	0	38	26	0	0	0	0	0	212	847					
05:35:00 PM	0	0	0	0	1	6	0	0	0	49	21	0	0	0	0	0	216	844					
05:40:00 PM	0	0	0	0	1	4	0	0	0	38	24	0	0	0	0	0	211	842					
05:45:00 PM	0	0	0	0	0	5	0	0	0	42	16	0	0	0	0	0	207	844					
05:50:00 PM	0	0	0	0	0	6	0	0	0	40	24	0	0	0	0	0	200	840					
05:55:00 PM	0	0	0	0	0	5	0	0	0	39	14	0	0	0	0	0	191	821					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 9th St
E/W street	SW Highland Ave
City, State	Redmond OR
Site Notes	
Location	44.269616 - -121.177457
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:05:00 PM
Peak 15 Min Start	04:05:00 PM
PHF (15-Min Int)	0.96

Eastbound
SW Highland Ave
Heavy Vehicle 2.6%

In 539 Out 0



In	0	Out	433
Bicycles			
Right			
Thru			
Left			
U-Turn			

0 0 0 0 0

Peds 1

Bicycles 0

In 0 Out 611

Westbound
SW Highland Ave
Heavy Vehicle 0.0%

20 Highland at 9th

Peak Hour Summary

04:05 PM to 05:05 PM

U-Turn	Left	Thru	Right	Bicycles
0	0	403	101	1

In	504	Out	0
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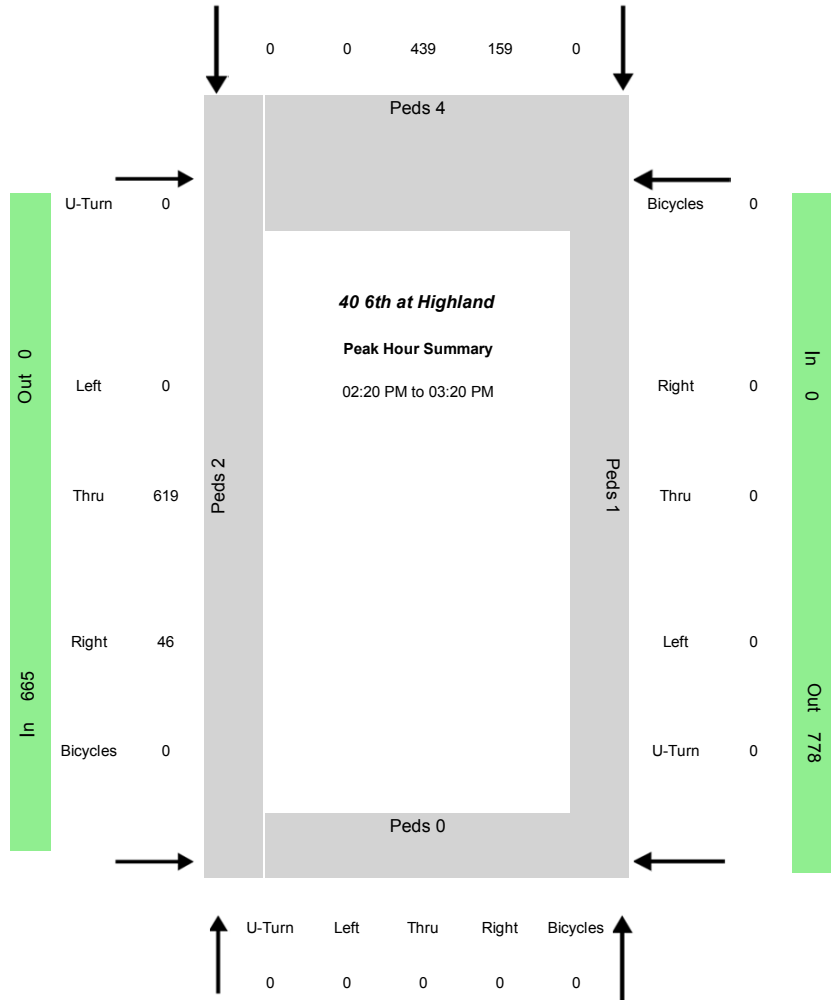
Heavy Vehicle 1.4%
SW 9th St
Northbound

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	403	101	0	0	0	0	0	29	510	0	0	0	0	0	0	504	0	539	0	0	432	0	611
Percent Heavy Vehicles																							
0.0%	1.5%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.4%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	2.6%	0.0%	#DIV/0!	1.6%	#DIV/0!	2.3%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	3		
All Vehicle Volumes																							
Time	Northbound SW 9th St				Southbound SW 9th St				Eastbound SW Highland Ave				Westbound SW Highland Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0	25	9	0	0	0	0	0	3	48	0	0	0	0	0	0							
02:05:00 PM	0	29	6	0	0	0	0	0	1	43	0	0	0	0	0	0							
02:10:00 PM	0	41	8	0	0	0	0	0	4	32	0	0	0	0	0	0	249						
02:15:00 PM	0	25	11	0	0	0	0	0	4	35	0	0	0	0	0	0	239						
02:20:00 PM	0	22	1	0	0	0	0	0	1	36	0	0	0	0	0	0	220						
02:25:00 PM	0	19	6	0	0	0	0	0	2	27	0	0	0	0	0	0	189						
02:30:00 PM	0	31	13	0	0	0	0	0	3	35	0	0	0	0	0	0	196						
02:35:00 PM	0	23	15	0	0	0	0	0	2	37	0	0	0	0	0	0	213						
02:40:00 PM	0	36	11	0	0	0	0	0	5	54	0	0	0	0	0	0	265						
02:45:00 PM	0	19	7	0	0	0	0	0	2	56	0	0	0	0	0	0	267						
02:50:00 PM	0	30	6	0	0	0	0	0	3	43	0	0	0	0	0	0	272						
02:55:00 PM	0	22	9	0	0	0	0	0	4	38	0	0	0	0	0	0	239	942					
03:00:00 PM	0	28	8	0	0	0	0	0	2	46	0	0	0	0	0	0	239	941					
03:05:00 PM	0	22	11	0	0	0	0	0	5	40	0	0	0	0	0	0	235	940					
03:10:00 PM	0	24	14	0	0	0	0	0	1	45	0	0	0	0	0	0	246	939					
03:15:00 PM	0	31	8	0	0	0	0	0	2	54	0	0	0	0	0	0	257	959					
03:20:00 PM	0	45	5	0	0	0	0	0	3	41	0	0	0	0	0	0	273	993					
03:25:00 PM	0	27	3	0	0	0	0	0	4	43	0	0	0	0	0	0	266	1016					
03:30:00 PM	0	30	8	0	0	0	0	0	2	39	0	0	0	0	0	0	250	1013					
03:35:00 PM	0	32	9	0	0	0	0	0	0	41	0	0	0	0	0	0	238	1018					
03:40:00 PM	0	24	4	0	0	0	0	0	1	38	0	0	0	0	0	0	228	979					
03:45:00 PM	0	37	7	0	0	0	0	0	3	36	0	0	0	0	0	0	232	978					
03:50:00 PM	0	22	9	0	0	0	0	0	3	32	0	0	0	0	0	0	216	962					
03:55:00 PM	0	28	9	0	0	0	0	0	0	42	0	0	0	0	0	0	228	968					
04:00:00 PM	0	29	5	0	0	0	0	0	1	43	0	0	0	0	0	0	223	962					
04:05:00 PM	0	37	9	0	0	0	0	0	1	47	0	0	0	0	0	0	251	978					
04:10:00 PM	0	41	8	0	0	0	0	0	3	44	0	0	0	0	0	0	268	990					
04:15:00 PM	0	29	6	0	0	0	0	0	2	45	0	0	0	0	0	0	272	977					
04:20:00 PM	0	36	10	0	0	0	0	0	3	38	0	0	0	0	0	0	265	970					
04:25:00 PM	0	32	6	0	0	0	0	0	3	34	0	0	0	0	0	0	244	968					
04:30:00 PM	0	27	7	0	0	0	0	0	4	47	0	0	0	0	0	0	247	974					
04:35:00 PM	0	37	11	0	0	0	0	0	1	43	0	0	0	0	0	0	252	984					
04:40:00 PM	0	30	11	0	0	0	0	0	1	45	0	0	0	0	0	0	264	1004					
04:45:00 PM	0	27	4	0	0	0	0	0	2	42	0	0	0	0	0	0	254	996					
04:50:00 PM	0	36	8	0	0	0	0	0	3	38	0	0	0	0	0	0	247	1015					
04:55:00 PM	0	33	7	0	0	0	0	0	2	50	0	0	0	0	0	0	252	1028					
05:00:00 PM	0	38	14	0	0	0	0	0	4	37	0	0	0	0	0	0	270	1043					
05:05:00 PM	0	40	10	0	0	0	0	0	2	38	0	0	0	0	0	0	275	1039					
05:10:00 PM	0	42	13	0	0	0	0	0	1	21	0	0	0	0	0	0	260	1020					
05:15:00 PM	0	27	4	0	0	0	0	0	2	52	0	0	0	0	0	0	252	1023					
05:20:00 PM	0	27	6	0	0	0	0	0	1	49	0	0	0	0	0	0	245	1019					
05:25:00 PM	0	24	3	0	0	0	0	0	3	52	0	0	0	0	0	0	250	1026					
05:30:00 PM	0	27	13	0	0	0	0	0	3	33	0	0	0	0	0	0	241	1017					
05:35:00 PM	0	28	7	0	0	0	0	0	2	41	0	0	0	0	0	0	236	1003					
05:40:00 PM	0	28	5	0	0	0	0	0	4	31	0	0	0	0	0	0	222	984					
05:45:00 PM	0	31	6	0	0	0	0	0	2	33	0	0	0	0	0	0	218	981					
05:50:00 PM	0	44	4	0	0	0	0	0	0	39	0	0	0	0	0	0	227	983					
05:55:00 PM	0	27	9	0	0	0	0	0	1	40	0	0	0	0	0	0	236	968					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 6th St
E/W street	SW Highland Ave
City, State	Redmond OR
Site Notes	
Location	44.26964 - -121.174235
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	40
Peak Hour Start	02:20:00 PM
Peak 15 Min Start	03:00:00 PM
PHF (15-Min Int)	0.94

Eastbound
SW Highland Ave
Heavy Vehicle 4.1%



Peak-Hour Volumes (PHV)																									
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB		
0	0	0	0	159	439	0	0	0	619	46	0	0	0	0	0	0	598	665	0	485	0	0	778		
Percent Heavy Vehicles																									
0.0%	0.0%	0.0%	0.0%	2.5%	1.4%	0.0%	0.0%	0.0%	4.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	#DIV/0!	1.7%	4.1%	0.0%	1.2%	0.0%	#DIV/0!	4.0%		
PHV- Bicycles																PHV - Pedestrians									
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	1	7				
All Vehicle Volumes																						15 Min		1 HR	
Time	Northbound SW 6th St				Southbound SW 6th St				Eastbound SW Highland Ave				Westbound SW Highland Ave												
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum							
02:00:00 PM	0	0	0	0	8	44	0	0	0	55	6	0	0	0	0	0									
02:05:00 PM	0	0	0	0	15	38	0	0	0	51	2	0	0	0	0	0									
02:10:00 PM	0	0	0	0	11	34	0	0	0	35	3	0	0	0	0	0	302								
02:15:00 PM	0	0	0	0	13	41	0	0	0	40	3	0	0	0	0	0	286								
02:20:00 PM	0	0	0	0	14	40	0	0	0	48	3	0	0	0	0	0	285								
02:25:00 PM	0	0	0	0	14	39	0	0	0	35	6	0	0	0	0	0	296								
02:30:00 PM	0	0	0	0	12	46	0	0	0	48	2	0	0	0	0	0	307								
02:35:00 PM	0	0	0	0	18	27	0	0	0	50	3	0	0	0	0	0	300								
02:40:00 PM	0	0	0	0	16	32	0	0	0	59	6	0	0	0	0	0	319								
02:45:00 PM	0	0	0	0	13	35	0	0	0	66	3	0	0	0	0	0	328								
02:50:00 PM	0	0	0	0	13	43	0	0	0	45	0	0	0	0	0	0	331								
02:55:00 PM	0	0	0	0	10	26	0	0	0	52	4	0	0	0	0	0	310	1227							
03:00:00 PM	0	0	0	0	16	38	0	0	0	47	2	0	0	0	0	0	296	1217							
03:05:00 PM	0	0	0	0	9	41	0	0	0	57	8	0	0	0	0	0	310	1226							
03:10:00 PM	0	0	0	0	13	42	0	0	0	57	5	0	0	0	0	0	335	1260							
03:15:00 PM	0	0	0	0	11	30	0	0	0	55	4	0	0	0	0	0	332	1263							
03:20:00 PM	0	0	0	0	7	41	0	0	0	41	4	0	0	0	0	0	310	1251							
03:25:00 PM	0	0	0	0	13	33	0	0	0	48	4	0	0	0	0	0	291	1255							
03:30:00 PM	0	0	0	0	11	33	0	0	0	56	2	0	0	0	0	0	293	1249							
03:35:00 PM	0	0	0	0	12	30	0	0	0	49	6	0	0	0	0	0	297	1248							
03:40:00 PM	0	0	0	0	9	24	0	0	0	46	1	0	0	0	0	0	279	1215							
03:45:00 PM	0	0	0	0	16	35	0	0	0	48	5	0	0	0	0	0	281	1202							
03:50:00 PM	0	0	0	0	11	46	0	0	0	48	4	0	0	0	0	0	293	1210							
03:55:00 PM	0	0	0	0	10	30	0	0	0	51	2	0	0	0	0	0	306	1211							
04:00:00 PM	0	0	0	0	10	37	0	0	0	55	5	0	0	0	0	0	309	1215							
04:05:00 PM	0	0	0	0	9	43	0	0	0	51	6	0	0	0	0	0	309	1209							
04:10:00 PM	0	0	0	0	14	40	0	0	0	51	2	0	0	0	0	0	323	1199							
04:15:00 PM	0	0	0	0	10	31	0	0	0	50	6	0	0	0	0	0	313	1196							
04:20:00 PM	0	0	0	0	14	45	0	0	0	49	5	0	0	0	0	0	317	1216							
04:25:00 PM	0	0	0	0	9	28	0	0	0	41	5	0	0	0	0	0	293	1201							
04:30:00 PM	0	0	0	0	11	35	0	0	0	54	5	0	0	0	0	0	301	1204							
04:35:00 PM	0	0	0	0	16	37	0	0	0	49	3	0	0	0	0	0	293	1212							
04:40:00 PM	0	0	0	0	14	45	0	0	0	48	4	0	0	0	0	0	321	1243							
04:45:00 PM	0	0	0	0	10	35	0	0	0	54	5	0	0	0	0	0	320	1243							
04:50:00 PM	0	0	0	0	9	34	0	0	0	41	3	0	0	0	0	0	302	1221							
04:55:00 PM	0	0	0	0	13	31	0	0	0	64	3	0	0	0	0	0	302	1239							
05:00:00 PM	0	0	0	0	13	44	0	0	0	49	1	0	0	0	0	0	305	1239							
05:05:00 PM	0	0	0	0	13	42	0	0	0	49	2	0	0	0	0	0	324	1236							
05:10:00 PM	0	0	0	0	11	31	0	0	0	43	7	0	0	0	0	0	305	1221							
05:15:00 PM	0	0	0	0	11	31	0	0	0	51	4	0	0	0	0	0	295	1221							
05:20:00 PM	0	0	0	0	9	41	0	0	0	52	2	0	0	0	0	0	293	1212							
05:25:00 PM	0	0	0	0	9	41	0	0	0	50	4	0	0	0	0	0	305	1233							
05:30:00 PM	0	0	0	0	4	20	0	0	0	49	7	0	0	0	0	0	288	1208							
05:35:00 PM	0	0	0	0	9	29	0	0	0	45	5	0	0	0	0	0	272	1191							
05:40:00 PM	0	0	0	0	6	22	0	0	0	44	3	0	0	0	0	0	243	1155							
05:45:00 PM	0	0	0	0	8	21	0	0	0	41	4	0	0	0	0	0	237	1125							
05:50:00 PM	0	0	0	0	14	24	0	0	0	38	0	0	0	0	0	0	225	1114							
05:55:00 PM	0	0	0	0	13	28	0	0	0	50	4	0	0	0	0	0	245	1098							



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 5th St
E/W street	SW Highland Ave
City, State	Redmond OR
Site Notes	
Location	44.269609 - -121.173291
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	39
Peak Hour Start	02:35:00 PM
Peak 15 Min Start	02:35:00 PM
PHF (15-Min Int)	0.92

Eastbound
SW Highland Ave
Heavy Vehicle 4.3%

In 786
Out 0

U-Turn 0
Left 290
Thru 496
Right 0
Bicycles 0

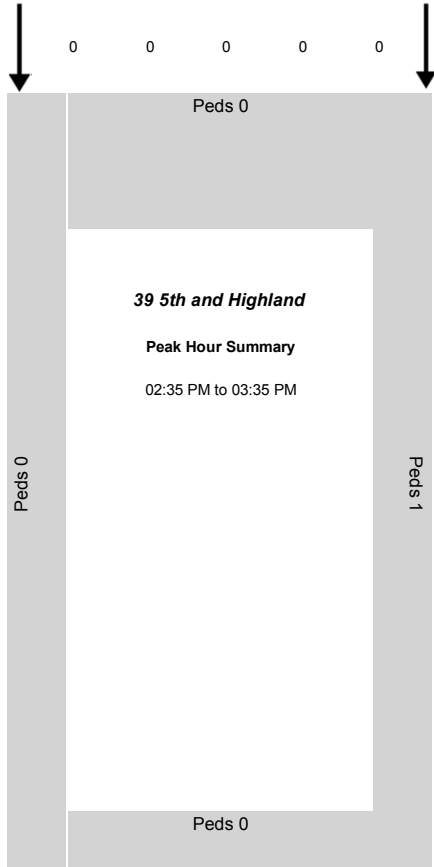
U-Turn 0
Left 0
Thru 254
Right 33
Bicycles 1

In 287 Out 0

Heavy Vehicle 1.4%
SW 5th St
Northbound

In 0 Out 545
Bicycles Right Thru Left U-Turn

Southbound
SW 5th St
Heavy Vehicle 0.0%



Bicycles 0
Right 0
Thru 0
Left 0
U-Turn 0

In 0
Out 529

Westbound
SW Highland Ave
Heavy Vehicle 0.0%

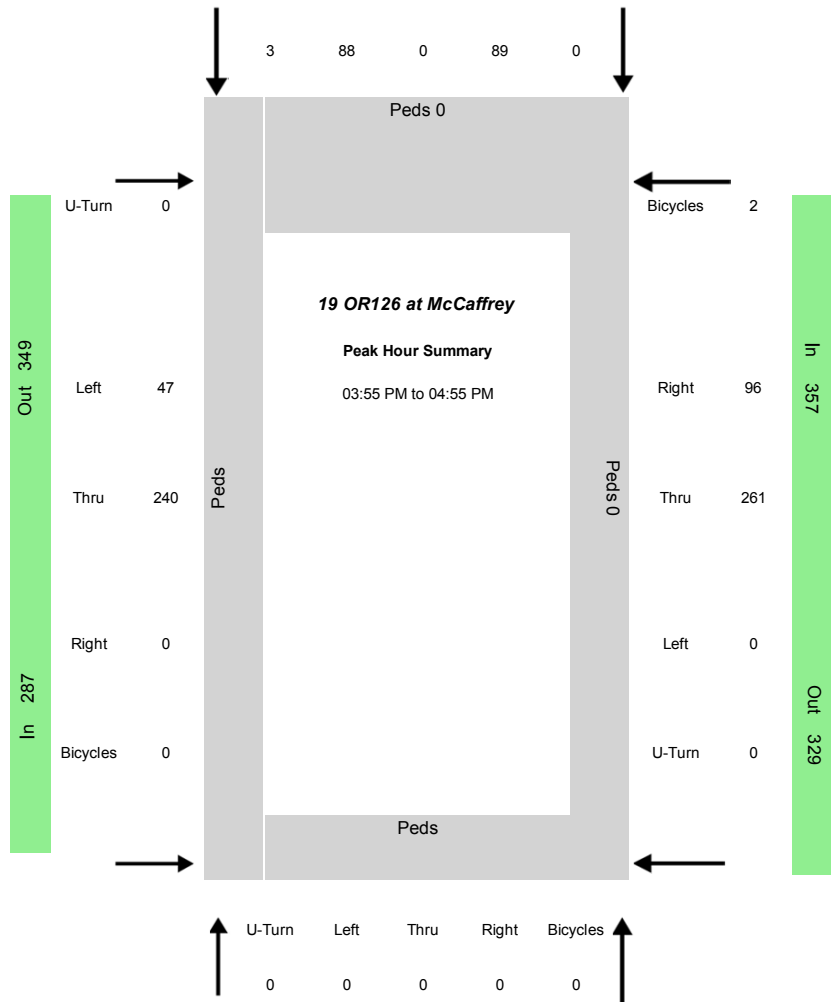
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	254	33	0	0	0	0	0	290	496	0	0	0	0	0	0	287	0	786	0	0	544	0	529
Percent Heavy Vehicles																							
0.0%	0.8%	6.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	4.3%	0.0%	#DIV/0!	0.9%	#DIV/0!	6.2%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk				Sum		
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1		
All Vehicle Volumes																							
Time	Northbound SW 5th St				Southbound SW 5th St				Eastbound SW Highland Ave				Westbound SW Highland Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0	18	3	0	0	0	0	0	24	39	0	0	0	0	0	0							
02:05:00 PM	0	23	3	0	0	0	0	0	24	39	0	0	0	0	0	0							
02:10:00 PM	0	30	1	0	0	0	0	0	18	27	0	0	0	0	0	0	249						
02:15:00 PM	0	14	1	0	0	0	0	0	23	31	0	0	0	0	0	0	234						
02:20:00 PM	0	21	3	0	0	0	0	0	25	34	0	0	0	0	0	0	228						
02:25:00 PM	0	18	5	0	0	0	0	0	15	38	0	0	0	0	0	0	228						
02:30:00 PM	0	14	1	0	0	0	0	0	23	38	0	0	0	0	0	0	235						
02:35:00 PM	0	17	5	0	0	0	0	0	24	45	0	0	0	0	0	0	243						
02:40:00 PM	0	30	2	0	0	0	0	0	32	37	0	0	0	0	0	0	268						
02:45:00 PM	0	19	2	0	0	0	0	0	33	47	0	0	0	0	0	0	293						
02:50:00 PM	0	23	3	0	0	0	0	0	23	33	0	0	0	0	0	0	284						
02:55:00 PM	0	34	1	0	0	0	0	0	23	41	0	0	0	0	0	0	282	1027					
03:00:00 PM	0	17	1	0	0	0	0	0	16	46	0	0	0	0	0	0	261	1023					
03:05:00 PM	0	23	5	0	0	0	0	0	18	52	0	0	0	0	0	0	277	1032					
03:10:00 PM	0	19	1	0	0	0	0	0	33	37	0	0	0	0	0	0	268	1046					
03:15:00 PM	0	17	4	0	0	0	0	0	24	46	0	0	0	0	0	0	279	1068					
03:20:00 PM	0	14	2	0	0	0	0	0	19	28	0	0	0	0	0	0	244	1048					
03:25:00 PM	0	23	3	0	0	0	0	0	24	36	0	0	0	0	0	0	240	1058					
03:30:00 PM	0	18	4	0	0	0	0	0	21	48	0	0	0	0	0	0	240	1073					
03:35:00 PM	0	17	4	0	0	0	0	0	25	37	0	0	0	0	0	0	260	1065					
03:40:00 PM	0	29	1	0	0	0	0	0	26	30	0	0	0	0	0	0	260	1050					
03:45:00 PM	0	17	3	0	0	0	0	0	22	38	0	0	0	0	0	0	249	1029					
03:50:00 PM	0	20	2	0	0	0	0	0	27	35	0	0	0	0	0	0	250	1031					
03:55:00 PM	0	22	1	0	0	0	0	0	29	31	0	0	0	0	0	0	247	1015					
04:00:00 PM	0	17	5	0	0	0	0	0	27	42	0	0	0	0	0	0	258	1026					
04:05:00 PM	0	17	1	0	0	0	0	0	20	39	0	0	0	0	0	0	251	1005					
04:10:00 PM	0	15	3	0	0	0	0	0	27	36	0	0	0	0	0	0	249	996					
04:15:00 PM	0	16	2	0	0	0	0	0	27	36	0	0	0	0	0	0	239	986					
04:20:00 PM	0	13	1	0	0	0	0	0	25	37	0	0	0	0	0	0	238	999					
04:25:00 PM	0	23	5	0	0	0	0	0	15	35	0	0	0	0	0	0	235	991					
04:30:00 PM	0	24	0	0	0	0	0	0	22	45	0	0	0	0	0	0	245	991					
04:35:00 PM	0	27	3	0	0	0	0	0	28	35	0	0	0	0	0	0	262	1001					
04:40:00 PM	0	12	6	0	0	0	0	0	15	48	0	0	0	0	0	0	265	996					
04:45:00 PM	0	16	8	0	0	0	0	0	28	33	0	0	0	0	0	0	259	1001					
04:50:00 PM	0	28	1	0	0	0	0	0	28	24	0	0	0	0	0	0	247	998					
04:55:00 PM	0	15	3	0	0	0	0	0	30	47	0	0	0	0	0	0	261	1010					
05:00:00 PM	0	34	5	0	0	0	0	0	23	38	0	0	0	0	0	0	276	1019					
05:05:00 PM	0	13	1	0	0	0	0	0	22	40	0	0	0	0	0	0	271	1018					
05:10:00 PM	0	14	2	0	0	0	0	0	19	35	0	0	0	0	0	0	246	1007					
05:15:00 PM	0	23	4	0	0	0	0	0	26	36	0	0	0	0	0	0	235	1015					
05:20:00 PM	0	21	3	0	0	0	0	0	32	29	0	0	0	0	0	0	244	1024					
05:25:00 PM	0	23	1	0	0	0	0	0	26	35	0	0	0	0	0	0	259	1031					
05:30:00 PM	0	15	5	0	0	0	0	0	17	35	0	0	0	0	0	0	242	1012					
05:35:00 PM	0	18	0	0	0	0	0	0	27	27	0	0	0	0	0	0	229	991					
05:40:00 PM	0	15	2	0	0	0	0	0	24	27	0	0	0	0	0	0	212	978					
05:45:00 PM	0	12	1	0	0	0	0	0	19	30	0	0	0	0	0	0	202	955					
05:50:00 PM	0	19	1	0	0	0	0	0	25	25	0	0	0	0	0	0	200	944					
05:55:00 PM	0	17	6	0	0	0	0	0	21	40	0	0	0	0	0	0	216	933					



Data Provided by K-D-N.com 503-594-4224	
N/S street	McCaffrey Rd
E/W street	OR-126
City, State	Redmond OR
Site Notes	
Location	44.268926 - -121.158729
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	03:55:00 PM
Peak 15 Min Start	03:55:00 PM
PHF (15-Min Int)	0.91

Eastbound

Heavy Vehicle 2.8%



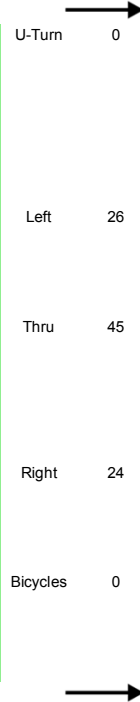
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	89	0	88	0	47	240	0	0	0	261	96	0	0	177	287	357	0	143	349	329
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	11.2%	0.0%	10.2%	0.0%	2.1%	2.9%	0.0%	0.0%	0.0%	2.7%	10.4%	0.0%	#DIV/0!	10.7%	2.8%	4.8%	#DIV/0!	7.7%	4.6%	5.2%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
				3		0	0	0	0	0	0	2	0	0	0	5		0		0	0		
All Vehicle Volumes																							
Time	Northbound				Southbound McCaffrey Rd				Eastbound OR-126				Westbound OR-126				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM					11		8	0	1	14		0	19	4	0								
02:05:00 PM					5		7	0	2	22		0	16	7	0								
02:10:00 PM					3		7	0	5	26		0	14	6	0		177						
02:15:00 PM					7		4	0	3	18		0	6	10	0		168						
02:20:00 PM					7		7	0	3	18		0	9	3	0		156						
02:25:00 PM					10		11	0	4	15		0	17	6	0		158						
02:30:00 PM					6		13	0	1	12		0	17	7	0		166						
02:35:00 PM					9		9	0	1	16		0	19	10	0		183						
02:40:00 PM					5		15	0	5	15		0	22	6	0		188						
02:45:00 PM					5		6	0	3	13		0	21	10	0		190						
02:50:00 PM					9		6	0	1	12		0	10	8	0		172						
02:55:00 PM					6		12	0	4	15		0	16	7	0		164	687					
03:00:00 PM					8		10	0	3	22		0	14	7	0		170	694					
03:05:00 PM					11		8	0	5	7		0	19	10	0		184	695					
03:10:00 PM					6		5	0	3	19		0	18	7	0		182	692					
03:15:00 PM					3		9	0	2	15		0	16	11	0		174	700					
03:20:00 PM					8		7	0	3	18		0	14	10	0		174	713					
03:25:00 PM					7		8	0	3	16		0	12	12	0		174	708					
03:30:00 PM					4		6	0	3	20		0	14	6	0		171	705					
03:35:00 PM					11		16	0	5	23		0	19	5	0		190	720					
03:40:00 PM					4		5	0	6	21		0	27	8	0		203	723					
03:45:00 PM					8		6	0	1	17		0	16	14	0		212	727					
03:50:00 PM					5		5	0	4	14		0	22	6	0		189	737					
03:55:00 PM					6		11	0	2	28		0	28	8	0		201	760					
04:00:00 PM					5		5	0	4	20		0	24	10	0		207	764					
04:05:00 PM					8		16	0	4	12		0	28	6	0		225	778					
04:10:00 PM					2		8	0	4	23		0	13	8	0		200	778					
04:15:00 PM					1		1	0	4	22		0	17	8	0		185	775					
04:20:00 PM					12		8	0	2	15		0	24	8	0		180	784					
04:25:00 PM					9		6	0	4	16		0	22	5	0		184	788					
04:30:00 PM					4		4	0	9	22		0	17	10	0		197	801					
04:35:00 PM					13		8	0	5	21		0	25	12	0		212	806					
04:40:00 PM					13		6	0	5	24		0	20	4	0		222	807					
04:45:00 PM					11		5	0	1	18		0	17	12	0		220	809					
04:50:00 PM					5		10	0	3	19		0	26	5	0		204	821					
04:55:00 PM					4		7	0	5	20		0	22	6	0		196	802					
05:00:00 PM					12		6	0	10	24		0	18	3	0		205	807					
05:05:00 PM					7		15	0	1	23		0	12	8	0		203	799					
05:10:00 PM					6		8	0	5	22		0	12	11	0		203	805					
05:15:00 PM					9		7	0	4	30		0	18	1	0		199	821					
05:20:00 PM					11		8	0	3	15		0	13	13	0		196	815					
05:25:00 PM					3		7	0	1	17		0	18	8	0		186	807					
05:30:00 PM					9		7	0	2	27		0	19	6	0		187	811					
05:35:00 PM					4		5	0	5	15		1	18	5	0		177	780					
05:40:00 PM					7		3	0	4	22		0	15	9	0		183	768					
05:45:00 PM					2		1	0	2	13		0	15	8	0		154	745					
05:50:00 PM					1		6	0	2	24		0	15	4	0		153	729					
05:55:00 PM					3		6	0	4	14		0	12	5	0		137	709					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 27th St
E/W street	SW Obsidian Ave
City, State	Redmond OR
Site Notes	
Location	44.261881 - -121.199971
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	25
Peak Hour Start	04:45:00 PM
Peak 15 Min Start	05:30:00 PM
PHF (15-Min Int)	0.91

Eastbound
SW Obsidian Ave
Heavy Vehicle 2.1%

In 95 Out 168



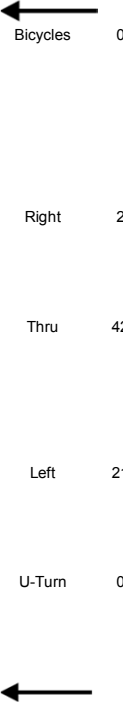
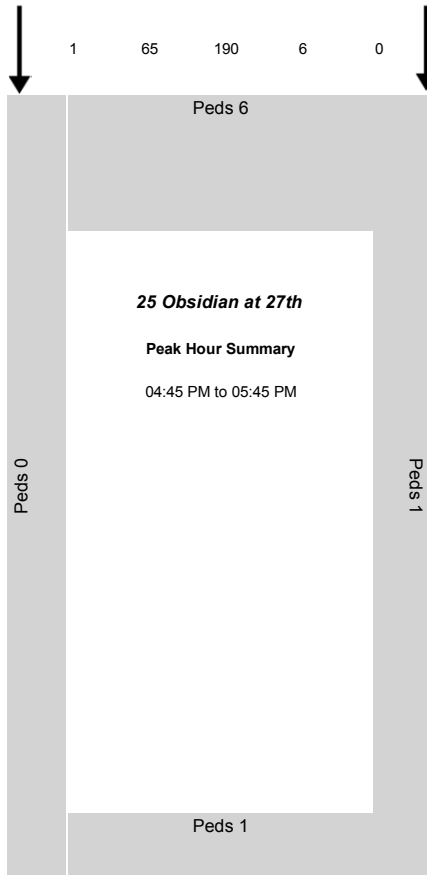
U-Turn	Left	Thru	Right	Bicycles
0	61	312	16	1

In	389	Out	235
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Heavy Vehicle 1.5%
SW 27th St
Northbound

In	262	Out	340	
Bicycles	Right	Thru	Left	U-Turn

1 65 190 6 0



In 65 Out 67

Westbound
SW Obsidian Ave
Heavy Vehicle 0.0%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
61	312	16	0	6	190	65	0	26	45	24	0	21	42	2	0	389	261	95	65	235	340	168	67
Percent Heavy Vehicles																							
3.3%	1.3%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	3.8%	0.0%	4.2%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	0.4%	2.1%	0.0%	0.9%	1.5%	1.2%	0.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2	1	6	0	1	8		
All Vehicle Volumes																							
Time	Northbound SW 27th St				Southbound SW 27th St				Eastbound SW Obsidian Ave				Westbound SW Obsidian Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0	15	1	0	2	6	1	0	1	0	1	0	0	2	0	0							
02:05:00 PM	3	9	1	0	1	9	1	0	1	0	2	0	0	1	2	0							
02:10:00 PM	1	7	0	0	1	3	1	0	0	3	2	0	0	2	0	0	79						
02:15:00 PM	2	9	0	0	1	13	0	0	2	2	2	0	0	2	1	0	84						
02:20:00 PM	2	22	0	0	3	11	2	0	1	0	0	0	0	1	0	0	96						
02:25:00 PM	3	13	2	0	0	9	3	0	2	1	2	0	1	0	2	0	114						
02:30:00 PM	1	15	0	0	2	6	0	0	2	2	1	0	1	2	0	0	112						
02:35:00 PM	1	7	0	0	0	16	0	0	2	1	0	0	2	3	0	0	102						
02:40:00 PM	1	13	0	0	1	11	3	0	0	0	2	0	2	5	1	0	103						
02:45:00 PM	4	8	0	0	2	20	1	0	3	5	1	0	1	2	1	0	119						
02:50:00 PM	3	21	1	0	0	18	3	0	2	7	0	0	0	2	1	0	145						
02:55:00 PM	2	22	1	0	0	5	2	0	2	1	0	0	1	2	0	0	144	440					
03:00:00 PM	3	15	1	0	1	12	0	0	1	1	0	0	1	1	1	0	133	448					
03:05:00 PM	3	26	1	0	1	15	7	0	1	2	0	0	2	4	0	0	137	480					
03:10:00 PM	5	13	1	0	2	8	5	0	1	0	2	0	0	3	2	0	141	502					
03:15:00 PM	2	19	2	0	3	20	3	0	1	2	1	0	1	4	0	0	162	526					
03:20:00 PM	5	19	1	0	0	17	8	0	3	0	3	0	1	5	1	0	163	547					
03:25:00 PM	5	16	0	0	0	13	5	0	4	0	1	0	0	6	0	0	171	559					
03:30:00 PM	7	16	3	0	1	18	4	0	1	3	0	0	0	3	1	0	170	584					
03:35:00 PM	5	22	2	0	0	18	1	0	10	3	7	0	1	1	1	0	178	623					
03:40:00 PM	1	19	2	0	0	15	4	0	8	3	14	0	1	1	0	0	196	652					
03:45:00 PM	4	18	2	0	0	17	3	0	5	5	5	0	3	4	1	0	206	671					
03:50:00 PM	2	30	1	0	1	12	6	0	1	1	3	0	0	1	3	0	196	674					
03:55:00 PM	0	22	1	0	1	9	2	0	5	2	6	0	1	2	0	0	179	687					
04:00:00 PM	3	17	1	0	1	20	3	0	2	1	1	0	2	2	0	0	165	703					
04:05:00 PM	7	20	1	0	0	9	1	0	3	3	4	0	0	1	0	0	153	690					
04:10:00 PM	3	21	0	0	0	13	2	0	3	4	1	0	1	1	1	0	152	698					
04:15:00 PM	0	18	1	0	0	11	1	0	0	3	2	0	3	3	0	0	141	682					
04:20:00 PM	2	15	1	0	0	14	2	0	1	1	3	0	0	7	0	0	138	665					
04:25:00 PM	2	14	2	0	0	18	1	0	3	1	3	0	0	3	0	0	135	662					
04:30:00 PM	5	16	0	0	2	17	2	0	1	1	2	0	0	0	0	0	139	651					
04:35:00 PM	1	24	0	0	1	14	4	0	2	7	3	0	3	2	0	0	154	641					
04:40:00 PM	3	19	0	0	0	16	1	0	3	3	4	0	2	2	2	0	162	628					
04:45:00 PM	2	24	2	0	0	21	3	0	0	7	1	0	1	1	0	0	178	623					
04:50:00 PM	3	18	1	0	0	13	6	0	1	3	1	0	1	3	0	0	167	612					
04:55:00 PM	5	28	2	0	1	10	2	0	1	2	2	0	1	2	0	0	168	617					
05:00:00 PM	8	23	0	0	0	15	7	0	6	3	0	0	1	4	0	0	173	631					
05:05:00 PM	4	26	0	0	1	20	6	0	5	4	1	0	5	1	0	0	196	655					
05:10:00 PM	11	25	0	0	2	15	5	0	0	4	2	0	4	2	0	0	210	675					
05:15:00 PM	4	27	1	0	0	11	8	0	0	4	2	0	0	6	1	0	207	697					
05:20:00 PM	4	33	2	0	0	20	6	0	0	3	1	0	1	4	0	0	208	725					
05:25:00 PM	6	26	1	0	0	11	8	0	3	6	4	0	1	5	1	0	210	750					
05:30:00 PM	6	28	3	0	1	18	4	0	3	2	5	0	0	5	0	0	221	779					
05:35:00 PM	4	28	2	0	0	17	3	0	4	4	3	0	4	4	0	0	220	791					
05:40:00 PM	4	26	2	0	1	19	7	0	3	3	2	0	2	5	0	0	222	810					
05:45:00 PM	5	16	4	0	0	17	3	0	3	2	3	0	0	2	1	0	203	804					
05:50:00 PM	2	11	1	0	0	11	8	0	4	5	0	0	1	6	0	0	179	803					
05:55:00 PM	2	16	2	0	1	8	4	0	6	6	2	0	2	6	0	0	160	802					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 23rd St
E/W street	SW Obsidian Ave
City, State	Redmond OR
Site Notes	
Location	44.261959 - -121.194223
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	44
Peak Hour Start	05:00:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.94

Eastbound
SW Obsidian Ave
Heavy Vehicle 0.0%

Out 82
In 76

U-Turn	0
Left	49
Thru	3
Right	24
Bicycles	1

Southbound SW 23rd St Heavy Vehicle 0.4%				
In	271	Out	314	
Bicycles		Right	Thru	Left
				U-Turn

0	58	205	8	0
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Peds 0

44 Obsidian at 23rd

Peak Hour Summary

05:00 PM to 06:00 PM

Peds 0	Peds 2
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Right	24
Left	0
U-Turn	0

Peds 4

U-Turn	Left	Thru	Right	Bicycles
0	21	256	10	1

In	287	Out	229
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Heavy Vehicle 0.7%
SW 23rd St
Northbound

Bicycles	0
Right	8
Thru	3
Left	0
U-Turn	0

In 11
Out 21

Westbound
SW Obsidian Ave
Heavy Vehicle 0.0%

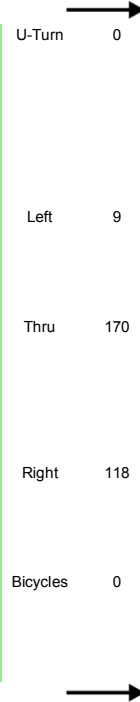
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
21	256	10	0	8	205	58	0	49	3	24	0	0	3	8	0	287	271	76	11	229	313	82	21
Percent Heavy Vehicles																							
0.0%	0.8%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	0.4%	0.0%	0.0%	0.4%	0.6%	0.0%	0.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	4	0	0	2	6		
All Vehicle Volumes																							
Time	Northbound SW 23rd St				Southbound SW 23rd St				Eastbound SW Obsidian Ave				Westbound SW Obsidian Ave				15 Min		1 HR				
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0	6	1	0	0	13	2	0	1	0	2	0	0	0	0	0							
02:05:00 PM	0	13	1	0	0	3	2	0	3	0	1	0	0	1	1	0							
02:10:00 PM	0	13	0	0	0	6	2	0	3	0	0	0	0	0	0	0	74						
02:15:00 PM	2	9	0	0	0	8	3	0	4	0	3	0	0	0	1	0	79						
02:20:00 PM	1	10	0	0	0	9	0	0	0	0	0	0	0	0	2	0	76						
02:25:00 PM	0	15	0	0	1	15	0	0	2	0	2	0	0	0	3	0	90						
02:30:00 PM	1	15	0	0	1	15	2	0	2	0	1	0	0	0	0	0	97						
02:35:00 PM	0	12	1	0	0	20	4	0	2	1	2	0	0	1	0	0	118						
02:40:00 PM	2	9	0	0	2	14	4	0	0	0	0	0	0	0	4	0	115						
02:45:00 PM	0	19	0	0	0	9	5	0	1	0	3	0	0	0	0	0	115						
02:50:00 PM	1	14	0	0	0	22	2	0	5	0	3	0	0	0	0	0	119						
02:55:00 PM	1	16	0	0	0	17	5	0	3	0	0	0	1	0	0	0	127	406					
03:00:00 PM	2	13	0	0	1	17	3	0	3	0	1	0	0	0	0	0	130	421					
03:05:00 PM	2	11	0	0	1	14	2	0	3	0	0	0	0	0	0	0	116	429					
03:10:00 PM	1	20	0	0	0	11	5	0	2	0	0	0	0	0	2	0	114	446					
03:15:00 PM	0	11	0	0	2	11	4	0	2	1	3	0	0	0	1	0	109	451					
03:20:00 PM	2	16	0	0	1	14	4	0	1	0	2	0	0	0	2	0	118	471					
03:25:00 PM	2	14	0	0	1	19	7	0	1	0	0	0	0	0	1	0	122	478					
03:30:00 PM	3	16	0	0	0	13	1	0	4	0	2	0	0	0	0	0	126	480					
03:35:00 PM	1	14	1	0	0	17	2	0	2	0	0	0	0	0	0	0	121	474					
03:40:00 PM	0	12	0	0	2	19	3	0	8	0	2	0	0	0	0	0	122	485					
03:45:00 PM	1	8	0	0	0	14	7	0	9	0	2	0	0	0	2	0	126	491					
03:50:00 PM	4	17	0	0	0	12	3	0	1	0	0	0	0	0	1	0	127	482					
03:55:00 PM	0	11	1	0	1	11	3	0	1	0	0	0	0	0	0	0	109	467					
04:00:00 PM	0	17	0	0	1	11	5	0	2	0	1	0	0	0	0	0	103	464					
04:05:00 PM	1	18	2	0	2	12	1	0	3	0	2	0	0	0	1	0	107	473					
04:10:00 PM	2	12	0	0	1	13	0	0	4	0	1	0	0	0	0	0	112	465					
04:15:00 PM	1	10	1	0	0	12	7	0	3	1	0	0	0	0	2	0	112	467					
04:20:00 PM	2	16	0	0	0	23	2	0	2	0	1	0	0	0	3	0	119	474					
04:25:00 PM	1	15	0	0	2	11	3	0	3	0	1	0	0	0	1	0	123	466					
04:30:00 PM	1	13	1	0	0	17	1	0	1	1	0	0	0	0	0	0	121	462					
04:35:00 PM	1	14	2	0	0	23	4	0	3	1	3	0	0	0	2	0	125	478					
04:40:00 PM	0	14	0	0	1	16	4	0	1	0	2	0	1	0	2	0	129	473					
04:45:00 PM	0	14	1	0	2	17	2	0	9	0	1	0	0	0	0	0	140	476					
04:50:00 PM	2	16	0	0	1	6	4	0	4	1	1	0	0	0	0	0	122	473					
04:55:00 PM	1	18	1	0	1	14	3	0	1	0	1	0	0	0	0	0	121	485					
05:00:00 PM	2	19	0	0	2	19	4	0	1	0	5	0	0	0	0	0	127	500					
05:05:00 PM	2	19	0	0	1	11	7	0	4	0	1	0	0	0	1	0	138	504					
05:10:00 PM	0	17	0	0	1	28	5	0	3	0	2	0	0	0	3	0	157	530					
05:15:00 PM	4	19	0	0	0	24	5	0	2	0	1	0	0	1	0	0	161	549					
05:20:00 PM	4	24	2	0	2	14	5	0	4	0	2	0	0	0	0	0	172	557					
05:25:00 PM	3	29	3	0	0	13	1	0	4	0	0	0	0	0	0	0	166	573					
05:30:00 PM	1	23	1	0	0	13	5	0	5	0	5	0	0	0	1	0	164	592					
05:35:00 PM	2	21	1	0	1	15	6	0	4	1	3	0	0	0	1	0	162	594					
05:40:00 PM	0	24	0	0	0	20	3	0	4	0	1	0	0	1	0	0	162	606					
05:45:00 PM	0	28	0	0	0	16	4	0	6	0	2	0	0	1	1	0	166	618					
05:50:00 PM	0	18	0	0	1	14	7	0	4	0	1	0	0	0	0	0	156	628					
05:55:00 PM	3	15	3	0	0	18	6	0	8	2	1	0	0	0	1	0	160	645					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW Canal Blvd
E/W street	SW Veterans Way
City, State	Redmond OR
Site Notes	
Location	44.263726 - -121.178737
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	23
Peak Hour Start	04:25:00 PM
Peak 15 Min Start	04:25:00 PM
PHF (15-Min Int)	0.95

Eastbound
SW Veterans Way
Heavy Vehicle 2.0%

In 297 Out 405



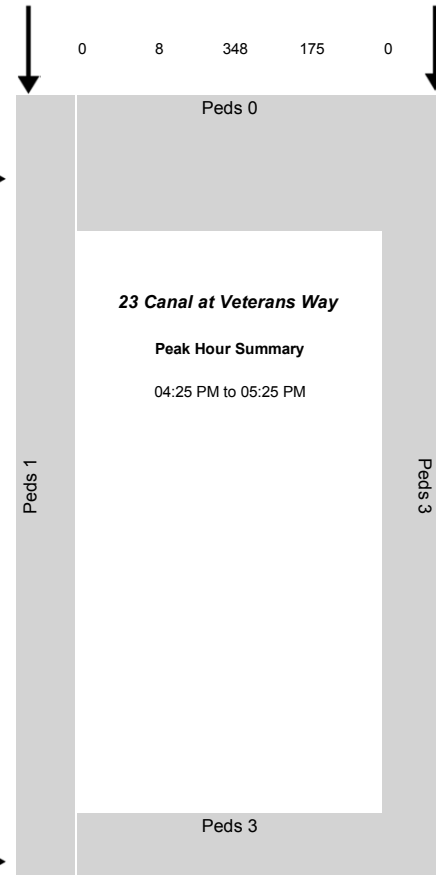
U-Turn	Left	Thru	Right	Bicycles
0	127	280	80	0

In	487	Out	576
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Heavy Vehicle 1.0%
SW Canal Blvd
Northbound

In	531	Out	487	
Bicycles	Right	Thru	Left	U-Turn

0	8	348	175	0
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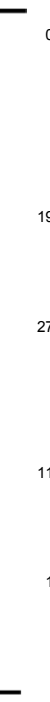


23 Canal at Veterans Way

Peak Hour Summary

04:25 PM to 05:25 PM

Westbound
SW Veterans Way
Heavy Vehicle 1.9%



U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	9
Thru	170
Right	118
Bicycles	0

U-Turn	0
Left	19
Thru	27
Right	11
Bicy	1

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
127	280	80	0	175	348	8	0	9	170	118	0	110	270	198	1	487	531	297	579	576	487	405	426
Percent Heavy Vehicles																							
0.8%	0.7%	2.5%	0.0%	1.7%	0.6%	0.0%	0.0%	0.0%	2.9%	0.8%	0.0%	0.9%	3.3%	0.5%	0.0%	1.0%	0.9%	2.0%	1.9%	0.7%	0.6%	2.5%	2.3%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	3	7		
All Vehicle Volumes																							
Time	Northbound SW Canal Blvd				Southbound SW Canal Blvd				Eastbound SW Veterans Way				Westbound SW Veterans Way				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	7	31	7	0	13	29	2	0	0	13	7	0	9	13	13	0							
02:05:00 PM	18	24	7	0	16	39	1	0	1	8	11	0	9	8	14	0							
02:10:00 PM	7	16	5	0	18	28	0	0	0	8	10	0	7	20	20	0	439						
02:15:00 PM	8	28	9	0	18	34	3	0	1	10	7	0	6	13	16	0	448						
02:20:00 PM	10	26	9	0	11	24	1	0	0	11	15	0	8	11	9	0	427						
02:25:00 PM	7	21	4	0	27	25	1	0	0	11	11	0	3	19	15	0	432						
02:30:00 PM	10	20	3	0	16	20	3	0	0	20	10	0	7	20	9	0	417						
02:35:00 PM	11	32	9	0	18	23	0	0	0	14	6	0	4	26	8	0	433						
02:40:00 PM	5	28	6	0	15	26	1	0	0	16	9	0	4	14	14	0	427						
02:45:00 PM	18	27	8	0	13	15	3	0	1	20	11	0	9	23	15	0	452						
02:50:00 PM	14	43	10	0	11	34	1	0	0	12	8	0	10	11	14	0	469						
02:55:00 PM	8	28	7	0	15	16	1	0	0	14	9	0	13	25	16	0	483	1781					
03:00:00 PM	9	25	9	0	23	29	0	0	1	23	10	0	4	19	16	0	488	1805					
03:05:00 PM	8	26	11	0	12	31	0	0	1	13	13	0	5	21	12	0	473	1802					
03:10:00 PM	8	17	8	0	20	19	1	0	2	13	5	0	4	34	16	0	468	1810					
03:15:00 PM	18	22	10	0	15	24	2	0	0	14	11	0	8	15	14	0	453	1810					
03:20:00 PM	9	24	9	0	9	24	0	0	1	11	8	0	5	20	12	0	432	1807					
03:25:00 PM	7	21	5	0	15	20	0	0	0	22	8	0	5	23	15	0	426	1804					
03:30:00 PM	9	22	3	0	21	19	1	0	0	18	9	0	5	30	15	0	425	1818					
03:35:00 PM	3	20	7	0	9	30	1	0	1	15	10	0	11	27	16	0	443	1817					
03:40:00 PM	6	16	4	0	15	20	0	0	0	21	13	0	11	25	15	0	448	1825					
03:45:00 PM	12	31	6	0	13	27	5	0	1	14	12	0	3	26	13	0	459	1825					
03:50:00 PM	9	31	11	0	15	29	2	0	0	11	2	0	7	18	14	0	458	1806					
03:55:00 PM	4	27	8	0	11	24	0	0	0	10	12	0	17	19	11	0	455	1797					
04:00:00 PM	13	26	5	0	10	22	1	0	1	14	10	0	15	14	17	0	440	1777					
04:05:00 PM	9	24	4	0	24	27	2	0	0	9	5	0	10	26	12	0	443	1776					
04:10:00 PM	9	19	8	0	20	25	0	0	0	8	13	0	13	23	15	0	453	1782					
04:15:00 PM	6	21	6	0	9	33	0	0	1	11	5	1	4	25	18	0	445	1769					
04:20:00 PM	9	13	6	0	10	18	1	0	0	13	10	0	6	19	14	0	412	1756					
04:25:00 PM	10	23	9	0	16	31	0	0	0	18	6	0	5	24	18	0	419	1775					
04:30:00 PM	10	29	7	0	21	34	1	0	3	14	9	0	11	18	12	0	448	1792					
04:35:00 PM	14	29	3	0	14	29	1	0	0	16	7	0	12	23	18	1	496	1809					
04:40:00 PM	8	15	3	0	16	25	0	0	1	10	12	0	10	33	12	0	481	1808					
04:45:00 PM	7	22	7	0	11	26	0	0	0	11	12	0	8	26	8	0	450	1783					
04:50:00 PM	12	30	9	0	18	28	0	0	0	11	12	0	4	26	12	0	445	1796					
04:55:00 PM	12	26	9	0	9	29	1	0	3	14	15	0	10	20	19	0	467	1820					
05:00:00 PM	10	27	8	0	10	35	0	0	0	8	9	0	6	16	27	0	485	1828					
05:05:00 PM	7	18	9	0	14	25	1	0	1	18	6	0	13	28	18	0	481	1834					
05:10:00 PM	16	29	6	0	13	27	3	0	1	15	10	0	12	13	25	0	484	1851					
05:15:00 PM	8	15	5	0	13	30	1	0	0	17	10	0	10	14	15	0	466	1849					
05:20:00 PM	13	17	5	0	20	29	0	0	0	18	10	0	9	29	14	0	472	1894					
05:25:00 PM	10	21	11	0	9	27	2	0	0	3	4	0	11	24	9	0	433	1865					
05:30:00 PM	8	20	9	0	11	25	0	0	0	20	9	0	16	17	11	0	441	1842					
05:35:00 PM	16	17	5	0	16	17	3	0	0	19	7	0	7	25	24	0	433	1831					
05:40:00 PM	8	20	12	0	11	20	0	0	0	11	8	0	8	22	13	0	435	1819					
05:45:00 PM	13	17	9	0	13	29	4	0	0	10	7	0	7	20	5	0	423	1815					
05:50:00 PM	7	23	9	0	12	23	1	0	0	6	9	0	3	10	9	0	379	1765					
05:55:00 PM	15	16	6	0	9	17	0	0	0	13	9	0	4	20	4	0	359	1711					

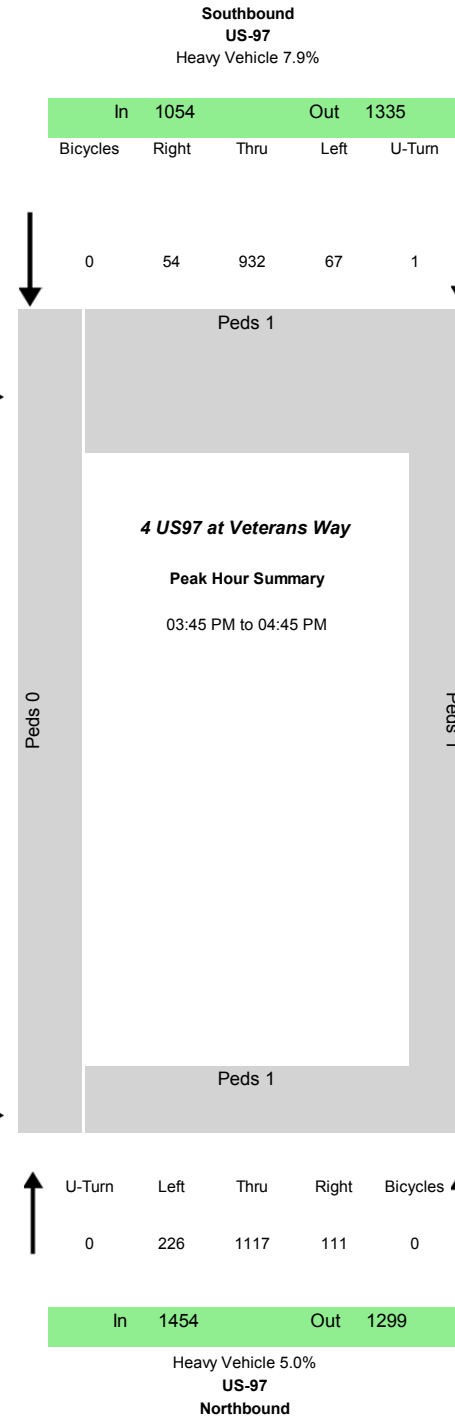


Data Provided by K-D-N.com 503-594-4224		
N/S street	US-97	
E/W street	SW Veterans Way	
City, State	Redmond OR	
Site Notes		
Location	44.263112	-121.176932
Start Date	Tuesday, April 18, 2017	
Start Time	02:00:00 PM	
Weather		
Study ID #	4	
Peak Hour Start	03:45:00 PM	
Peak 15 Min Start	04:00:00 PM	
PHF (15-Min Int)	0.96	

Eastbound
SW Veterans Way
Heavy Vehicle 3.4%

In 407
Out 547

U-Turn	0
Left	72
Thru	137
Right	198
Bicycles	0



Bicycles	0
Right	145
Thru	267
Left	169
U-Turn	0
In	581
Out	315

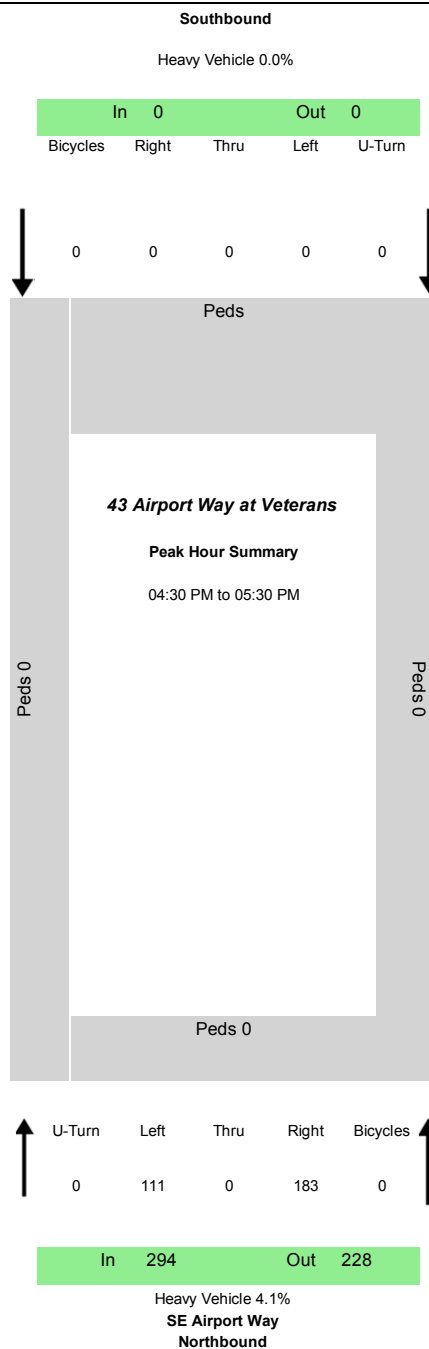
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
226	1117	111	0	67	932	54	1	72	137	198	0	169	267	145	0	1454	1054	407	581	1299	1335	547	315
Percent Heavy Vehicles																							
0.4%	4.7%	17.1%	0.0%	4.5%	8.3%	5.6%	0.0%	2.8%	3.6%	3.5%	0.0%	4.1%	1.9%	4.1%	0.0%	5.0%	7.9%	3.4%	3.1%	7.0%	4.6%	1.6%	8.6%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	3		
All Vehicle Volumes																							
Time	Northbound US-97				Southbound US-97				Eastbound SW Veterans Way				Westbound SW Veterans Way				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	12	64	6	0	6	44	3	1	6	12	22	0	14	20	18	0							
02:05:00 PM	11	71	16	0	6	87	4	0	6	7	7	0	11	19	9	0							
02:10:00 PM	21	70	11	0	9	49	4	0	2	19	22	0	14	18	17	0	738						
02:15:00 PM	9	60	12	0	9	85	5	0	9	15	14	0	9	25	6	0	768						
02:20:00 PM	15	85	12	0	6	75	5	0	6	9	7	0	9	7	6	0	756						
02:25:00 PM	23	73	8	0	5	63	2	0	7	14	30	0	18	18	10	0	771						
02:30:00 PM	13	75	13	0	6	94	0	0	1	14	14	0	12	16	15	0	786						
02:35:00 PM	15	74	8	0	8	66	6	0	5	21	18	0	19	17	14	0	815						
02:40:00 PM	21	98	9	0	3	69	4	0	5	18	17	0	11	21	14	0	834						
02:45:00 PM	16	87	13	0	6	100	2	0	4	15	8	0	10	15	9	0	846						
02:50:00 PM	16	70	9	0	7	61	4	0	8	20	14	0	20	29	9	0	842						
02:55:00 PM	23	86	10	0	15	74	4	0	6	16	13	0	7	18	12	0	836	3179					
03:00:00 PM	15	82	8	0	8	77	1	1	10	14	15	0	9	23	12	0	826	3226					
03:05:00 PM	14	87	4	0	5	69	5	0	7	17	22	0	14	27	13	0	843	3256					
03:10:00 PM	28	86	11	0	14	70	1	0	4	17	14	0	9	20	14	0	847	3288					
03:15:00 PM	11	86	10	0	6	86	3	0	10	13	12	0	11	23	12	0	855	3313					
03:20:00 PM	17	83	12	0	5	73	3	0	2	12	14	0	9	18	14	0	833	3333					
03:25:00 PM	26	77	9	0	7	52	5	0	7	15	21	0	18	19	18	0	819	3336					
03:30:00 PM	21	76	7	0	1	82	2	0	8	14	14	0	16	32	17	0	826	3353					
03:35:00 PM	24	65	5	0	6	70	4	0	3	17	24	0	18	25	12	0	837	3355					
03:40:00 PM	12	82	8	0	6	67	8	0	6	8	16	0	17	19	12	0	824	3326					
03:45:00 PM	21	100	9	0	6	69	4	0	5	20	16	0	15	22	18	0	839	3346					
03:50:00 PM	15	84	10	0	5	85	4	0	9	13	19	0	17	31	15	0	873	3386					
03:55:00 PM	16	90	10	0	5	73	5	0	8	12	13	0	12	17	4	0	877	3367					
04:00:00 PM	15	114	8	0	3	101	10	0	3	7	15	0	10	18	10	0	886	3406					
04:05:00 PM	14	92	8	0	2	71	4	0	3	9	23	0	23	35	23	0	886	3429					
04:10:00 PM	22	85	12	0	8	78	9	1	7	9	19	0	14	19	11	0	915	3435					
04:15:00 PM	20	100	10	0	2	80	3	0	6	8	12	0	15	14	9	0	880	3431					
04:20:00 PM	15	99	12	0	5	69	3	0	8	13	12	0	8	22	9	0	848	3444					
04:25:00 PM	24	92	6	0	7	83	1	0	7	13	17	0	10	19	9	0	842	3458					
04:30:00 PM	22	102	8	0	9	80	5	0	9	10	24	0	13	18	8	0	871	3476					
04:35:00 PM	19	70	3	0	10	61	3	0	4	16	18	0	20	33	15	0	868	3475					
04:40:00 PM	23	89	15	0	5	82	3	0	3	7	10	0	12	19	14	0	862	3496					
04:45:00 PM	24	67	5	0	6	58	5	0	5	11	20	0	16	17	16	0	804	3441					
04:50:00 PM	16	104	12	0	4	104	5	0	8	11	12	0	9	14	14	0	845	3447					
04:55:00 PM	18	103	4	0	3	66	6	0	9	10	16	0	21	37	12	0	868	3487					
05:00:00 PM	25	81	11	0	4	57	1	1	4	8	9	0	17	19	11	0	866	3421					
05:05:00 PM	16	107	7	0	8	70	7	0	4	12	23	0	17	27	12	0	863	3424					
05:10:00 PM	17	82	10	0	6	72	4	0	4	11	22	0	12	30	12	0	840	3412					
05:15:00 PM	13	111	11	0	7	112	7	0	4	6	19	0	15	21	9	0	927	3468					
05:20:00 PM	24	100	6	0	6	81	6	0	8	6	20	0	13	17	10	0	914	3490					
05:25:00 PM	24	86	8	0	6	42	3	0	7	11	14	0	12	22	15	0	882	3452					
05:30:00 PM	16	118	13	0	3	81	9	0	6	9	19	0	10	14	8	0	853	3450					
05:35:00 PM	29	74	8	0	3	65	3	0	11	13	17	0	20	26	6	0	831	3453					
05:40:00 PM	23	110	15	0	5	74	4	0	2	15	12	0	9	11	7	0	868	3458					
05:45:00 PM	21	95	6	0	5	82	3	0	11	7	14	0	16	13	13	0	848	3494					
05:50:00 PM	10	76	3	0	6	51	3	0	8	9	12	0	7	4	11	0	773	3381					
05:55:00 PM	12	95	6	0	3	71	5	0	7	9	15	0	11	9	14	0	743	3333					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SE Airport Way
E/W street	SE Veterans Way
City, State	Redmond OR
Site Notes	
Location	44.260835 - -121.165926
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	43
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:30:00 PM
PHF (15-Min Int)	0.92

Eastbound
SE Veterans Way
Heavy Vehicle 4.8%

U-Turn	0
Left	0
Thru	111
Right	56
Bicycles	0
In	167
Out	236



Bicycles	0
Right	0
Thru	125
Left	172
U-Turn	0
In	297
Out	294

Westbound
SE Veterans Way
Heavy Vehicle 6.7%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
111	0	183	0	0	0	0	0	0	111	56	0	172	125	0	0	294	0	167	297	228	0	236	294
Percent Heavy Vehicles																							
3.6%	0.0%	4.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%	8.9%	0.0%	5.2%	8.8%	0.0%	0.0%	4.1%	0.0%	4.8%	6.7%	6.1%	0.0%	6.4%	3.7%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0		0	0					0	0	0	0	0	0		0				0	0	0		
All Vehicle Volumes																							
Time	Northbound SE Airport Way				Southbound				Eastbound SE Veterans Way				Westbound SE Veterans Way				15 Min 1 HR						
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	9		6	0					8	4	0		8	1		0							
02:05:00 PM	4		7	0					13	4	0		4	8		0							
02:10:00 PM	11		12	0					5	7	0		8	2		0	121						
02:15:00 PM	8		9	0					9	7	0		15	4		0	137						
02:20:00 PM	4		10	0					4	10	0		10	3		0	138						
02:25:00 PM	12		8	0					8	4	0		7	5		0	137						
02:30:00 PM	14		6	0					5	10	0		6	8		0	134						
02:35:00 PM	14		18	0					3	9	0		11	4		0	152						
02:40:00 PM	10		11	0					2	3	0		8	8		0	150						
02:45:00 PM	4		7	0					10	12	0		10	12		0	156						
02:50:00 PM	9		10	0					8	5	0		10	10		0	149						
02:55:00 PM	12		14	0					6	10	0		9	9		0	167	575					
03:00:00 PM	12		9	0					1	11	0		6	7		0	158	585					
03:05:00 PM	15		17	0					8	6	0		12	4		0	168	607					
03:10:00 PM	23		11	0					9	5	0		9	5		0	170	624					
03:15:00 PM	20		6	0					7	12	0		11	8		0	188	636					
03:20:00 PM	18		11	0					7	4	0		7	7		0	180	649					
03:25:00 PM	13		13	0					10	9	0		13	4		0	180	667					
03:30:00 PM	17		15	0					6	4	0		13	6		0	177	679					
03:35:00 PM	13		9	0					11	7	0		13	13		0	189	686					
03:40:00 PM	11		13	0					7	3	0		9	8		0	178	695					
03:45:00 PM	15		13	0					8	4	0		8	6		0	171	694					
03:50:00 PM	12		11	0					12	3	0		11	10		0	164	701					
03:55:00 PM	9		17	0					11	3	0		13	6		0	172	700					
04:00:00 PM	9		10	0					9	3	0		8	10		0	167	703					
04:05:00 PM	15		15	0					11	5	0		12	11		0	177	710					
04:10:00 PM	8		15	0					11	2	0		8	11		0	173	703					
04:15:00 PM	12		14	0					8	2	0		6	2		0	168	683					
04:20:00 PM	7		12	0					9	6	0		12	5		0	150	680					
04:25:00 PM	7		12	0					6	3	0		11	11		0	145	668					
04:30:00 PM	15		18	0					6	7	0		18	10		0	175	681					
04:35:00 PM	9		16	0					10	5	0		15	12		0	191	682					
04:40:00 PM	9		14	0					9	6	0		18	10		0	207	697					
04:45:00 PM	8		13	0					6	5	0		15	9		0	189	699					
04:50:00 PM	8		10	0					10	5	0		15	12		0	182	700					
04:55:00 PM	11		6	0					5	1	0		12	11		0	162	687					
05:00:00 PM	7		13	0					9	6	0		17	13		0	171	703					
05:05:00 PM	12		23	0					12	6	0		12	6		0	182	705					
05:10:00 PM	12		20	0					14	3	0		7	8		0	200	714					
05:15:00 PM	5		19	0					11	7	0		13	11		0	201	736					
05:20:00 PM	7		16	0					8	4	0		14	8		0	187	742					
05:25:00 PM	8		15	0					11	1	0		16	15		0	189	758					
05:30:00 PM	1		15	0					6	5	0		7	13		0	170	731					
05:35:00 PM	4		15	0					3	4	0		12	6		0	157	708					
05:40:00 PM	8		10	0					6	4	0		9	8		0	136	687					
05:45:00 PM	5		9	0					7	4	0		10	11		0	135	677					
05:50:00 PM	6		9	0					4	1	0		5	5		0	121	647					
05:55:00 PM	4		9	0					7	2	0		12	8		0	118	643					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SE Veterans Way
E/W street	OR-126
City, State	Redmond OR
Site Notes	
Location	44.264071 - -121.152042
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.93

Eastbound

OR-126

Heavy Vehicle 3.6%

In 305 Out 263

U-Turn 0
Left 0
Thru 300
Right 5
Bicycles 0

Peds 0

U-Turn 0 Left 4 Thru 0 Right 250 Bicycles 0

In 254 Out 204

Heavy Vehicle 3.1%
SE Veterans Way
Northbound

Southbound

Heavy Vehicle 0.0%

In 0 Out 0
Bicycles Right Thru Left U-Turn

0 0 0 0 0

Peds

Bicycles 0

21 OR126 at Veterans Way

Peak Hour Summary

04:30 PM to 05:30 PM

Right 0

Thru 259

Left 199

U-Turn 0

Peds 0

Peds 0

In 458

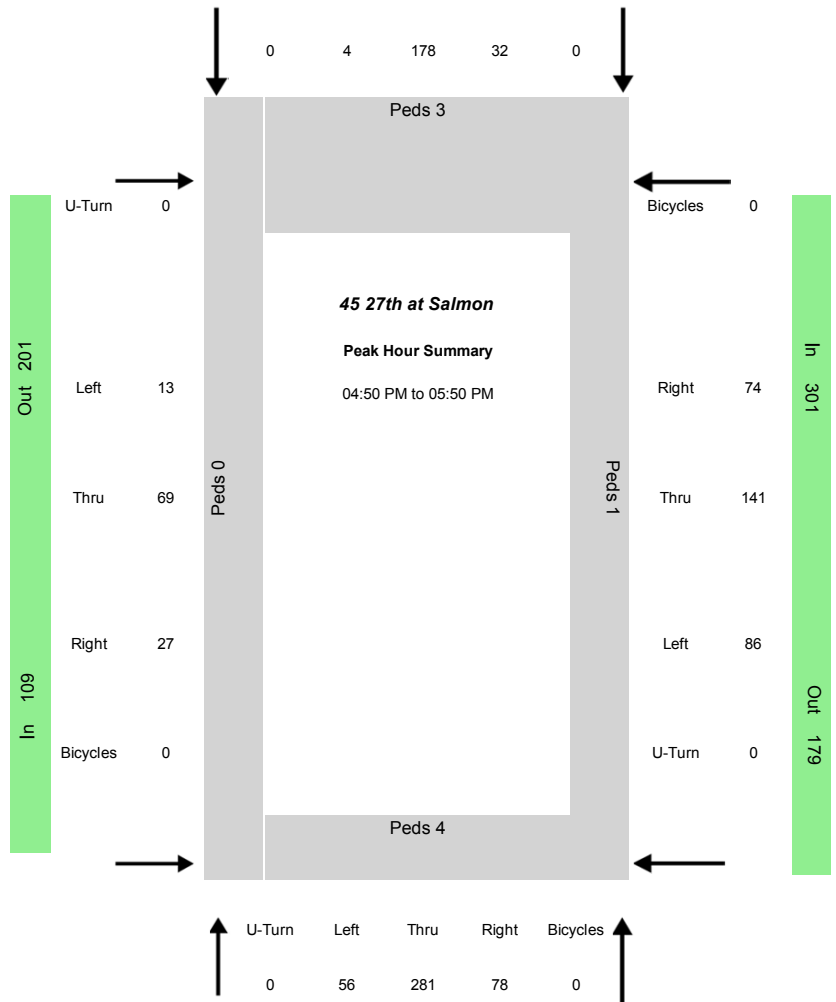
Out 550

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
4	0	250	0	0	0	0	0	0	300	5	0	199	259	0	0	254	0	305	458	204	0	263	550
Percent Heavy Vehicles																							
0.0%	0.0%	3.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.0%	40.0%	0.0%	2.0%	4.6%	0.0%	0.0%	3.1%	0.0%	3.6%	3.5%	2.9%	0.0%	4.6%	3.1%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB	Sum		
0		0	0						0	0	0	0	0		0	0		0	0			0	
All Vehicle Volumes																							
Time	Northbound SE Veterans Way				Southbound				Eastbound OR-126				Westbound OR-126				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0		4	0					8	0	0		0	4		0							
02:05:00 PM	0		15	0					23	0	0		10	21		0							
02:10:00 PM	0		12	0					23	0	0		11	12		0						143	
02:15:00 PM	1		14	0					23	2	0		11	12		0						190	
02:20:00 PM	0		13	0					18	0	0		12	11		0						175	
02:25:00 PM	0		16	0					20	0	0		4	19		0						176	
02:30:00 PM	1		7	0					15	0	0		13	26		0						175	
02:35:00 PM	0		14	0					24	1	0		12	19		0						191	
02:40:00 PM	1		12	0					17	0	0		10	28		0						200	
02:45:00 PM	0		12	0					16	0	0		12	21		0						199	
02:50:00 PM	0		14	0					16	0	0		17	18		0						194	
02:55:00 PM	0		20	0					16	1	0		11	20		0						194	713
03:00:00 PM	0		12	0					21	0	0		4	25		0						195	759
03:05:00 PM	0		18	0					14	2	0		16	23		0						203	763
03:10:00 PM	1		14	0					22	0	0		10	24		0						206	776
03:15:00 PM	0		14	0					18	0	0		16	21		0						213	782
03:20:00 PM	1		11	0					21	0	0		5	18		0						196	784
03:25:00 PM	0		12	0					16	0	0		11	16		0						180	780
03:30:00 PM	1		17	0					25	0	0		14	16		0						184	791
03:35:00 PM	0		17	0					20	0	0		12	31		0						208	801
03:40:00 PM	1		17	0					25	1	0		15	26		0						238	818
03:45:00 PM	1		19	0					23	0	0		16	29		0						253	845
03:50:00 PM	1		18	0					19	0	0		16	24		0						251	858
03:55:00 PM	1		26	0					23	1	0		19	33		0						269	893
04:00:00 PM	1		18	0					27	0	0		11	31		0						269	919
04:05:00 PM	1		11	0					13	1	0		12	24		0						253	908
04:10:00 PM	0		24	0					22	0	0		10	22		0						228	915
04:15:00 PM	2		13	0					27	2	0		4	17		0						205	911
04:20:00 PM	1		16	0					18	1	0		15	27		0						221	933
04:25:00 PM	2		16	0					17	0	0		19	18		0						215	950
04:30:00 PM	0		19	0					22	0	0		17	24		0						232	959
04:35:00 PM	0		24	0					31	1	0		13	28		0						251	976
04:40:00 PM	0		21	0					24	1	0		13	30		0						268	980
04:45:00 PM	0		16	0					28	1	0		21	16		0						268	974
04:50:00 PM	0		19	0					20	0	0		18	30		0						258	983
04:55:00 PM	0		10	0					21	0	0		17	27		0						244	955
05:00:00 PM	0		13	0					26	1	0		22	13		0						237	942
05:05:00 PM	1		24	0					30	0	0		6	13		0						224	954
05:10:00 PM	0		35	0					24	0	0		13	15		0						236	963
05:15:00 PM	2		25	0					31	0	0		13	19		0						251	988
05:20:00 PM	1		26	0					24	1	0		23	20		0						272	1005
05:25:00 PM	0		18	0					19	0	0		23	24		0						269	1017
05:30:00 PM	1		17	0					27	0	0		15	17		0						256	1012
05:35:00 PM	1		20	0					21	0	0		15	20		0						238	992
05:40:00 PM	2		14	0					26	0	0		11	20		0						227	976
05:45:00 PM	0		14	0					15	0	0		13	19		0						211	955
05:50:00 PM	0		12	0					20	0	0		12	18		0						196	930
05:55:00 PM	0		12	0					18	1	0		10	15		0						179	911



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 27th St
E/W street	SW Salmon Ave
City, State	Redmond OR
Site Notes	
Location	44.254717 - -121.199291
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	45
Peak Hour Start	04:50:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.89

Eastbound
SW Salmon Ave
Heavy Vehicle 0.0%



Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
56	281	78	0	32	178	4	0	13	69	27	0	86	141	74	0	415	214	109	301	291	368	201	179
Percent Heavy Vehicles																							
0.0%	0.7%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	0.7%	2.7%	0.0%	0.5%	1.4%	0.0%	1.3%	1.4%	1.1%	0.5%	0.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	1	8		
All Vehicle Volumes																							
Time	Northbound SW 27th St				Southbound SW 27th St				Eastbound SW Salmon Ave				Westbound SW Salmon Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	1	10	2	0	4	5	0	0	1	8	4	0	5	7	6	0							
02:05:00 PM	0	7	3	0	1	7	2	0	3	2	2	0	6	3	1	0							
02:10:00 PM	2	5	6	0	1	6	0	0	1	3	1	0	1	7	4	0	127						
02:15:00 PM	2	8	1	0	1	6	0	0	1	6	1	0	3	2	6	0	111						
02:20:00 PM	2	11	0	0	1	10	2	0	3	4	3	0	7	5	2	0	124						
02:25:00 PM	0	9	7	0	2	10	2	0	0	5	1	0	6	7	4	0	140						
02:30:00 PM	0	11	4	0	4	8	0	0	0	3	0	0	2	5	2	0	142						
02:35:00 PM	2	11	9	0	2	8	0	0	0	5	1	0	4	10	3	0	147						
02:40:00 PM	7	12	9	0	1	10	1	0	0	4	3	0	8	5	3	0	157						
02:45:00 PM	3	16	12	0	1	12	0	0	1	7	2	0	7	6	3	0	188						
02:50:00 PM	3	14	7	0	5	14	2	0	0	4	2	0	5	11	5	0	205						
02:55:00 PM	2	23	8	0	1	8	0	0	3	5	1	0	15	7	2	0	217	641					
03:00:00 PM	2	17	3	0	0	9	0	0	2	6	1	0	7	4	3	0	201	642					
03:05:00 PM	0	20	6	0	3	9	2	0	0	7	0	0	10	8	6	0	200	676					
03:10:00 PM	3	11	6	0	1	8	0	0	1	6	0	0	7	7	2	0	177	691					
03:15:00 PM	1	22	6	0	3	3	1	0	2	7	0	0	4	7	2	0	181	712					
03:20:00 PM	2	19	7	0	2	23	0	0	0	11	0	0	6	7	3	0	190	742					
03:25:00 PM	6	15	4	0	3	17	1	0	1	6	3	0	6	6	4	0	210	761					
03:30:00 PM	6	16	4	0	1	14	1	0	1	7	0	0	2	10	4	0	218	788					
03:35:00 PM	2	16	10	0	2	9	2	0	1	4	3	0	9	8	4	0	208	803					
03:40:00 PM	4	9	8	0	5	13	2	0	4	4	1	0	8	14	4	0	212	816					
03:45:00 PM	3	17	12	0	5	13	2	0	1	4	4	0	10	7	8	0	232	832					
03:50:00 PM	0	19	14	0	6	10	2	0	3	5	2	0	3	8	8	0	242	840					
03:55:00 PM	3	15	4	0	2	8	2	0	2	8	2	0	8	4	5	0	229	828					
04:00:00 PM	3	11	5	0	2	15	1	0	1	7	1	0	4	9	7	0	209	840					
04:05:00 PM	4	24	8	0	4	16	0	0	1	7	2	0	9	10	5	0	219	859					
04:10:00 PM	4	20	4	0	1	8	0	0	1	5	2	0	6	7	5	0	219	870					
04:15:00 PM	2	13	3	0	2	9	0	0	1	6	1	0	6	7	3	0	206	865					
04:20:00 PM	2	11	7	0	4	5	1	0	0	9	2	0	2	12	4	0	175	844					
04:25:00 PM	4	16	5	0	4	11	0	0	0	6	0	0	5	13	1	0	177	837					
04:30:00 PM	5	12	8	0	3	12	2	0	2	5	3	0	4	8	4	0	192	839					
04:35:00 PM	5	20	4	0	2	13	1	0	1	7	4	0	6	8	2	0	206	842					
04:40:00 PM	2	15	4	0	4	11	0	0	2	5	2	0	11	14	4	0	215	840					
04:45:00 PM	3	24	6	0	5	12	0	0	4	5	1	0	7	5	3	0	222	829					
04:50:00 PM	5	14	4	0	3	17	0	0	0	8	3	0	7	11	3	0	224	824					
04:55:00 PM	3	28	2	0	3	12	0	0	3	3	4	0	3	11	4	0	226	837					
05:00:00 PM	2	32	4	0	4	11	0	0	0	7	3	0	9	9	5	0	237	857					
05:05:00 PM	4	20	6	0	1	14	0	0	1	9	2	0	10	12	5	0	246	851					
05:10:00 PM	8	33	3	0	2	20	1	0	0	4	1	0	12	16	5	0	275	893					
05:15:00 PM	3	30	8	0	5	13	0	0	0	5	2	0	6	16	7	0	284	935					
05:20:00 PM	9	27	9	0	4	11	1	0	3	4	0	0	6	13	5	0	292	968					
05:25:00 PM	4	19	13	0	3	11	0	0	0	8	2	0	6	10	12	0	275	991					
05:30:00 PM	8	25	11	0	1	15	0	0	2	9	2	0	6	15	9	0	283	1026					
05:35:00 PM	3	19	8	0	1	21	1	0	1	4	0	0	5	9	8	0	271	1033					
05:40:00 PM	2	17	4	0	3	13	1	0	2	6	4	0	7	6	5	0	253	1029					
05:45:00 PM	5	17	6	0	2	20	0	0	1	2	4	0	9	13	6	0	235	1039					
05:50:00 PM	2	9	6	0	6	10	0	0	0	3	0	0	4	16	3	0	214	1023					
05:55:00 PM	6	23	6	0	2	6	0	0	0	5	4	0	9	6	2	0	213	1016					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW Canal Blvd
E/W street	SW Odem Medo Way
City, State	Redmond OR
Site Notes	
Location	44.253479 - -121.187406
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	24
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:15:00 PM
PHF (15-Min Int)	0.96

Eastbound

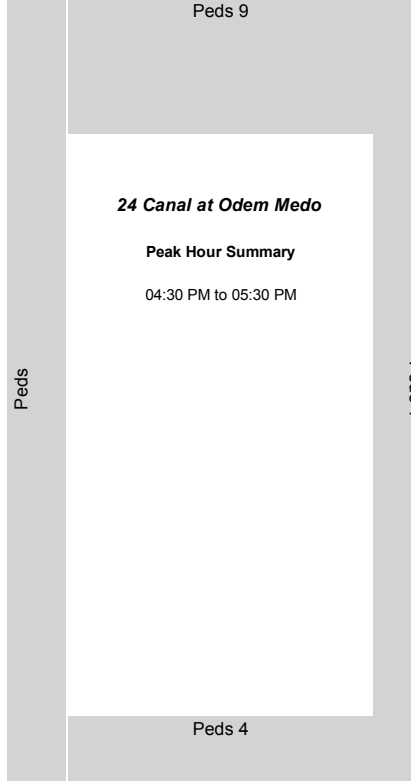
Heavy Vehicle NaN

Out 0
In 0

U-Turn	0
Left	0
Thru	0
Right	0
Bicycles	0

Southbound SW Canal Blvd Heavy Vehicle 0.8%				
In	480	Out	657	
Bicycles		Right	Thru	Left
				U-Turn

1	0	258	221	0
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U-Turn	Left	Thru	Right	Bicycles
0	0	291	154	0

In	445	Out	429
Heavy Vehicle 0.9% SW Canal Blvd Northbound			

Bicycles	1
Right	366
Thru	0
Left	171
U-Turn	0

In 537
Out 375

Westbound
SW Odem Medo Way
Heavy Vehicle 0.6%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	291	154	0	221	258	0	0	0	0	0	0	171	0	366	0	445	479	0	537	429	657	0	375
Percent Heavy Vehicles																							
0.0%	0.7%	1.3%	0.0%	0.5%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.9%	0.8%	#DIV/0!	0.6%	0.7%	0.8%	#DIV/0!	0.8%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk				Sum		
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	1		0					1		0	0		2	4	9			4	17
All Vehicle Volumes																							
Time	Northbound SW Canal Blvd				Southbound SW Canal Blvd				Eastbound				Westbound SW Odem Medo Way				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM		23	4	0	19	21		0					5		21	0							
02:05:00 PM		25	8	0	19	16		0					19		25	0							
02:10:00 PM		19	9	0	19	30		0					8		15	0		305					
02:15:00 PM		26	10	0	24	28		0					8		20	0		328					
02:20:00 PM		15	5	0	16	21		0					14		26	0		313					
02:25:00 PM		17	10	0	21	23		0					8		15	0		307					
02:30:00 PM		22	6	0	21	18		0					10		21	0		289					
02:35:00 PM		27	11	0	19	28		0					14		12	0		303					
02:40:00 PM		38	18	0	15	19		0					10		15	0		324					
02:45:00 PM		40	11	0	8	17		0					13		21	0		336					
02:50:00 PM		24	11	0	24	14		0					9		26	0		333					
02:55:00 PM		22	7	0	19	20		0					20		24	0		330	1266				
03:00:00 PM		24	13	0	16	24		0					7		20	0		324	1277				
03:05:00 PM		17	8	0	30	14		0					12		27	0		324	1273				
03:10:00 PM		26	8	0	20	25		0					9		16	0		316	1277				
03:15:00 PM		17	9	0	23	20		0					9		17	0		307	1256				
03:20:00 PM		24	9	0	21	21		0					14		21	0		309	1269				
03:25:00 PM		29	12	0	16	19		0					13		29	0		323	1293				
03:30:00 PM		23	8	0	16	16		0					11		26	0		328	1295				
03:35:00 PM		12	8	0	13	19		0					8		30	0		308	1274				
03:40:00 PM		26	17	0	20	27		0					9		21	0		310	1279				
03:45:00 PM		31	10	0	16	20		0					7		20	0		314	1273				
03:50:00 PM		26	15	0	23	21		0					13		26	0		348	1289				
03:55:00 PM		27	14	0	18	20		0					7		34	0		348	1297				
04:00:00 PM		23	12	0	20	14		0					11		30	0		354	1303				
04:05:00 PM		18	14	0	21	22		0					13		23	0		341	1306				
04:10:00 PM		15	11	0	18	15		0					19		32	0		331	1312				
04:15:00 PM		21	11	0	23	28		0					13		27	0		344	1340				
04:20:00 PM		21	15	0	19	15		0					20		35	0		358	1355				
04:25:00 PM		25	11	0	26	19		0					11		24	0		364	1353				
04:30:00 PM		30	14	0	24	22		0					15		36	0		382	1394				
04:35:00 PM		27	9	0	21	22		0					15		23	0		374	1421				
04:40:00 PM		26	13	0	18	26		0					11		24	0		376	1419				
04:45:00 PM		21	13	0	21	10		0					20		26	0		346	1426				
04:50:00 PM		21	15	0	18	27		0					13		28	0		351	1424				
04:55:00 PM		29	8	0	13	26		0					10		31	0		350	1421				
05:00:00 PM		21	12	0	18	20		0					12		32	0		354	1426				
05:05:00 PM		30	17	0	12	26		0					14		26	0		357	1440				
05:10:00 PM		22	6	0	22	18		0					14		31	0		353	1443				
05:15:00 PM		15	18	0	18	19		0					15		36	0		359	1441				
05:20:00 PM		23	19	0	24	26		0					16		36	0		378	1460				
05:25:00 PM		26	10	0	12	16		0					16		37	0		382	1461				
05:30:00 PM		31	8	0	16	16		0					17		33	0		382	1441				
05:35:00 PM		21	13	0	18	21		0					22		28	0		361	1447				
05:40:00 PM		26	15	0	13	17		0					7		28	0		350	1435				
05:45:00 PM		21	7	0	13	16		0					14		24	0		324	1419				
05:50:00 PM		26	10	0	14	22		0					7		22	0		302	1398				
05:55:00 PM		24	7	0	16	18		0					13		25	0		299	1384				

Data Provided by K-D-N.com 503-594-4224	
N/S street	US-97
E/W street	SW Odem Medo Way
City, State	Redmond OR
Site Notes	
Location	44.251748 - -121.1844
Start Date	Tuesday, April 18, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	3
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:15:00 PM
PHF (15-Min Int)	0.94

Eastbound

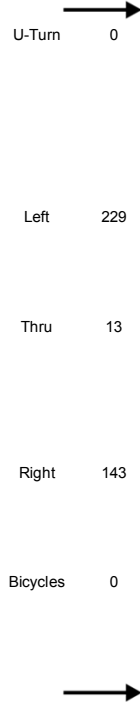
SW Odem Medo Way

Heavy Vehicle 2.1%



Out 498

In 385



U-Turn	Left	Thru	Right	Bicycles
0	242	1278	8	0

In	1528	Out	1161
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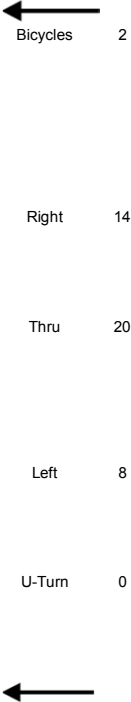
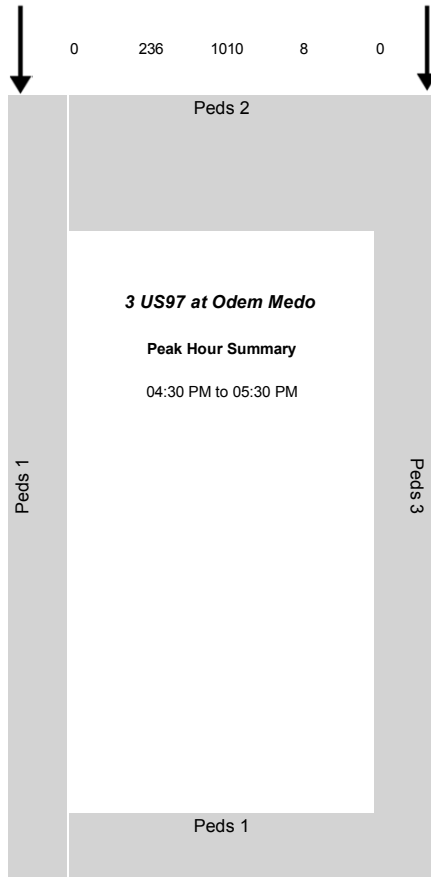
Heavy Vehicle 3.5%

US-97

Northbound

Southbound				
US-97				
Heavy Vehicle 6.2%				
In	1254	Out	1521	
Bicycles	Right	Thru	Left	U-Turn

0	236	1010	8	0
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Out 29

In 42

Westbound

SW Odem Medo Way

Heavy Vehicle 2.3%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
242	1278	8	0	8	1010	236	0	229	13	143	0	8	20	14	0	1528	1254	385	42	1161	1521	498	29
Percent Heavy Vehicles																							
0.8%	4.1%	0.0%	0.0%	0.0%	7.2%	2.1%	0.0%	1.3%	0.0%	3.5%	0.0%	0.0%	0.0%	7.1%	0.0%	3.5%	6.2%	2.1%	2.4%	6.7%	3.7%	1.4%	0.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	1	2	1	3	7		
All Vehicle Volumes																							
Time	Northbound US-97				Southbound US-97				Eastbound SW Odem Medo Way				Westbound SW Odem Medo Way				15 Min						1 HR
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	14	74	2	0	0	79	18	0	12	1	9	0	1	2	2	0							
02:05:00 PM	5	66	0	0	0	83	13	0	20	2	12	0	1	1	1	0							
02:10:00 PM	8	71	3	0	0	66	9	0	14	2	6	0	0	0	1	0	598						
02:15:00 PM	18	71	0	0	0	65	17	0	20	0	7	0	2	2	1	0	587						
02:20:00 PM	14	78	0	0	1	84	20	0	19	0	12	0	1	0	0	0	612						
02:25:00 PM	4	96	1	0	0	98	19	0	13	0	10	0	1	1	1	0	676						
02:30:00 PM	13	82	2	0	1	78	11	0	11	0	17	0	1	2	2	0	693						
02:35:00 PM	10	103	1	0	1	102	21	0	15	1	10	0	0	0	2	0	730						
02:40:00 PM	10	89	0	0	0	86	15	0	20	1	10	0	0	1	1	0	719						
02:45:00 PM	13	85	1	0	0	81	11	0	23	1	9	0	0	1	0	0	724						
02:50:00 PM	17	101	1	0	0	79	20	0	21	1	9	0	0	1	2	0	710						
02:55:00 PM	4	99	2	0	2	85	19	0	13	2	7	0	0	1	0	0	711	2704					
03:00:00 PM	13	91	0	0	0	59	15	0	15	1	12	0	1	1	3	0	697	2701					
03:05:00 PM	11	96	1	0	0	91	12	0	20	0	10	0	1	3	0	0	690	2742					
03:10:00 PM	10	92	0	0	2	87	16	0	11	1	12	0	0	0	0	0	687	2793					
03:15:00 PM	14	97	1	0	1	65	17	0	15	2	17	0	2	0	2	0	709	2823					
03:20:00 PM	12	86	3	0	1	79	18	0	22	0	6	0	0	2	1	0	694	2824					
03:25:00 PM	15	88	3	0	2	94	23	0	16	1	7	0	1	2	2	0	717	2834					
03:30:00 PM	19	80	0	0	1	74	18	0	16	0	12	0	3	2	2	0	711	2841					
03:35:00 PM	11	89	1	0	0	85	21	0	15	0	10	0	0	0	1	0	714	2808					
03:40:00 PM	12	93	3	0	0	68	22	0	22	1	17	0	1	1	0	0	700	2815					
03:45:00 PM	8	113	2	0	0	75	20	0	12	0	8	0	2	3	1	0	717	2834					
03:50:00 PM	21	96	1	0	1	83	11	0	23	0	14	0	2	0	0	0	736	2834					
03:55:00 PM	13	108	1	0	0	115	15	0	13	0	13	0	3	1	0	0	778	2882					
04:00:00 PM	13	84	0	0	2	80	15	0	16	1	10	0	1	3	2	0	761	2898					
04:05:00 PM	14	96	2	0	1	86	19	0	20	7	12	0	1	2	0	0	769	2913					
04:10:00 PM	8	128	1	0	0	126	22	0	14	3	8	0	1	0	2	0	800	2995					
04:15:00 PM	11	105	0	0	2	81	21	0	18	0	15	0	0	5	2	0	833	3022					
04:20:00 PM	24	131	1	0	1	71	17	0	17	2	10	0	0	1	1	0	849	3068					
04:25:00 PM	15	91	0	0	2	90	12	0	10	1	10	0	2	6	4	0	779	3057					
04:30:00 PM	27	123	1	0	0	67	25	0	27	2	15	0	0	3	2	0	811	3122					
04:35:00 PM	19	90	0	0	1	102	16	0	9	0	13	0	0	2	2	0	789	3143					
04:40:00 PM	13	74	0	0	1	76	19	0	21	2	19	0	0	3	0	0	774	3131					
04:45:00 PM	12	113	0	0	1	72	14	0	18	1	18	0	1	1	0	0	733	3138					
04:50:00 PM	20	97	3	0	1	71	22	0	25	2	10	0	2	1	0	0	733	3140					
04:55:00 PM	32	129	1	0	0	101	20	0	9	1	9	0	1	0	0	0	808	3161					
05:00:00 PM	19	104	2	0	0	80	18	0	22	2	4	0	0	2	1	0	811	3188					
05:05:00 PM	18	98	0	0	0	88	18	0	27	1	10	0	1	1	1	0	820	3191					
05:10:00 PM	16	110	0	0	1	77	25	0	18	0	10	0	0	3	1	0	778	3139					
05:15:00 PM	18	92	0	0	0	75	24	0	24	0	9	0	3	2	4	0	775	3130					
05:20:00 PM	19	97	0	0	3	111	18	0	12	1	11	0	0	0	2	0	786	3128					
05:25:00 PM	29	151	1	0	0	90	17	0	17	1	15	0	0	2	1	0	849	3209					
05:30:00 PM	14	99	0	0	2	53	16	0	19	2	11	0	2	0	1	0	817	3136					
05:35:00 PM	23	145	1	0	0	93	12	0	15	0	8	0	2	3	1	0	846	3185					
05:40:00 PM	16	93	0	0	0	74	16	0	33	0	6	0	0	4	0	0	764	3199					
05:45:00 PM	11	114	1	0	1	85	13	0	14	1	9	0	1	1	0	0	796	3199					
05:50:00 PM	16	95	0	0	2	80	16	0	12	0	2	0	0	0	0	0	716	3168					
05:55:00 PM	25	92	0	0	1	62	12	0	12	1	4	0	2	2	0	0	687	3078					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW Helmholtz Way
E/W street	SW Wickiup Ave
City, State	Redmond OR
Site Notes	
Location	44.247537 - -121.229331
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	05:00:00 PM
Peak 15 Min Start	05:35:00 PM
PHF (15-Min Int)	0.97

Eastbound
SW Wickiup Ave
Heavy Vehicle 0.0%

In 18 Out 24

U-Turn	0
Left	4
Thru	13
Right	1
Bicycles	0

Southbound SW Helmholtz Way Heavy Vehicle 3.3%				
In	120	Out	239	
Bicycles		Right	Thru	Left
				U-Turn

0	8	77	35	0
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Peds 0

51st at Helmholtz
Peak Hour Summary
05:00 PM to 06:00 PM

Peds 0

U-Turn	0
Left	6
Thru	202
Right	48
Bicycles	0

U-Turn	0
Left	6
Thru	202
Right	48
Bicycles	0

In	256	Out	96
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Heavy Vehicle 0.0%
SW Helmholtz Way
Northbound

Bicycles	0
Right	33
Thru	10
Left	18
U-Turn	0

In 61 Out 96

Westbound
SW Wickiup Ave
Heavy Vehicle 0.0%

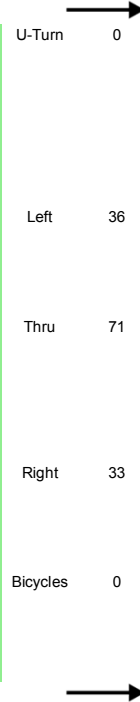
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
6	202	48	0	35	77	8	0	4	13	1	0	18	10	33	0	256	120	18	61	96	239	24	96
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	5.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0			
All Vehicle Volumes																							
Time	Northbound SW Helmholtz Way				Southbound SW Helmholtz Way				Eastbound SW Wickiup Ave				Westbound SW Wickiup Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0	3	2	0	5	4	0	0	0	0	0	0	2	0	5	0							
02:05:00 PM	0	9	0	0	1	10	0	0	0	0	0	0	2	2	2	0							
02:10:00 PM	0	4	0	0	0	4	0	0	1	3	0	0	2	1	2	0	64						
02:15:00 PM	0	7	0	0	1	5	1	0	1	1	0	0	1	1	4	0	65						
02:20:00 PM	0	9	3	0	2	6	0	0	2	1	0	0	0	3	3	0	68						
02:25:00 PM	0	8	2	0	2	6	0	0	0	0	0	0	0	1	3	0	73						
02:30:00 PM	0	5	0	0	4	6	0	0	0	0	0	0	2	2	0	0	70						
02:35:00 PM	0	12	2	0	1	7	0	0	0	1	0	0	2	1	3	0	70						
02:40:00 PM	0	6	2	0	3	8	1	0	1	0	0	0	2	1	5	0	77						
02:45:00 PM	0	6	4	0	2	3	0	0	1	1	0	0	3	3	2	0	83						
02:50:00 PM	0	8	2	0	0	1	0	0	0	1	0	0	2	2	1	0	71						
02:55:00 PM	1	9	2	0	1	10	0	0	0	0	0	0	0	2	3	0	70	284					
03:00:00 PM	0	6	2	0	3	5	1	0	0	1	0	0	0	0	3	0	66	284					
03:05:00 PM	2	14	4	0	1	6	0	0	0	1	0	0	1	0	3	0	81	290					
03:10:00 PM	0	8	4	0	2	5	3	0	1	2	0	0	0	2	4	0	84	304					
03:15:00 PM	0	5	1	0	4	6	1	0	0	1	0	0	3	0	2	0	86	305					
03:20:00 PM	1	13	2	0	3	9	0	0	0	2	0	0	1	1	1	0	87	309					
03:25:00 PM	0	9	1	0	5	3	0	0	0	0	0	0	0	2	2	0	78	309					
03:30:00 PM	0	12	2	0	2	7	1	0	0	0	0	0	3	0	4	0	86	321					
03:35:00 PM	0	6	2	0	4	6	3	0	0	0	0	0	2	0	3	0	79	318					
03:40:00 PM	0	7	5	0	4	4	2	0	0	1	0	0	3	0	5	0	88	320					
03:45:00 PM	0	8	5	0	3	7	1	0	1	0	1	0	1	0	1	0	85	323					
03:50:00 PM	0	9	4	0	5	10	0	0	1	0	0	0	0	1	2	0	91	338					
03:55:00 PM	0	14	1	0	3	11	0	0	0	0	0	0	4	0	1	0	94	344					
04:00:00 PM	0	11	1	0	3	6	2	0	0	0	1	0	1	1	4	0	96	353					
04:05:00 PM	0	19	4	0	3	6	1	0	0	2	0	0	1	0	2	0	102	359					
04:10:00 PM	0	12	4	0	2	7	1	0	1	1	0	0	2	0	2	0	100	360					
04:15:00 PM	0	15	5	0	2	5	2	0	2	2	0	0	0	3	1	0	107	374					
04:20:00 PM	2	17	3	0	4	9	3	0	1	2	0	0	2	1	4	0	117	389					
04:25:00 PM	0	14	7	0	3	9	0	0	3	2	0	0	1	1	2	0	127	409					
04:30:00 PM	1	15	4	0	6	7	2	0	2	1	0	0	2	0	3	0	133	421					
04:35:00 PM	0	15	4	0	4	5	0	0	1	1	1	0	2	0	1	0	119	429					
04:40:00 PM	1	14	4	0	0	5	1	0	1	1	1	0	1	1	2	0	109	430					
04:45:00 PM	0	5	5	0	2	9	0	0	0	3	0	0	2	1	3	0	96	432					
04:50:00 PM	1	19	6	0	1	3	1	0	1	0	0	0	2	3	0	0	99	437					
04:55:00 PM	0	10	0	0	1	6	2	0	0	1	0	0	2	2	1	0	92	428					
05:00:00 PM	0	20	1	0	3	6	2	0	0	2	0	0	1	1	2	0	100	436					
05:05:00 PM	3	11	5	0	3	9	2	0	1	2	0	0	1	1	2	0	103	438					
05:10:00 PM	0	15	2	0	3	5	0	0	0	0	0	0	1	0	3	0	107	435					
05:15:00 PM	1	17	2	0	1	9	0	0	0	1	1	0	1	2	5	0	109	438					
05:20:00 PM	0	22	2	0	3	9	0	0	2	1	0	0	1	0	4	0	113	434					
05:25:00 PM	0	12	5	0	1	6	1	0	1	1	0	0	1	2	1	0	115	423					
05:30:00 PM	0	19	9	0	3	2	0	0	0	1	0	0	1	0	1	0	111	416					
05:35:00 PM	0	25	6	0	4	7	0	0	0	0	0	0	1	0	2	0	112	427					
05:40:00 PM	2	15	4	0	1	5	0	0	0	1	0	0	1	2	4	0	116	430					
05:45:00 PM	0	15	3	0	4	7	1	0	0	2	0	0	2	0	3	0	117	437					
05:50:00 PM	0	15	5	0	2	2	1	0	0	2	0	0	4	1	2	0	106	434					
05:55:00 PM	0	16	4	0	7	10	1	0	0	0	0	0	3	1	4	0	117	455					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 27th St
E/W street	SW Wickiup Ave
City, State	Redmond OR
Site Notes	
Location	44.247488 - -121.199159
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	26
Peak Hour Start	05:00:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.92

Eastbound
SW Wickiup Ave
Heavy Vehicle 1.4%

In 140 Out 222



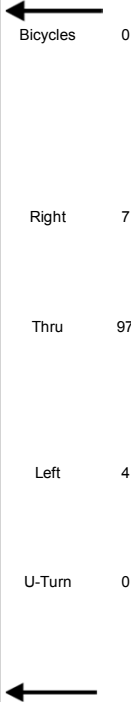
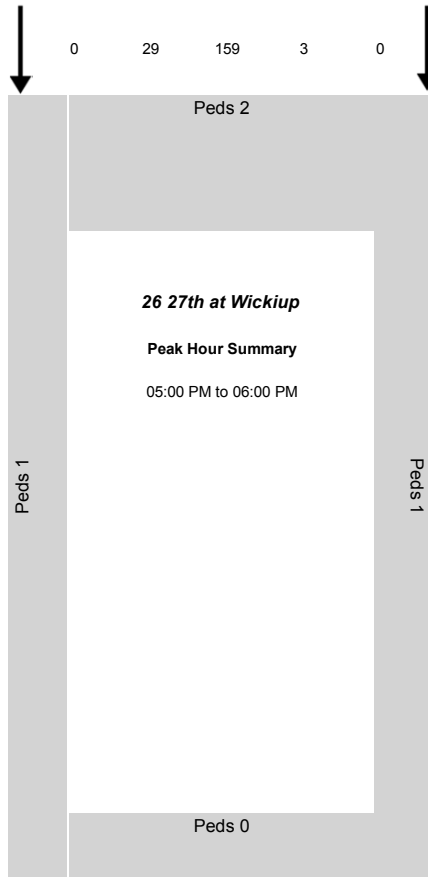
U-Turn	Left	Thru	Right	Bicycles
0	96	380	5	0

In	481	Out	196
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Heavy Vehicle 1.0%
SW 27th St
Northbound

In 191		Out 423		
Bicycles	Right	Thru	Left	U-Turn

0	29	159	3	0
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In 108 Out 79

Westbound
SW Wickiup Ave
Heavy Vehicle 0.0%

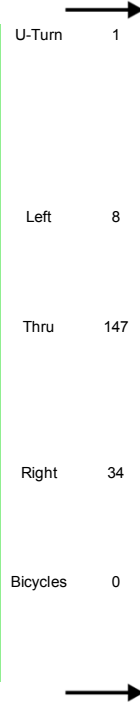
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
96	380	5	0	3	159	29	0	36	71	33	0	4	97	7	0	481	191	140	108	196	423	222	79
Percent Heavy Vehicles																							
2.1%	0.8%	0.0%	0.0%	0.0%	0.6%	3.4%	0.0%	2.8%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	1.0%	1.4%	0.0%	0.5%	0.9%	1.4%	1.3%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	4		
All Vehicle Volumes																							
Time	Northbound SW 27th St				Southbound SW 27th St				Eastbound SW Wickiup Ave				Westbound SW Wickiup Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	7	5	0	0	0	12	5	0	3	7	2	0	1	3	1	0							
02:05:00 PM	6	11	0	0	1	13	5	0	3	7	2	0	0	7	0	0							
02:10:00 PM	8	17	0	0	0	8	12	0	5	6	2	0	0	12	0	0	171						
02:15:00 PM	11	10	1	0	0	13	3	0	4	3	0	0	0	12	0	0	182						
02:20:00 PM	8	15	0	0	1	13	5	0	1	6	3	0	0	10	1	0	190						
02:25:00 PM	2	12	0	0	1	22	9	0	2	2	4	0	0	15	1	0	190						
02:30:00 PM	4	14	0	0	0	14	7	0	2	6	3	0	0	6	1	0	190						
02:35:00 PM	10	18	0	0	0	11	3	0	4	12	2	0	1	10	0	0	198						
02:40:00 PM	5	19	0	0	0	9	7	0	16	15	9	0	0	10	0	0	218						
02:45:00 PM	3	18	0	0	2	14	2	0	9	13	7	0	0	9	1	0	239						
02:50:00 PM	0	22	2	0	0	16	4	0	5	12	7	0	1	10	1	0	248						
02:55:00 PM	8	19	1	0	2	9	0	0	2	3	3	0	0	7	1	0	213	792					
03:00:00 PM	6	16	1	0	0	7	2	0	2	7	4	0	0	6	1	0	187	798					
03:05:00 PM	3	15	1	0	0	7	4	0	2	1	3	0	0	6	0	0	149	785					
03:10:00 PM	5	15	0	0	0	9	2	0	1	5	3	0	0	4	0	0	138	759					
03:15:00 PM	6	20	0	0	1	9	4	0	2	8	2	0	0	9	1	0	148	764					
03:20:00 PM	3	24	1	0	0	6	2	0	4	4	8	0	1	2	1	0	162	757					
03:25:00 PM	9	17	0	0	0	15	1	0	1	5	4	0	1	8	0	0	179	748					
03:30:00 PM	2	15	1	0	0	15	2	0	1	5	4	0	0	8	1	0	171	745					
03:35:00 PM	8	17	0	0	0	5	1	0	1	8	7	0	1	3	2	0	168	727					
03:40:00 PM	3	15	0	0	1	12	2	0	2	4	1	0	0	9	1	0	157	687					
03:45:00 PM	7	15	2	0	3	11	3	0	2	8	3	0	0	9	0	0	166	672					
03:50:00 PM	7	17	1	0	1	11	4	0	1	6	3	0	2	11	1	0	178	657					
03:55:00 PM	7	19	2	0	1	15	1	0	5	8	6	0	0	5	0	0	197	671					
04:00:00 PM	8	12	0	0	0	12	3	0	2	12	4	0	0	7	0	0	194	679					
04:05:00 PM	5	22	0	0	0	9	3	0	4	6	5	0	1	9	0	0	193	701					
04:10:00 PM	6	27	1	0	0	19	4	0	3	4	7	0	2	11	0	0	208	741					
04:15:00 PM	6	27	0	0	0	15	2	0	1	5	5	0	1	8	0	0	218	749					
04:20:00 PM	8	23	0	0	1	12	1	0	2	10	5	0	1	8	3	0	228	767					
04:25:00 PM	6	24	0	0	1	8	0	0	2	9	4	0	1	10	1	0	210	772					
04:30:00 PM	6	22	0	0	0	15	3	0	0	7	3	0	0	3	0	0	199	777					
04:35:00 PM	10	35	0	0	0	13	3	0	3	2	8	0	0	10	0	0	209	808					
04:40:00 PM	6	19	0	0	3	13	1	0	6	3	4	0	0	10	0	0	208	823					
04:45:00 PM	7	25	2	0	0	13	3	0	2	5	7	0	1	8	0	0	222	833					
04:50:00 PM	10	24	1	0	0	10	2	0	3	6	4	0	1	11	0	0	210	840					
04:55:00 PM	9	20	0	0	1	12	3	0	2	5	1	0	1	4	0	0	203	829					
05:00:00 PM	10	25	1	0	0	20	2	0	2	4	2	0	0	7	0	0	203	842					
05:05:00 PM	4	40	2	0	0	18	0	0	3	6	1	0	0	9	0	0	214	861					
05:10:00 PM	7	45	0	0	0	15	4	0	2	6	3	0	1	6	0	0	245	866					
05:15:00 PM	8	35	0	0	0	18	1	0	2	5	2	0	0	6	0	0	249	873					
05:20:00 PM	4	34	1	0	0	9	4	0	5	5	2	0	1	13	2	0	246	879					
05:25:00 PM	9	24	0	0	1	18	3	0	0	4	3	0	0	8	0	0	227	883					
05:30:00 PM	7	33	0	0	1	10	0	0	3	5	5	0	0	12	0	0	226	900					
05:35:00 PM	7	32	0	0	0	8	2	0	1	6	2	0	0	15	0	0	219	889					
05:40:00 PM	7	26	0	0	0	9	3	0	3	6	5	0	0	3	2	0	213	888					
05:45:00 PM	3	29	0	0	1	14	5	0	4	8	2	0	1	3	0	0	207	885					
05:50:00 PM	14	19	1	0	0	10	3	0	6	8	5	0	1	7	1	0	209	888					
05:55:00 PM	16	38	0	0	0	10	2	0	5	8	1	0	0	8	2	0	235	920					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW Canal Blvd
E/W street	SW 27th St
City, State	Redmond OR
Site Notes	
Location	44.244219 - -121.199063
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	
Peak Hour Start	05:00:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.86

Eastbound
SW 27th St
Heavy Vehicle 0.0%

In 190
Out 491



Southbound SW Canal Blvd Heavy Vehicle 0.4%				
In	228	Out	271	
Bicycles		Right	Thru	Left
				U-Turn

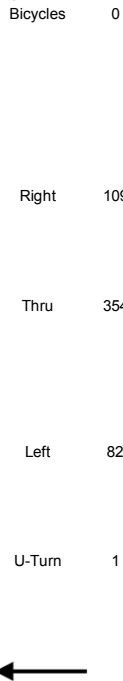
0	36	126	65	1
---	----	-----	----	---

Peds 1

SW Yew Ave at SW Canal Blvd

Peak Hour Summary

05:00 PM to 06:00 PM



In 546
Out 305

Westbound
SW Yew Ave
Heavy Vehicle 0.4%

U-Turn	Left	Thru	Right	Bicycles
0	100	153	92	0

In	345	Out	242
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Heavy Vehicle 2.9%
SW Canal Blvd
Northbound

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
100	153	92	0	65	126	36	1	8	147	34	1	82	354	109	1	345	228	190	546	242	271	491	305
Percent Heavy Vehicles																							
5.0%	1.3%	3.3%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	2.9%	0.4%	0.0%	0.4%	0.4%	0.7%	1.4%	1.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	1	0	0	0		
All Vehicle Volumes																							
Time	Northbound SW Canal Blvd				Southbound SW Canal Blvd				Eastbound SW 27th St				Westbound SW Yew Ave				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	2	14	6	0	2	11	2	0	0	7	7	0	5	9	6	0							
02:05:00 PM	3	12	5	0	6	12	2	0	0	11	5	0	3	14	8	0							
02:10:00 PM	2	13	9	0	2	12	2	1	2	10	1	0	5	22	3	0	236						
02:15:00 PM	3	9	8	1	2	8	1	0	0	9	7	0	7	17	4	0	241						
02:20:00 PM	5	8	0	0	1	6	0	0	0	10	5	1	8	19	2	0	225						
02:25:00 PM	2	9	5	2	3	6	0	0	3	13	4	0	2	12	7	0	209						
02:30:00 PM	5	11	4	0	5	10	0	0	0	14	10	0	6	15	8	0	221						
02:35:00 PM	3	8	4	0	4	15	1	0	1	10	1	0	0	24	8	0	235						
02:40:00 PM	4	6	7	0	3	9	0	0	0	14	2	0	5	17	6	0	240						
02:45:00 PM	6	16	5	0	5	11	1	0	1	17	5	0	6	21	11	0	257						
02:50:00 PM	1	5	11	0	5	9	0	0	0	21	2	0	9	24	5	0	270						
02:55:00 PM	4	13	7	0	5	7	0	1	1	10	3	0	2	25	3	1	279	964					
03:00:00 PM	2	9	8	0	7	9	0	0	1	10	0	0	4	17	1	0	242	961					
03:05:00 PM	2	13	8	0	6	7	2	0	0	9	4	0	9	16	9	0	235	965					
03:10:00 PM	1	10	8	1	3	11	1	0	0	9	2	0	7	16	8	0	230	958					
03:15:00 PM	4	19	8	0	10	10	1	0	0	10	1	0	5	23	11	0	264	984					
03:20:00 PM	4	5	3	1	3	10	0	0	2	13	2	0	9	22	8	1	262	1002					
03:25:00 PM	2	12	6	0	7	6	0	0	0	15	3	0	6	24	5	0	271	1020					
03:30:00 PM	2	9	1	0	5	13	0	0	0	16	3	0	1	20	6	0	245	1008					
03:35:00 PM	3	10	4	0	3	11	0	0	0	13	3	0	8	23	9	0	249	1016					
03:40:00 PM	2	6	7	0	3	16	1	0	1	7	4	0	7	13	8	0	238	1018					
03:45:00 PM	2	12	4	0	3	11	1	0	1	12	2	0	4	23	4	0	241	992					
03:50:00 PM	1	12	5	0	7	20	2	0	2	9	1	0	12	19	13	0	257	1003					
03:55:00 PM	5	8	5	0	6	22	0	0	3	10	6	0	12	21	5	1	286	1025					
04:00:00 PM	3	13	4	0	6	12	1	0	2	8	9	0	10	16	10	0	301	1051					
04:05:00 PM	4	19	5	0	8	7	2	0	1	9	10	0	8	21	16	0	308	1076					
04:10:00 PM	4	13	4	0	3	10	1	0	1	12	12	0	13	25	11	0	313	1108					
04:15:00 PM	9	12	6	0	7	12	5	0	1	12	5	0	12	20	9	0	329	1116					
04:20:00 PM	7	20	8	0	5	13	2	0	1	11	6	0	11	21	11	0	335	1149					
04:25:00 PM	5	13	9	0	7	9	3	0	1	10	6	0	8	30	7	0	334	1171					
04:30:00 PM	3	13	11	0	3	10	5	0	1	14	5	0	7	23	11	0	330	1201					
04:35:00 PM	3	14	5	0	2	18	3	0	1	14	8	0	7	32	13	0	334	1234					
04:40:00 PM	7	13	2	0	4	18	2	0	0	13	7	0	9	17	6	0	324	1257					
04:45:00 PM	3	18	4	0	2	15	3	1	0	20	8	0	9	28	10	0	339	1299					
04:50:00 PM	2	10	4	0	4	17	9	0	1	8	4	0	8	30	13	0	329	1306					
04:55:00 PM	0	0	0	0	6	2	3	0	0	0	0	0	0	0	0	0	242	1213					
05:00:00 PM	6	13	10	0	2	12	2	0	1	15	1	0	7	31	11	0	232	1230					
05:05:00 PM	8	11	7	0	3	13	4	0	1	16	2	0	9	34	17	0	247	1245					
05:10:00 PM	9	12	13	0	7	6	0	0	0	15	3	0	7	43	13	0	364	1264					
05:15:00 PM	8	13	10	0	7	12	5	0	0	23	2	1	3	37	5	0	379	1280					
05:20:00 PM	8	13	13	0	3	19	3	0	1	6	4	0	9	25	8	0	366	1276					
05:25:00 PM	7	11	7	0	8	8	3	0	0	11	3	0	12	26	9	0	343	1273					
05:30:00 PM	12	11	3	0	6	9	2	0	0	16	3	0	9	27	7	0	322	1272					
05:35:00 PM	5	13	10	0	9	5	2	0	0	8	3	0	4	27	10	0	306	1248					
05:40:00 PM	6	12	4	0	5	13	1	1	4	7	1	0	2	27	8	0	292	1241					
05:45:00 PM	9	15	6	0	8	5	3	0	0	8	5	0	6	28	3	0	283	1216					
05:50:00 PM	8	14	4	0	3	11	3	0	0	14	3	0	7	26	8	0	288	1207					
05:55:00 PM	14	15	5	0	4	13	8	0	1	8	4	0	7	23	10	1	310	1309					



Data Provided by K-D-N.com 503-594-4224	
N/S street	US-97 SB Ramps
E/W street	SW Yew Ave
City, State	Redmond OR
Site Notes	
Location	44.242809 - -121.193704
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	2
Peak Hour Start	03:55:00 PM
Peak 15 Min Start	04:00:00 PM
PHF (15-Min Int)	0.84

Eastbound
SW Yew Ave
Heavy Vehicle 3.3%

In 306 Out 571

U-Turn 0
Left 0
Thru 154
Right 152
Bicycles 0

Southbound
US-97 SB Ramps
Heavy Vehicle 3.0%

In 231 Out 0

Bicycles Right Thru Left U-Turn

0 141 0 90 0

Peds 0

2 US97 SB Ramps at Airport Way

Peak Hour Summary

03:55 PM to 04:55 PM

Bicycles 1
Right 0
Thru 430
Left 378
U-Turn 0

In 808 Out 244

Westbound
SW Yew Ave
Heavy Vehicle 3.0%

U-Turn Left Thru Right Bicycles

0 0 0 0 0

In 0 Out 530

Heavy Vehicle NaN
US-97 SB Ramps
Northbound

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	90	0	141	0	0	154	152	0	378	430	0	0	0	231	306	808	530	0	571	244
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	2.2%	0.0%	3.5%	0.0%	0.0%	5.8%	0.7%	0.0%	4.5%	1.6%	0.0%	0.0%	#DIV/0!	3.0%	3.3%	3.0%	3.4%	0.0%	2.1%	4.5%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	2		
All Vehicle Volumes																							
Time	Northbound US-97 SB Ramps				Southbound US-97 SB Ramps				Eastbound SW Yew Ave				Westbound SW Yew Ave				15 Min 1 HR						
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	0	0	0	0	12	0	6	0	0	10	6	0	13	10	0	0							
02:05:00 PM	0	0	0	0	13	0	11	0	0	11	13	0	16	21	0	0							
02:10:00 PM	0	0	0	0	8	0	6	0	0	10	13	0	17	31	0	0	227						
02:15:00 PM	0	0	0	0	16	0	14	0	0	9	12	0	7	15	0	0	243						
02:20:00 PM	0	0	0	0	7	0	7	0	0	9	8	0	17	21	0	0	227						
02:25:00 PM	0	0	0	0	5	0	9	0	0	13	12	0	16	20	0	0	217						
02:30:00 PM	0	0	0	0	12	0	7	0	0	19	12	0	18	19	0	0	231						
02:35:00 PM	0	0	0	0	6	0	3	0	0	9	10	0	10	35	0	0	235						
02:40:00 PM	0	0	0	0	9	0	3	0	0	17	11	0	31	29	0	0	260						
02:45:00 PM	0	0	0	0	7	0	10	0	0	13	14	0	22	29	0	0	268						
02:50:00 PM	0	0	0	0	5	0	9	0	0	25	12	0	28	23	0	0	297						
02:55:00 PM	0	0	0	0	11	0	15	0	0	18	6	0	29	24	0	0	300	1004					
03:00:00 PM	0	0	0	0	7	0	11	0	0	17	9	0	23	16	0	0	288	1030					
03:05:00 PM	0	0	1	0	15	0	9	0	0	15	7	0	17	24	0	0	274	1033					
03:10:00 PM	0	0	0	0	12	0	11	0	0	13	12	0	16	27	0	0	262	1039					
03:15:00 PM	0	0	0	0	7	0	9	0	0	16	12	0	19	40	0	0	282	1069					
03:20:00 PM	0	0	0	0	2	0	7	0	0	8	14	0	20	29	0	0	274	1080					
03:25:00 PM	0	0	0	0	2	0	9	0	0	18	11	0	17	24	0	0	264	1086					
03:30:00 PM	0	0	0	0	10	0	2	0	0	15	12	0	20	27	0	0	247	1085					
03:35:00 PM	0	0	0	0	4	0	13	0	0	11	11	0	32	33	0	0	271	1116					
03:40:00 PM	0	0	0	0	5	0	8	0	0	14	6	0	26	19	0	0	268	1094					
03:45:00 PM	0	0	0	0	6	0	8	0	0	13	7	0	21	25	0	0	262	1079					
03:50:00 PM	0	0	0	0	2	0	12	0	0	15	14	0	26	33	0	0	260	1079					
03:55:00 PM	0	0	0	0	6	0	15	0	0	8	13	0	48	30	0	0	302	1096					
04:00:00 PM	0	0	0	0	6	0	11	0	0	15	13	0	47	32	0	0	346	1137					
04:05:00 PM	0	0	0	0	7	0	16	0	0	13	13	0	53	37	0	0	383	1188					
04:10:00 PM	0	0	0	0	8	0	12	0	0	11	16	0	51	40	0	0	401	1235					
04:15:00 PM	0	0	0	0	8	0	8	0	0	13	14	0	22	39	0	0	381	1236					
04:20:00 PM	0	0	0	0	9	0	14	0	0	18	14	0	12	34	0	0	343	1257					
04:25:00 PM	0	0	0	0	11	0	8	0	0	14	12	0	19	29	0	0	298	1269					
04:30:00 PM	0	0	0	0	9	0	7	0	0	17	10	0	28	43	0	0	308	1297					
04:35:00 PM	0	0	0	0	8	0	13	0	0	9	15	0	23	39	0	0	314	1300					
04:40:00 PM	0	0	0	0	6	0	11	0	0	8	12	0	25	31	0	0	314	1315					
04:45:00 PM	0	0	0	0	7	0	15	0	0	16	15	0	14	38	0	0	305	1340					
04:50:00 PM	0	0	0	0	5	0	11	0	0	12	5	0	36	38	0	0	305	1345					
04:55:00 PM	0	0	0	0	6	0	9	0	0	14	12	0	17	42	0	0	312	1325					
05:00:00 PM	0	0	0	0	7	0	10	0	0	13	13	1	23	40	0	0	314	1308					
05:05:00 PM	0	0	0	0	4	0	12	0	0	14	14	0	28	51	0	0	330	1292					
05:10:00 PM	0	0	0	0	10	0	14	0	0	16	14	0	19	59	0	0	362	1286					
05:15:00 PM	0	0	0	0	7	0	9	0	0	17	20	0	12	41	0	0	361	1288					
05:20:00 PM	0	0	0	0	8	0	12	0	0	15	11	0	10	35	0	0	329	1278					
05:25:00 PM	0	0	0	0	3	0	14	0	0	8	17	0	14	45	0	0	298	1286					
05:30:00 PM	0	0	0	0	7	0	13	0	0	13	13	0	20	32	0	0	290	1270					
05:35:00 PM	0	0	0	0	3	0	4	0	0	15	11	0	12	43	0	0	287	1251					
05:40:00 PM	0	0	0	0	7	0	5	0	0	11	6	0	10	32	0	0	257	1229					
05:45:00 PM	0	0	0	0	4	0	14	0	0	11	12	0	17	32	0	0	249	1214					
05:50:00 PM	0	0	0	0	5	0	11	0	0	14	10	0	19	40	0	0	260	1206					
05:55:00 PM	0	0	0	0	2	0	9	0	0	13	10	0	17	35	0	0	275	1192					



Data Provided by K-D-N.com 503-594-4224	
N/S street	US-97 NB Ramps
E/W street	SE Airport Way
City, State	Redmond OR
Site Notes	
Location	44.241845 - -121.192247
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	1
Peak Hour Start	03:55:00 PM
Peak 15 Min Start	04:00:00 PM
PHF (15-Min Int)	0.83

Eastbound
SE Airport Way
Heavy Vehicle 5.7%

In 244 Out 804

U-Turn 0
Left 86
Thru 157
Right 1
Bicycles 0

Peds 0

U-Turn 0
Left 266
Thru 2
Right 143
Bicycles 0

In 411 Out 2

Heavy Vehicle 3.2%
US-97 NB Ramps
Northbound

In 1 Out 218
Bicycles Right Thru Left U-Turn

0 0 0 1 0

Peds 0

1 US 97 NB Ramps at Airport Way

Peak Hour Summary

03:55 PM to 04:55 PM

Bicycles 1
Right 130
Thru 538
Left 1
U-Turn 0

Peds 0

In 669 Out 301

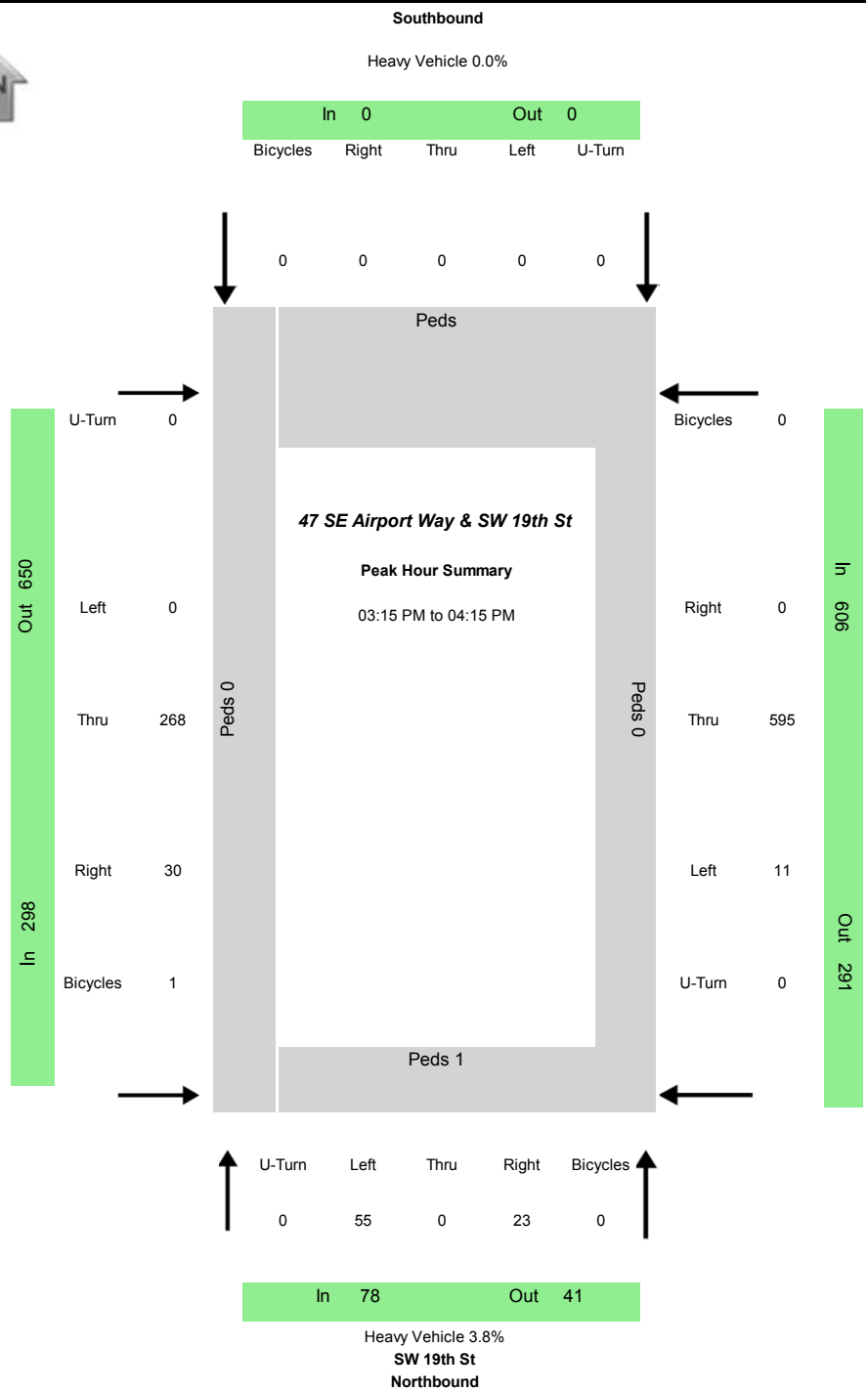
Westbound
SE Airport Way
Heavy Vehicle 3.9%

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
266	2	143	0	1	0	0	0	86	157	1	0	1	538	130	0	411	1	244	669	2	218	804	301
Percent Heavy Vehicles																							
1.5%	0.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	4.7%	6.4%	0.0%	0.0%	0.0%	4.1%	3.1%	0.0%	3.2%	0.0%	5.7%	3.9%	0.0%	3.7%	3.2%	6.3%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound					in Crosswalk						
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4	0	0	0	4		
All Vehicle Volumes																							
Time	Northbound US-97 NB Ramps				Southbound US-97 NB Ramps				Eastbound SE Airport Way				Westbound SE Airport Way				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	8	0	26	0	0	0	0	0	8	9	0	0	0	20	7	0							
02:05:00 PM	8	0	32	0	0	0	0	0	9	19	0	0	0	27	10	0							
02:10:00 PM	15	0	17	0	0	0	0	0	4	14	0	0	0	30	11	0	274						
02:15:00 PM	7	0	20	0	0	0	0	0	7	20	0	0	0	14	7	0	271						
02:20:00 PM	13	0	22	0	0	0	0	0	3	11	0	0	0	23	10	0	248						
02:25:00 PM	14	0	19	0	0	0	0	0	6	13	0	0	0	25	12	0	246						
02:30:00 PM	11	0	16	0	0	0	0	0	14	18	0	0	0	23	11	0	264						
02:35:00 PM	17	0	25	0	0	0	0	0	10	10	0	0	0	29	11	0	284						
02:40:00 PM	14	0	17	0	0	0	0	0	7	14	0	0	0	46	12	0	305						
02:45:00 PM	17	0	19	0	0	0	0	0	8	14	0	0	0	34	8	0	312						
02:50:00 PM	15	0	15	0	0	0	0	0	9	22	0	0	0	35	8	0	314						
02:55:00 PM	20	0	19	0	0	0	0	0	9	22	0	0	0	33	8	0	315	1140					
03:00:00 PM	13	0	18	0	0	0	0	0	3	19	0	0	0	26	8	0	302	1149					
03:05:00 PM	14	0	24	0	0	0	0	0	11	17	0	0	0	24	10	0	298	1144					
03:10:00 PM	17	0	11	0	0	0	0	0	10	16	0	0	0	28	16	1	286	1152					
03:15:00 PM	27	0	20	0	0	0	0	0	8	14	0	0	0	33	10	0	311	1189					
03:20:00 PM	14	0	14	0	0	0	0	0	4	10	0	0	0	33	10	0	296	1192					
03:25:00 PM	16	0	18	0	0	0	0	0	6	13	0	0	0	24	15	0	289	1195					
03:30:00 PM	15	0	19	0	0	0	0	0	6	15	0	0	0	37	14	0	283	1208					
03:35:00 PM	17	0	14	0	0	0	0	0	6	12	0	0	0	41	8	0	296	1204					
03:40:00 PM	11	0	7	0	0	0	0	0	7	12	0	0	0	33	9	0	283	1173					
03:45:00 PM	20	0	17	0	0	0	0	0	6	15	0	0	0	27	5	0	267	1163					
03:50:00 PM	24	0	11	0	0	0	0	0	5	12	0	0	0	38	11	0	270	1160					
03:55:00 PM	17	0	16	0	0	0	0	0	4	10	0	0	0	63	8	0	309	1167					
04:00:00 PM	16	0	7	0	0	0	0	0	8	12	0	0	0	68	13	0	343	1204					
04:05:00 PM	24	1	11	0	1	0	0	0	7	13	1	0	1	63	24	0	388	1250					
04:10:00 PM	14	0	8	0	0	0	0	0	8	11	0	0	0	71	16	0	398	1279					
04:15:00 PM	28	0	9	0	0	0	0	0	7	16	0	0	0	31	7	0	372	1265					
04:20:00 PM	29	0	17	0	0	0	0	0	12	11	0	0	0	21	13	0	329	1283					
04:25:00 PM	26	0	20	0	0	0	0	0	7	17	0	0	0	26	6	0	303	1293					
04:30:00 PM	24	0	9	0	0	0	0	0	11	15	0	0	0	41	7	0	312	1294					
04:35:00 PM	17	0	15	0	0	0	0	0	6	13	0	0	0	42	12	0	314	1301					
04:40:00 PM	20	1	6	0	0	0	0	0	4	13	0	0	0	38	8	0	302	1312					
04:45:00 PM	24	0	11	0	0	0	0	0	6	13	0	0	0	30	9	0	288	1315					
04:50:00 PM	27	0	14	0	0	0	0	0	6	13	0	0	0	44	7	0	294	1325					
04:55:00 PM	23	0	12	0	0	0	0	0	5	15	0	0	0	36	11	0	306	1309					
05:00:00 PM	27	0	15	0	0	0	0	0	2	16	0	0	0	40	10	0	323	1295					
05:05:00 PM	26	0	16	0	0	0	0	0	11	8	0	0	0	48	11	0	332	1269					
05:10:00 PM	36	0	20	0	0	0	0	0	7	21	0	0	0	42	13	0	369	1280					
05:15:00 PM	30	0	19	0	0	0	0	0	6	17	0	0	0	25	7	0	363	1286					
05:20:00 PM	24	0	12	0	0	0	0	0	12	12	0	0	0	16	12	0	331	1271					
05:25:00 PM	38	0	10	0	0	0	0	0	3	8	0	0	0	24	6	0	281	1258					
05:30:00 PM	18	0	14	0	0	0	0	0	4	16	0	0	0	32	6	0	267	1241					
05:35:00 PM	33	0	22	0	0	0	0	0	8	10	0	0	0	23	5	0	280	1237					
05:40:00 PM	21	0	15	0	0	0	0	0	4	13	0	0	0	19	10	0	273	1229					
05:45:00 PM	28	0	17	0	0	0	0	0	4	12	0	0	0	24	8	0	276	1229					
05:50:00 PM	30	0	7	0	0	0	0	0	6	10	0	0	0	32	5	0	265	1208					
05:55:00 PM	14	0	7	0	0	0	0	0	1	3	0	0	0	14	4	0	226	1149					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW 19th St
E/W street	SE Airport Way
City, State	Redmond OR
Site Notes	
Location	44.240122 - -121.189137
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	47
Peak Hour Start	03:15:00 PM
Peak 15 Min Start	03:55:00 PM
PHF (15-Min Int)	0.75

Eastbound
SE Airport Way
Heavy Vehicle 5.7%



Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
55	0	23	0	0	0	0	0	0	268	30	0	11	595	0	0	78	0	298	606	41	0	650	291
Percent Heavy Vehicles																							
3.6%	0.0%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.3%	0.0%	0.0%	27.3%	3.5%	0.0%	0.0%	3.8%	0.0%	5.7%	4.0%	7.3%	0.0%	3.5%	6.2%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				Sum	in Crosswalk					Sum	
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		NB	SB	EB	WB			
0		0	0					1	0	0		0	0		0	1	1		0	0		1	
All Vehicle Volumes																							
Time	Northbound SW 19th St				Southbound				Eastbound SE Airport Way				Westbound SE Airport Way				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	4		1	0					33	5	0		1	19		0							
02:05:00 PM	4		0	0					43	5	0		0	32		0							
02:10:00 PM	10		0	0					23	5	0		1	35		0	221						
02:15:00 PM	4		6	0					32	7	0		2	12		0	221						
02:20:00 PM	4		1	0					32	4	0		0	26		0	204						
02:25:00 PM	9		0	0					22	4	0		1	25		0	191						
02:30:00 PM	5		0	0					30	4	0		0	21		0	188						
02:35:00 PM	4		1	0					29	5	0		1	29		0	190						
02:40:00 PM	2		2	0					20	2	0		0	44		0	199						
02:45:00 PM	6		1	0					37	1	0		1	33		0	218						
02:50:00 PM	5		2	0					31	1	0		0	29		0	217						
02:55:00 PM	6		2	0					33	3	0		2	36		0	229	840					
03:00:00 PM	5		1	0					32	5	0		1	26		0	220	847					
03:05:00 PM	3		1	0					26	4	0		0	26		0	212	823					
03:10:00 PM	5		1	0					23	3	0		3	30		0	195	814					
03:15:00 PM	8		0	0					28	3	0		0	35		0	199	825					
03:20:00 PM	4		0	0					18	1	0		1	35		0	198	817					
03:25:00 PM	2		3	0					30	0	0		1	34		0	203	826					
03:30:00 PM	2		1	0					29	5	0		1	40		0	207	844					
03:35:00 PM	4		1	0					24	2	0		1	51		0	231	858					
03:40:00 PM	2		0	0					16	5	0		2	33		0	219	846					
03:45:00 PM	2		2	0					19	4	0		0	31		0	199	825					
03:50:00 PM	8		1	0					27	1	0		0	35		0	188	829					
03:55:00 PM	4		5	0					24	2	0		2	69		0	236	853					
04:00:00 PM	7		2	0					19	3	0		2	81		0	292	897					
04:05:00 PM	4		7	0					20	2	0		1	75		0	329	946					
04:10:00 PM	8		1	0					14	2	0		0	76		0	324	982					
04:15:00 PM	2		1	0					17	1	0		3	29		0	263	961					
04:20:00 PM	1		1	0					22	2	0		0	29		0	209	957					
04:25:00 PM	2		0	0					27	3	0		3	26		0	169	948					
04:30:00 PM	5		0	0					19	2	1		2	31		0	176	930					
04:35:00 PM	6		1	0					27	1	0		0	32		0	188	914					
04:40:00 PM	2		0	0					11	1	0		0	36		0	177	906					
04:45:00 PM	3		1	0					14	4	0		0	30		0	169	900					
04:50:00 PM	3		3	0					22	5	0		0	42		0	177	903					
04:55:00 PM	0		2	0					15	5	0		1	40		0	190	860					
05:00:00 PM	3		0	0					22	1	0		1	36		0	201	809					
05:05:00 PM	5		2	0					15	3	0		0	41		0	192	766					
05:10:00 PM	8		0	0					29	2	1		0	40		0	209	745					
05:15:00 PM	2		1	0					31	1	0		1	28		0	210	756					
05:20:00 PM	8		0	0					25	0	0		0	18		0	195	752					
05:25:00 PM	3		2	0					17	0	0		0	21		0	158	734					
05:30:00 PM	3		0	0					18	5	0		0	26		0	146	726					
05:35:00 PM	5		2	0					22	2	0		0	19		0	145	709					
05:40:00 PM	7		0	0					18	1	0		2	17		0	147	704					
05:45:00 PM	6		0	0					19	1	0		0	20		0	141	698					
05:50:00 PM	2		0	0					13	0	0		1	27		0	134	666					
05:55:00 PM	5		0	0					19	1	0		0	21		0	135	649					



Data Provided by K-D-N.com 503-594-4224	
N/S street	SW Canal Blvd
E/W street	SW Helmholtz Way
City, State	Redmond OR
Site Notes	
Location	44.221881 - -121.228094
Start Date	Wednesday, April 19, 2017
Start Time	02:00:00 PM
Weather	
Study ID #	22
Peak Hour Start	04:50:00 PM
Peak 15 Min Start	05:15:00 PM
PHF (15-Min Int)	0.87

Eastbound
SW Helmholtz Way
Heavy Vehicle 3.5%

In 85 Out 259

U-Turn	0
Left	7
Thru	0
Right	78
Bicycles	0

Southbound SW Canal Blvd Heavy Vehicle 0.7%				
In	137	Out	266	
Bicycles		Right	Thru	Left U-Turn

0	3	134	0	0
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Peds 0

U-Turn	0
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Peds 0

22 Canal at Helmholtz

Peak Hour Summary

04:50 PM to 05:50 PM

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Peds 0

Bicycles	0
Right	0
Thru	0
Left	0
U-Turn	0

In 0 Out 0

U-Turn	0
Left	256
Thru	257
Right	0
Bicycles	2

In	513	Out	212
----	-----	-----	-----

Heavy Vehicle 0.8%
SW Canal Blvd
Northbound

Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
256	257	0	0	0	134	3	0	7	0	78	0	0	0	0	0	513	137	85	0	212	264	259	0
Percent Heavy Vehicles																							
0.8%	0.8%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	3.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.7%	3.5%	0.0%	1.9%	0.8%	0.8%	0.0%
PHV- Bicycles																PHV - Pedestrians							
Northbound				Southbound				Eastbound				Westbound				in Crosswalk							
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum		
0	2		0		0	0	0	0		0		0				2	0	0	0		0		
All Vehicle Volumes																							
Time	Northbound SW Canal Blvd				Southbound SW Canal Blvd				Eastbound SW Helmholtz Way				Westbound				15 Min	1 HR					
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum					
02:00:00 PM	3	12		0		10	0	1	0		3	0											
02:05:00 PM	3	13		0		15	0	0	0		6	0											
02:10:00 PM	4	8		0		12	0	0	1		7	0						98					
02:15:00 PM	9	7		0		10	0	0	0		5	0						100					
02:20:00 PM	9	14		0		9	0	0	0		6	0						101					
02:25:00 PM	7	21		0		11	0	0	1		4	0						113					
02:30:00 PM	5	7		0		9	0	0	1		4	0						108					
02:35:00 PM	13	10		0		9	0	0	0		9	0						111					
02:40:00 PM	2	10		0		9	0	0	0		6	0						94					
02:45:00 PM	6	8		0		20	1	0	1		5	0						109					
02:50:00 PM	13	19		0		8	0	1	0		5	0						114					
02:55:00 PM	8	13		0		10	1	0	1		2	0						122	427				
03:00:00 PM	7	14		0		11	1	0	0		7	0						121	438				
03:05:00 PM	11	12		0		8	0	0	0		9	0						115	441				
03:10:00 PM	4	8		0		12	0	0	5		4	0						113	442				
03:15:00 PM	9	10		0		10	0	0	0		9	0						111	449				
03:20:00 PM	9	13		0		12	1	0	0		10	0						116	456				
03:25:00 PM	7	12		0		18	1	0	0		6	0						127	456				
03:30:00 PM	10	14		0		10	0	0	0		7	0						130	471				
03:35:00 PM	16	13		0		6	0	0	1		7	0						128	473				
03:40:00 PM	7	8		0		14	1	0	1		8	0						123	485				
03:45:00 PM	13	20		0		9	0	0	1		7	0						132	494				
03:50:00 PM	15	18		0		16	2	0	0		4	0						144	503				
03:55:00 PM	11	12		0		16	0	0	0		10	0						154	517				
04:00:00 PM	14	19		0		10	1	0	0		3	0						151	524				
04:05:00 PM	14	26		0		14	0	0	1		2	0						153	541				
04:10:00 PM	16	23		0		12	0	0	0		3	0						158	562				
04:15:00 PM	21	25		0		14	1	0	0		5	0						177	590				
04:20:00 PM	19	27		0		10	0	0	0		7	0						183	608				
04:25:00 PM	17	30		0		9	1	0	0		7	0						193	628				
04:30:00 PM	14	23		0		12	0	0	0		4	0						180	640				
04:35:00 PM	20	15		0		15	1	0	0		8	0						176	656				
04:40:00 PM	15	24		0		9	1	0	0		4	0						165	670				
04:45:00 PM	14	12		0		16	0	0	0		5	0						159	667				
04:50:00 PM	17	25		0		14	1	0	2		8	0						167	679				
04:55:00 PM	15	21		0		7	0	0	0		5	0						162	678				
05:00:00 PM	20	17		0		10	0	0	0		5	0						167	683				
05:05:00 PM	15	19		0		11	0	0	0		7	0						152	678				
05:10:00 PM	16	22		0		10	0	0	0		6	0						158	678				
05:15:00 PM	23	30		0		16	0	0	1		3	0						179	685				
05:20:00 PM	31	26		0		14	1	0	0		7	0						206	701				
05:25:00 PM	23	19		0		10	0	0	1		6	0						211	696				
05:30:00 PM	24	21		0		10	1	0	2		6	0						202	707				
05:35:00 PM	26	24		0		10	0	0	0		8	0						191	716				
05:40:00 PM	24	15		0		10	0	0	0		7	0						188	719				
05:45:00 PM	22	18		0		12	0	0	1		10	0						187	735				
05:50:00 PM	14	27		0		14	1	0	1		6	0						182	731				
05:55:00 PM	13	11		0		14	1	0	0		5	0						170	727				

Appendix E – Signal Timing Worksheets

NW Canal Blvd/ US 97 NB Ramps
NW Canal Blvd/ US 97 SB Ramps
NW Maple Ave/ NW 6th St
W Antler Ave/ SW 27th St
W Antler Ave/ SW Rimrock Way
SW Evergreen Ave/ SW 6th St
SW Evergreen Ave/ SW 5th St
SW Evergreen Ave/ US 97
OR 126 (SW Glacier Ave)/ SW 11th St
OR 126 (SW Glacier Ave)/ SW 9th St
OR 126 (SW Glacier Ave)/ SW 6th St
OR 126 (SW Glacier Ave)/ SW 5th St
OR 126 (SW Glacier/Highland Ave)/ US 97
OR 126 (SW Highland Ave)/ SW 27th St
OR 126 (SW Highland Ave)/ SW Rimrock Way
OR 126 (SW Highland Ave)/ SW 15th St
OR 126 (SW Highland Ave)/ SW 11th St
OR 126 (SW Highland Ave)/ SW 9th St
OR 126 (SW Highland Ave)/ SW 6th St
OR 126 (SW Highland Ave)/ SW 5th St
SW Veterans Way/ SW Canal Blvd
SW Veterans Way/ US 97
SW Odem Medo Way/ SW Canal Blvd
SW Odem Medo Way/ US 97

NW Canal Blvd/ US 97 NB Ramps

The screenshot displays the SCATS software interface for traffic signal control. The main window shows the 'Split Plan' for '10093 - Split Plan'. It includes a table for 'Active plan' with columns for 'Stretch', 'Split', 'Features', and 'Next stage'. The 'Split' column shows a 60% split for stretch A and a 40% split for stretch B. The 'Features' column shows various signal features like AS, FG, FS, NS, NG, PD, TG, and C. The 'Next stage' column shows the sequence of stages (A, B, C).

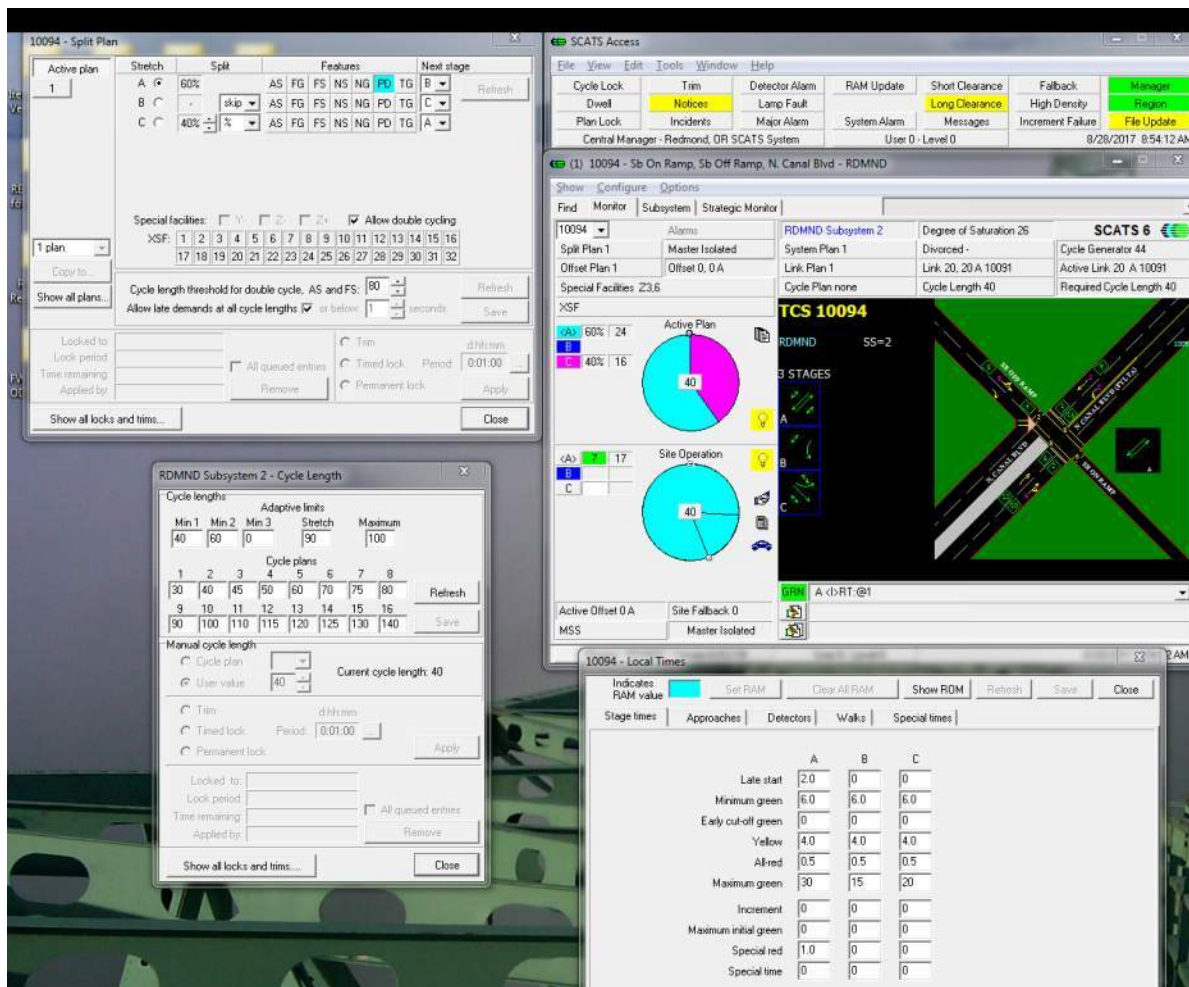
Below the table, there are options for 'Special facilities' and 'Cycle length threshold for double cycle, AS and FS'. The 'Cycle length threshold' is set to 80 seconds. The 'Allow late demands at all cycle lengths' checkbox is checked.

The 'SCATS Access' window shows the 'SCATS 6' interface with a 'Find' tab. It displays the 'RDMND Subsystem 1' and 'SCATS 6' status. The 'Find' tab shows the 'Active Plan' and 'Site Operation' with a '40' value. The 'Local Times' window shows the 'Stage times' for 'Approaches', 'Detectors', 'Walks', and 'Special times'.

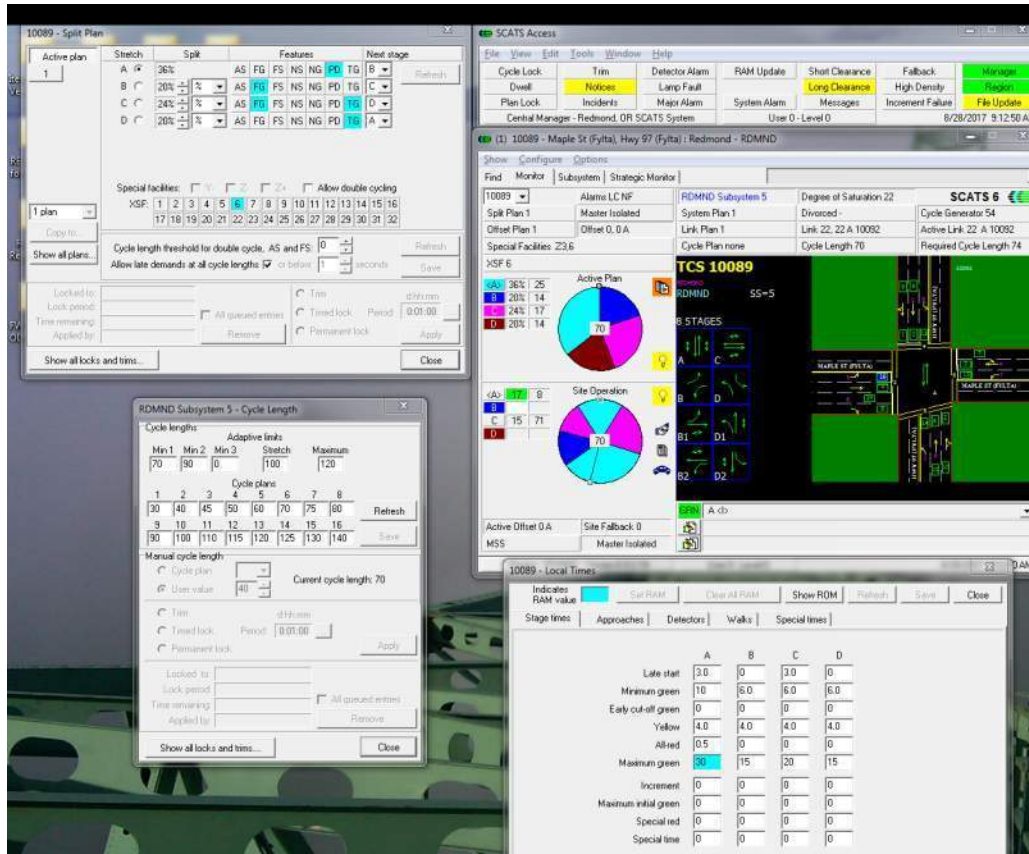
The 'Local Times' window displays a table of stage times for approaches A, B, and C:

	A	B	C
Late start	3.0	0	0
Minimum green	6.0	6.0	6.0
Early cut-off green	0	0	0
Yellow	4.0	4.0	4.0
All-red	0.5	0.5	0.5
Maximum green	30	15	20
Increment	0	0	0
Maximum initial green	0	0	0
Special red	1.0	0	0
Special time	0	0	0

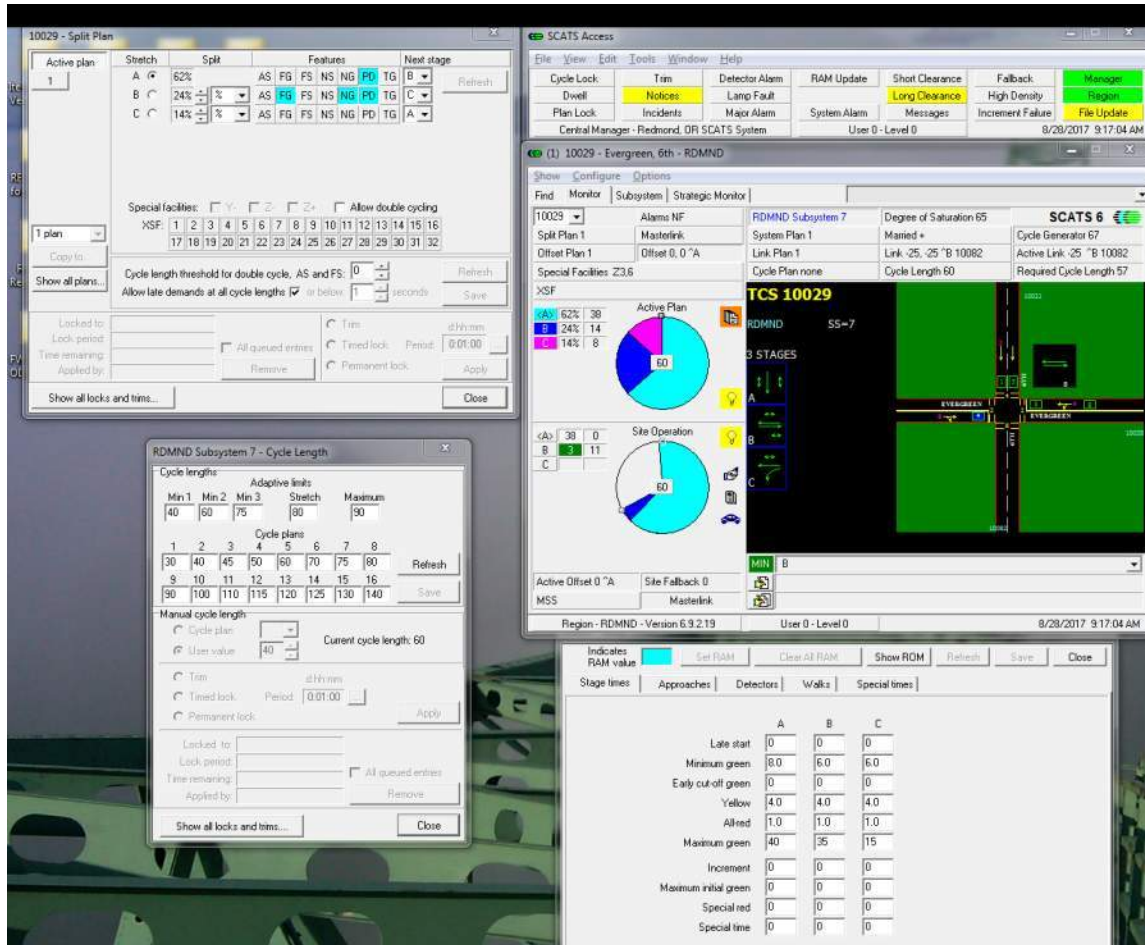
NW Canal Blvd/ US 97 SB Ramps



NW Maple/ NW 6th St



SW Evergreen Ave/SW 6th St

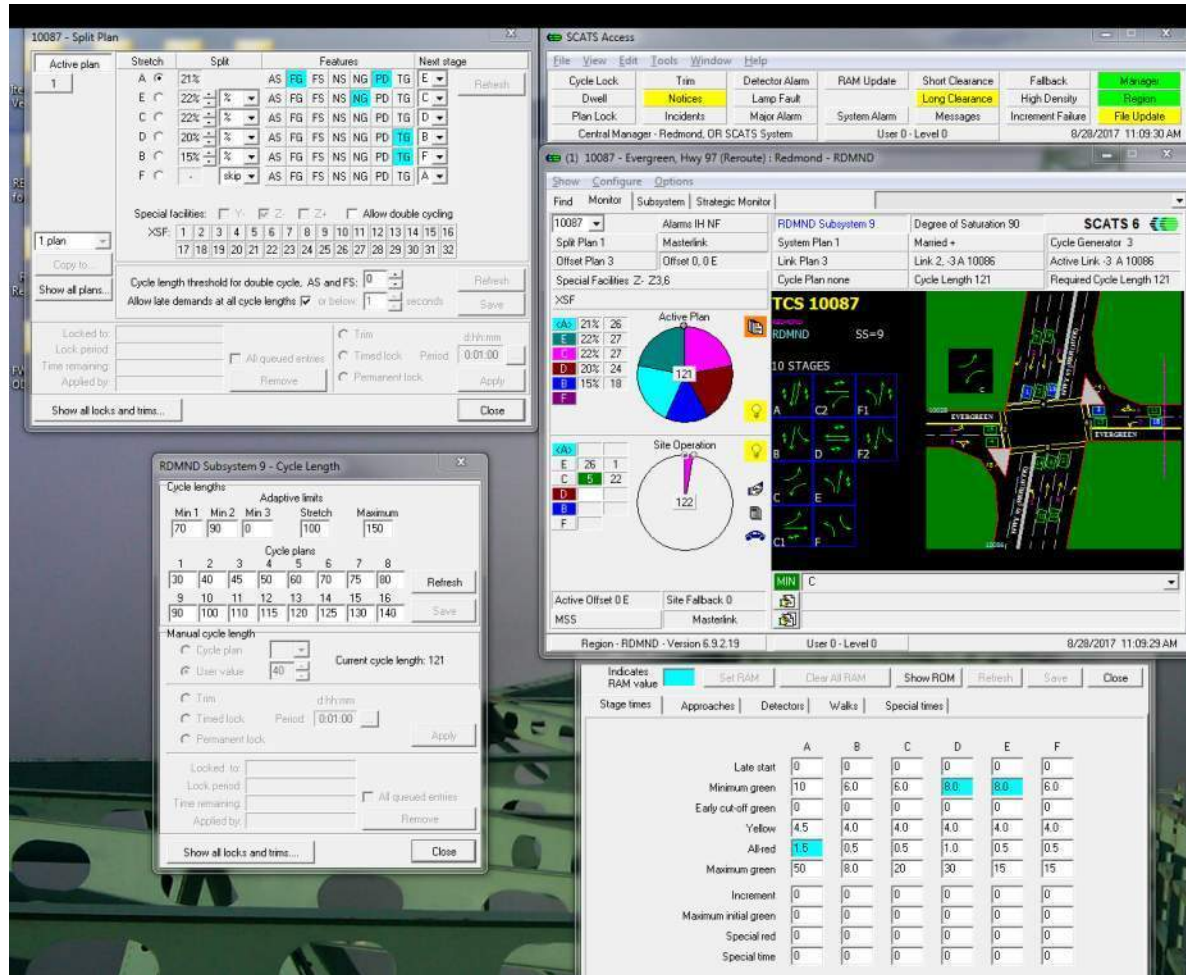


The screenshot displays the SCATS 6 software interface, which is used for traffic signal control. The main window, titled 'SCATS Access', shows a map of the RDMDND Subsystem 8 area, including the intersection of Evergreen Ave and 5th St. The interface is divided into several sections:

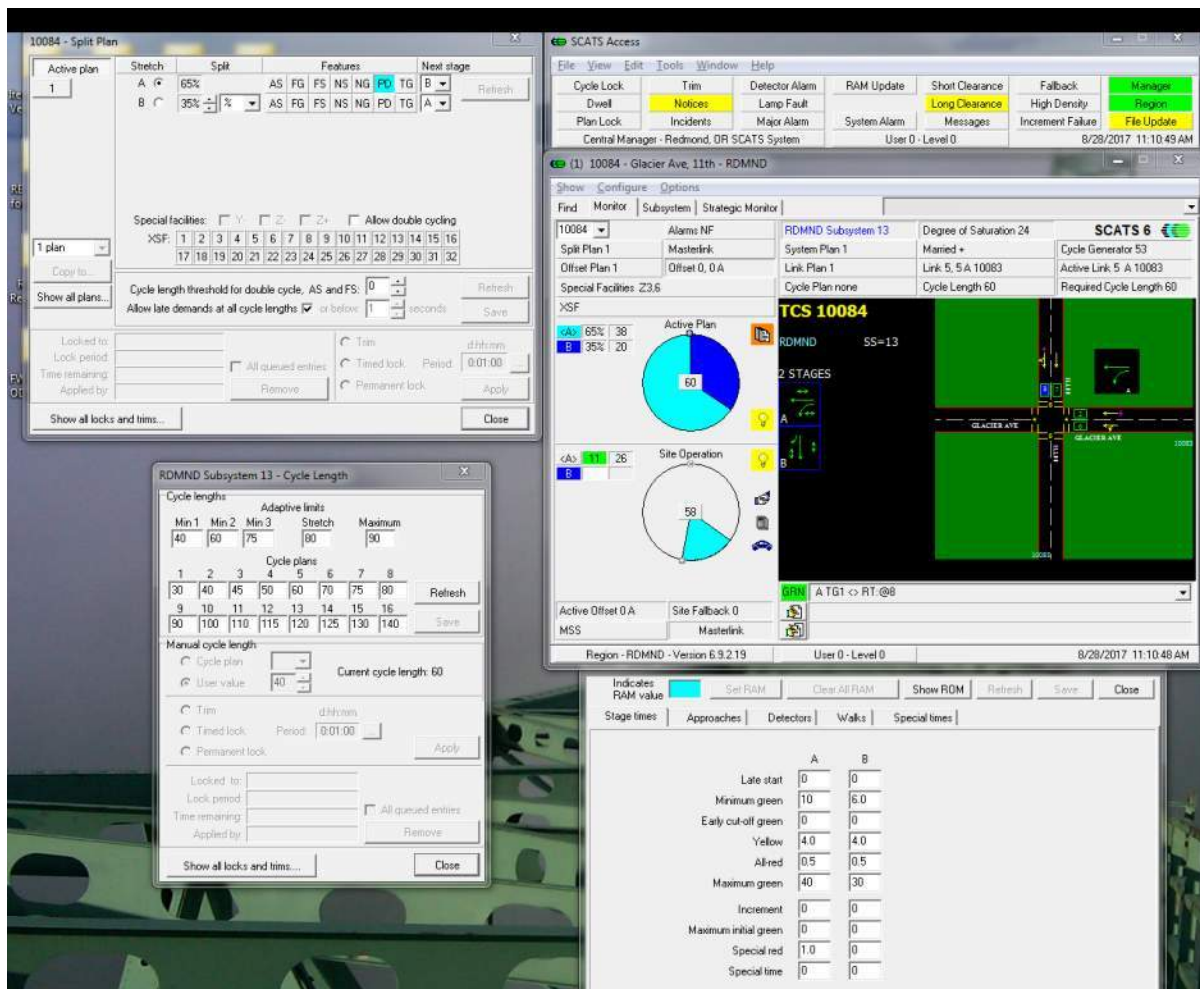
- Top Section:** Contains buttons for 'Cycle Lock', 'Dwell', 'Plan Lock', 'Detector Alarm', 'Notices', 'Incidents', 'Lamp Fault', 'Major Alarm', 'System Alarm', 'Short Clearance', 'Long Clearance', 'Messages', 'Fallback', 'High Density', 'Increment Failure', 'Manage', 'Program', and 'File Update'. It also shows the 'Central Manager - Redmond, OR SCATS System' and 'User 0 - Level 0'.
- Left Section:** Displays '10028 - Split Plan' with a table of cycle lengths and a 'Next stage' dropdown. The table shows cycle lengths for stages A, B, and C, with a 'Refresh' button.
- Right Section:** Shows 'SCATS 6' status, including 'Cycle Generator 25', 'Active Link 16', 'B 10091', and 'Required Cycle Length 60'. It also displays 'TCS 10028' and 'RDMDND SS=8'.
- Bottom Section:** Contains a 'Cycle Length' window for 'RDMDND Subsystem 8 - Cycle Length'. This window shows a table of cycle lengths for stages 1 through 8, with a 'Refresh' button. It also includes a 'Manual cycle length' section with a 'Current cycle length: 60' and a 'Cycle plan' dropdown.

The interface is designed for real-time monitoring and control of traffic signals, providing detailed information on cycle lengths, stage times, and system status.

SW Evergreen Ave/US 97



OR 126 (SW Glacier Ave)/SW 11th St



OR 126 (SW Glacier Ave)/SW 9th St

10083 - Split Plan

Active plan	Stretch	Split	Features	Next stage
A	60%	AS	FG FS NS NG PD TG	B
B	40%	AS	FG FS NS NG PD TG	A

Special facilities: ☐ V ☐ Z ☐ Z+ ☐ Allow double cycling

XSF: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

Cycle length threshold for double cycle, AS and FS: 0 seconds

Allow late demands at all cycle lengths ☒ or below 1 seconds

Locked to: Time remaining: Applied by:

Timed lock: Period: 0:01:00

Permanent lock:

Show all locks and times... Close

RDMND Subsystem 12 - Cycle Length

Cycle lengths: Min 1 Min 2 Min 3 Stretch Maximum

40	60	75	80	90
----	----	----	----	----

Cycle plans: 1 2 3 4 5 6 7 8

30	40	45	50	60	70	75	80
9	10	11	12	13	14	15	16
90	100	110	115	120	125	130	140

Manual cycle length: Current cycle length: 60

Timed lock: Period: 0:01:00

Permanent lock:

Locked to: Lock period: Time remaining: Applied by:

Show all locks and times... Close

SCATS Access

File View Edit Tools Window Help

Cycle Lock: ☐ Trim: ☐ Detector Alarm: ☐ RAM Update: ☐ Short Clearance: ☐ Fallback: ☐ Manage: ☐

Dwell: ☐ Notices: ☐ Lamp Fault: ☐ Long Clearance: ☐ High Density: ☐ Region: ☐

Plan Lock: ☐ Incidents: ☐ Major Alarm: ☐ System Alarm: ☐ Messages: ☐ Increment Failure: ☐ File Update: ☐

Central Manager - Redmond, OR SCATS System User 0 - Level 0 8/28/2017 11:11:50 AM

(1) 10083 - Glacier Ave, 9th St - RDMND

Show Configure Options

Find Monitor Subsystem Strategic Monitor

10083 Alarms NF RDMND Subsystem 12 Degree of Saturation 71 SCATS 6

Split Plan 1 Masterlink System Plan 1 Married + Cycle Generator 23

Offset Plan 1 Offset 0.0 "A Link Plan 1 Link 19, 19 "A 10082 Active Link 19 "A 10082

Special Facilities 23.6 Cycle Plan none Cycle Length 60 Required Cycle Length 62

XSF

Active Plan: 60% 36 40% 24

Site Operation: 60

Active Offset 0 "A Site Fallback 0 MSS Masterlink

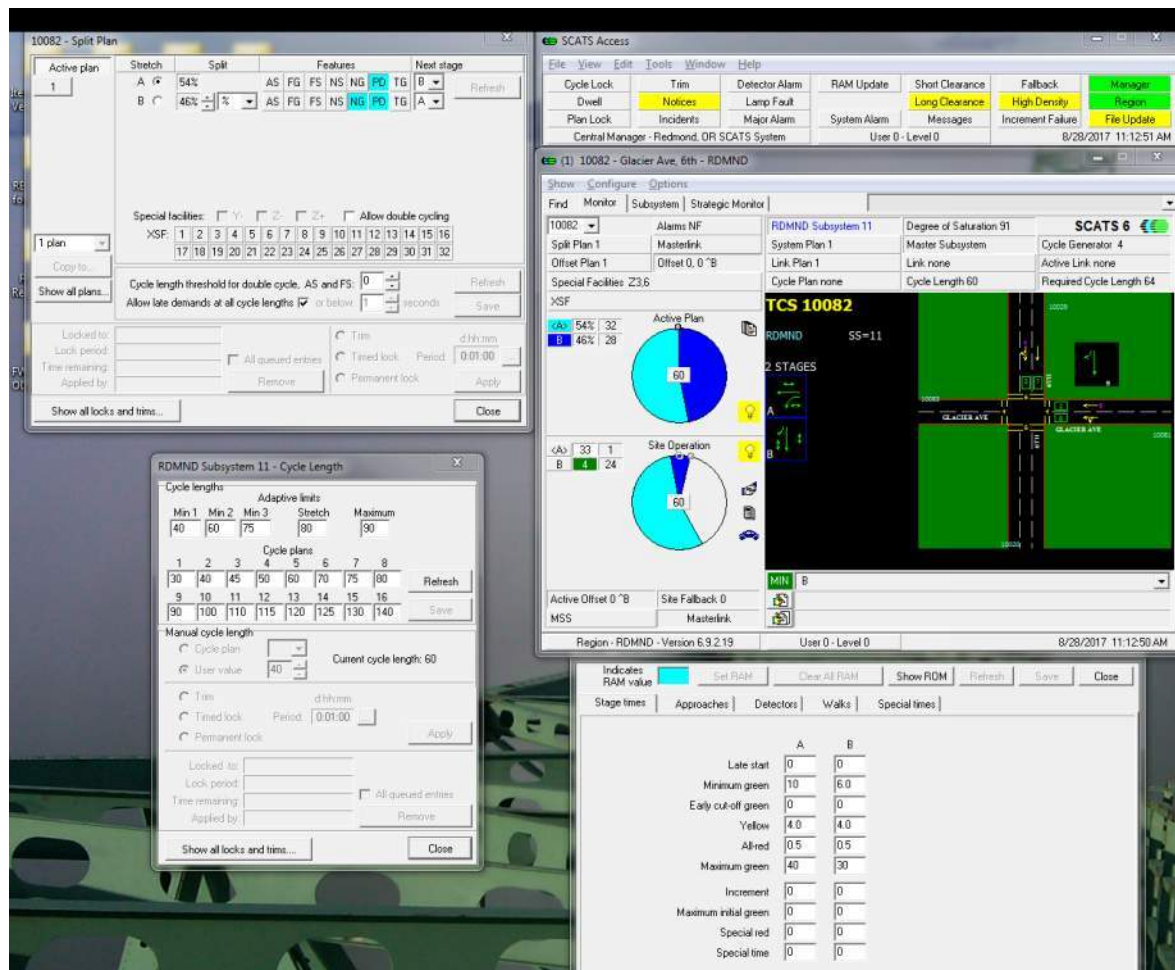
Region - RDMND - Version 6.9.2.19 User 0 - Level 0 8/28/2017 11:11:49 AM

Indicates RAM value: ☐ Set RAM: Clear All RAM: Show ROM: Refresh: Save: Close:

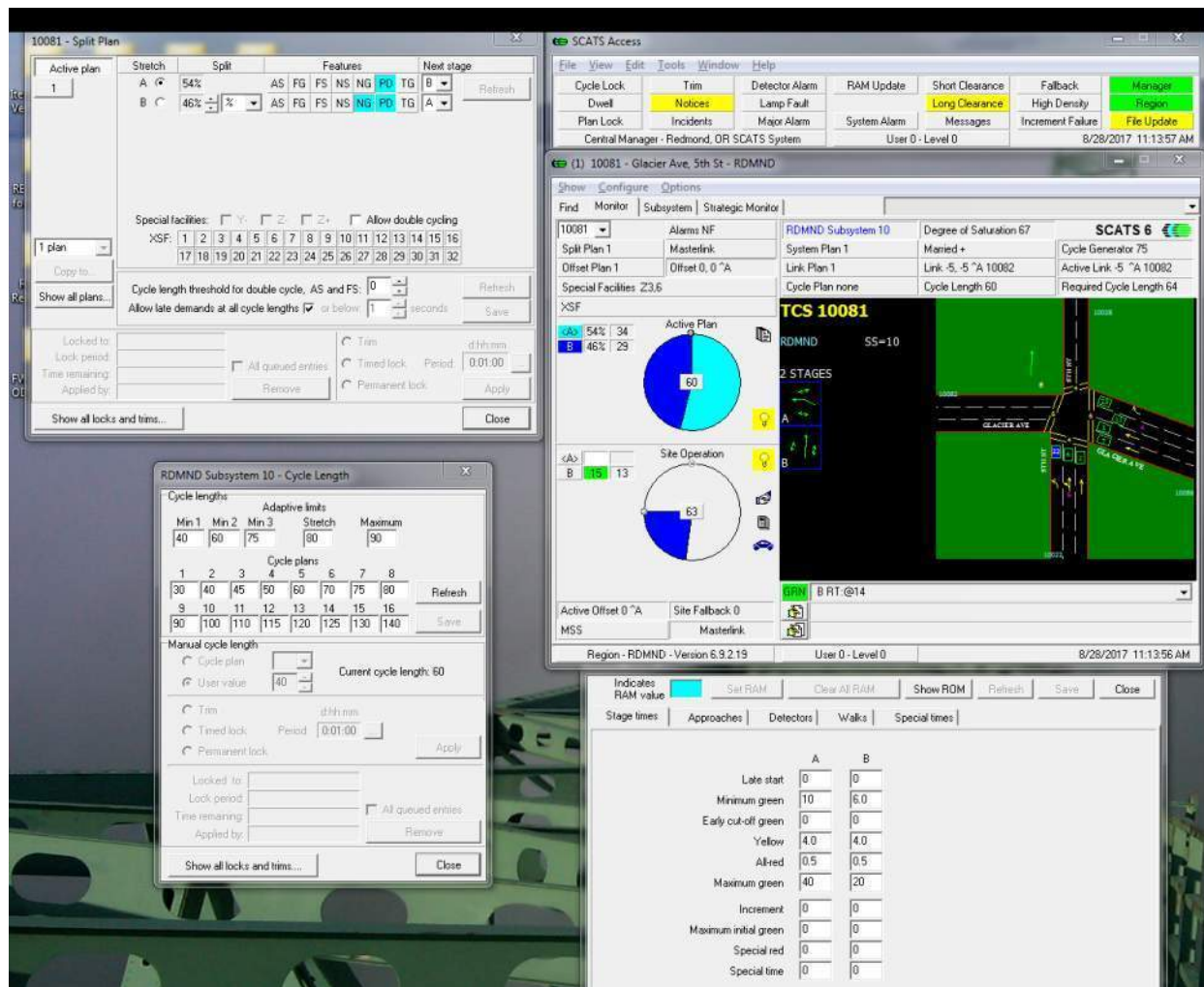
Stage times Approaches Detectors Walks Special times

	A	B
Late start	0	0
Minimum green	10	6.0
Early cut-off green	0	0
Yellow	4.0	4.0
All-red	0.5	0.5
Maximum green	40	30
Increment	0	0
Maximum initial green	0	0
Special red	0	0
Special time	0	0

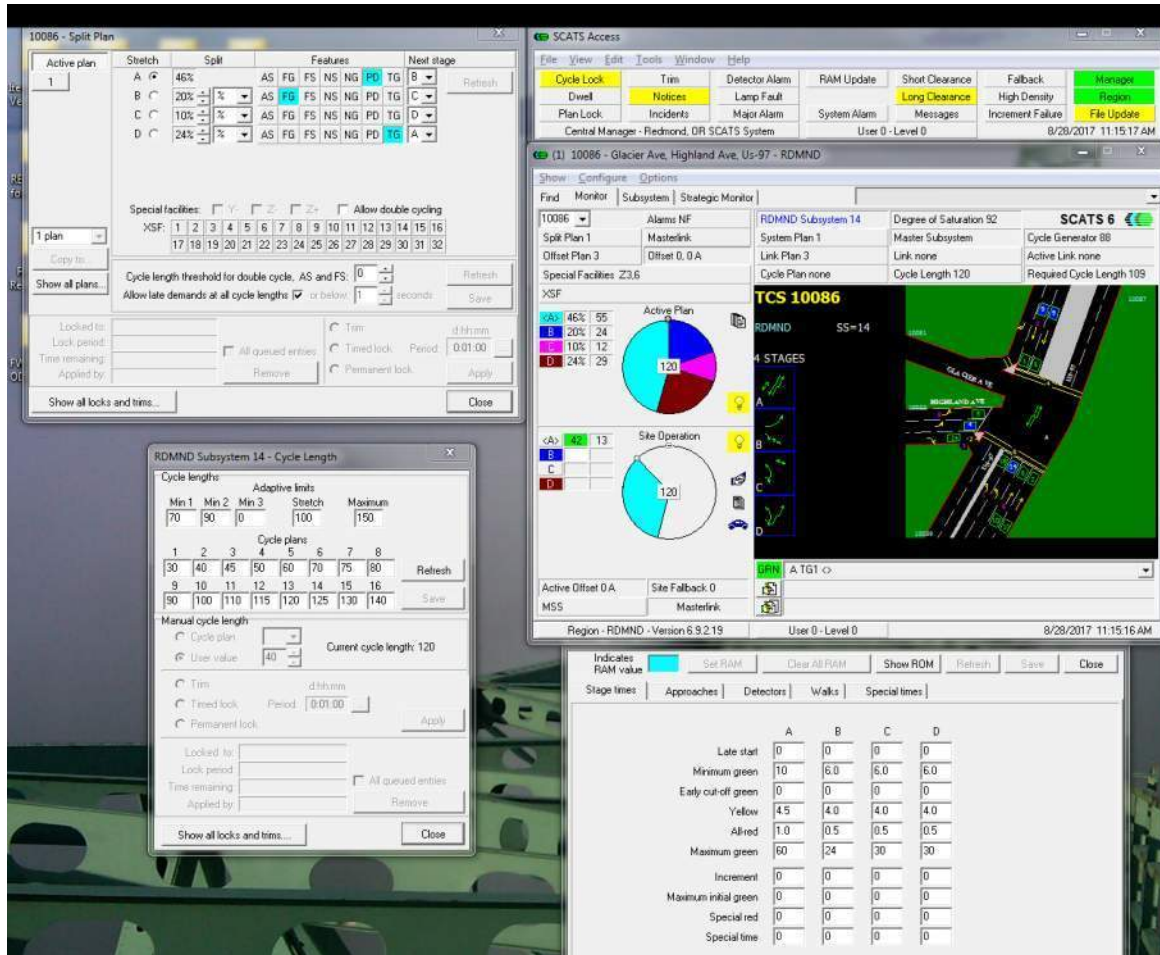
OR 126 (SW Glacier Ave)/SW 6th St



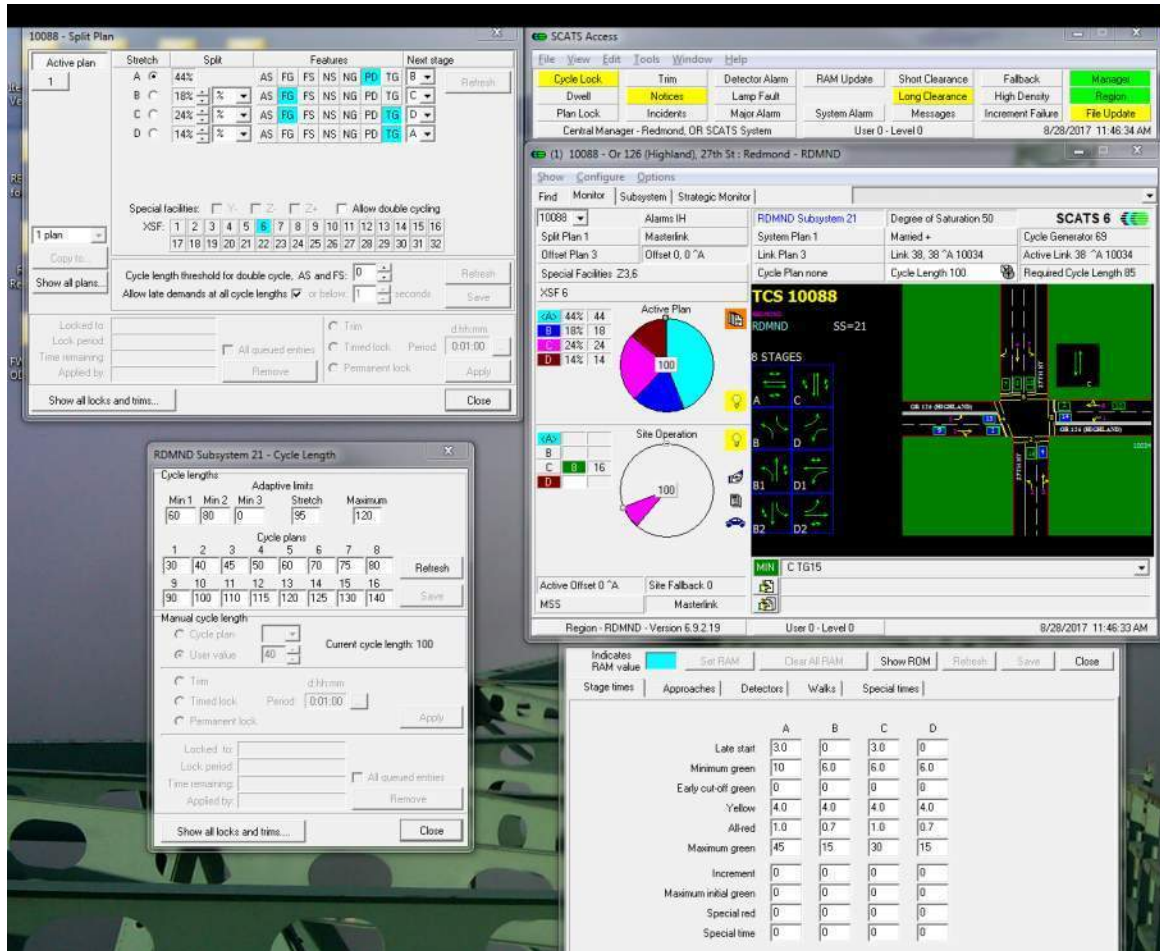
OR 126 (SW Glacier Ave)/SW 5th St



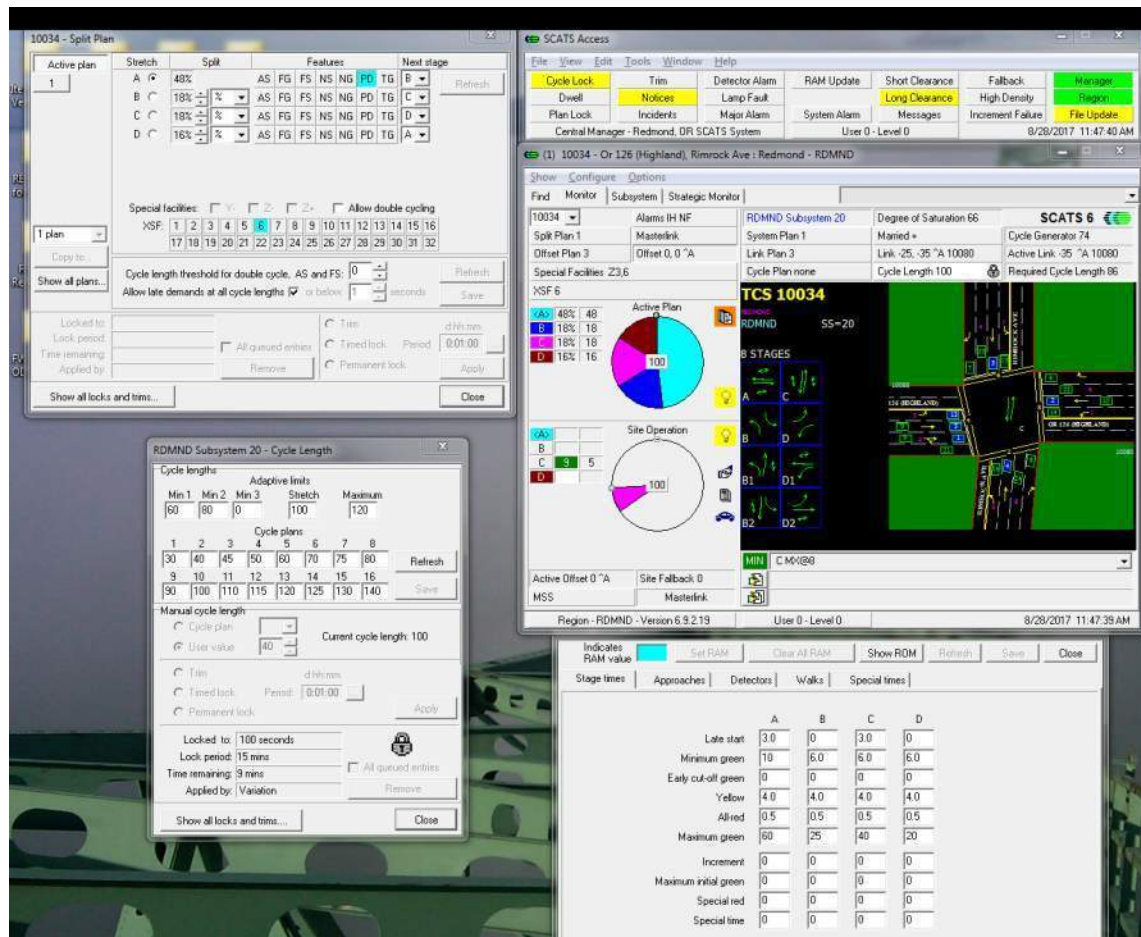
OR 126 (SW Glacier/Highland Ave)/US 97



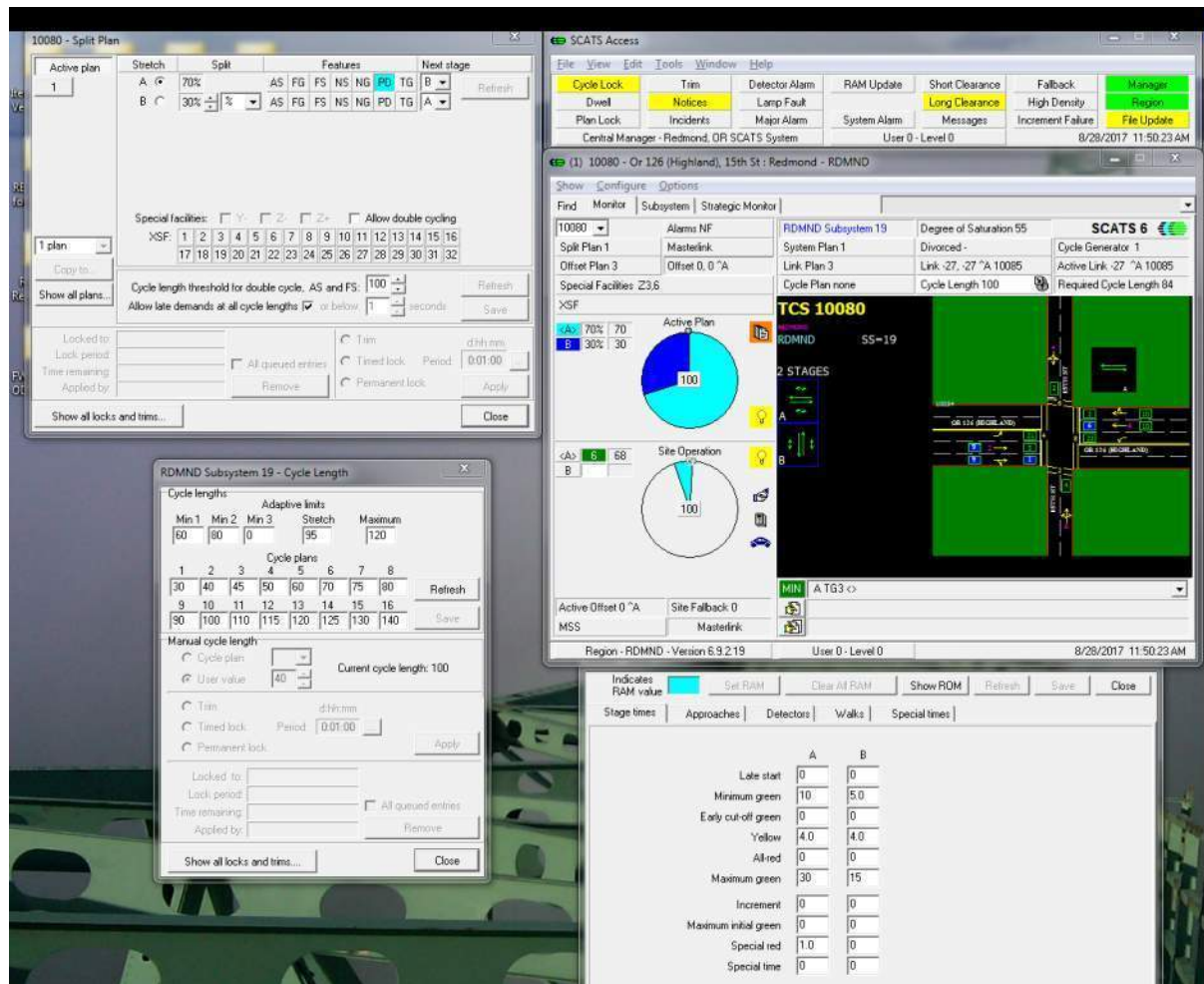
OR 126 (SW Highland Ave)/SW 27th St



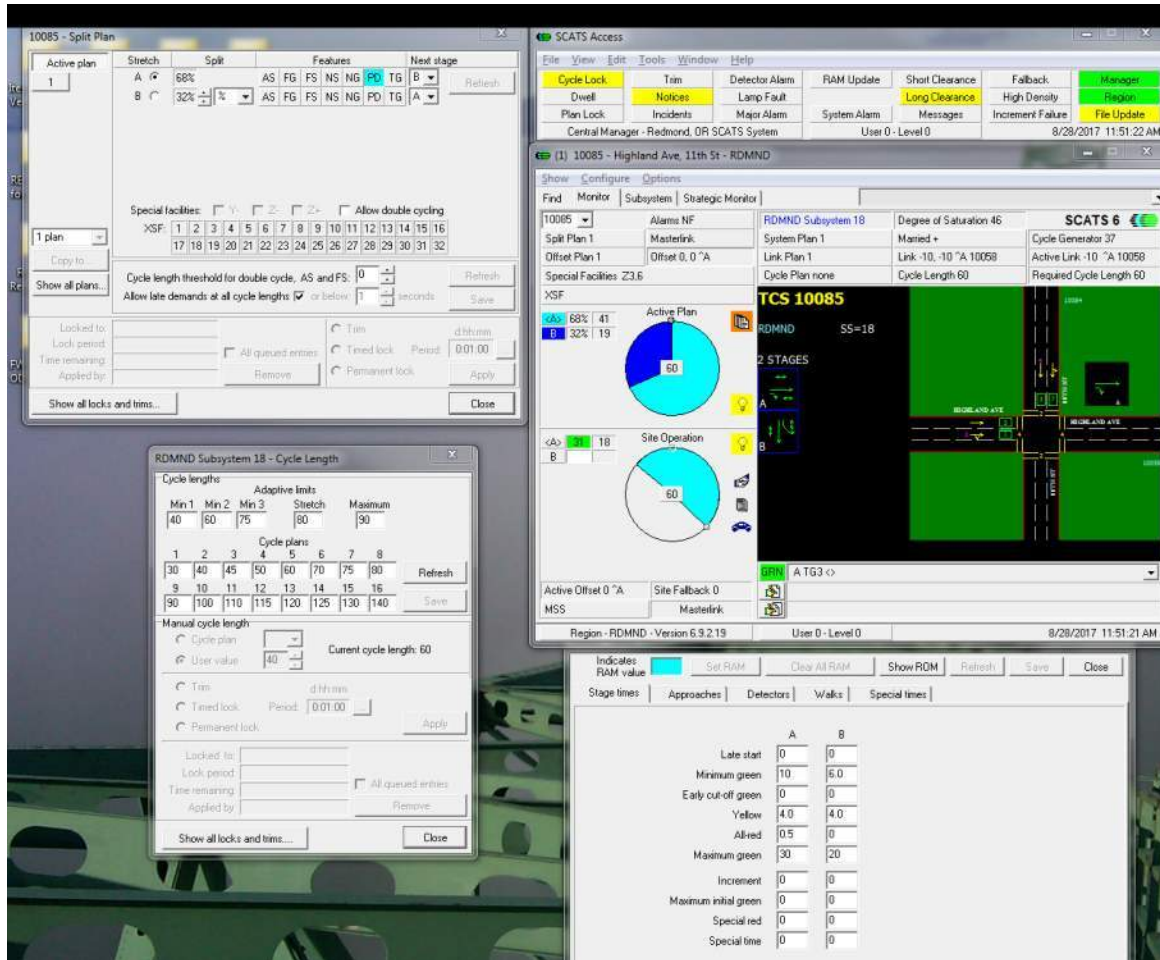
OR 126 (SW Highland Ave)/SW Rimrock Way



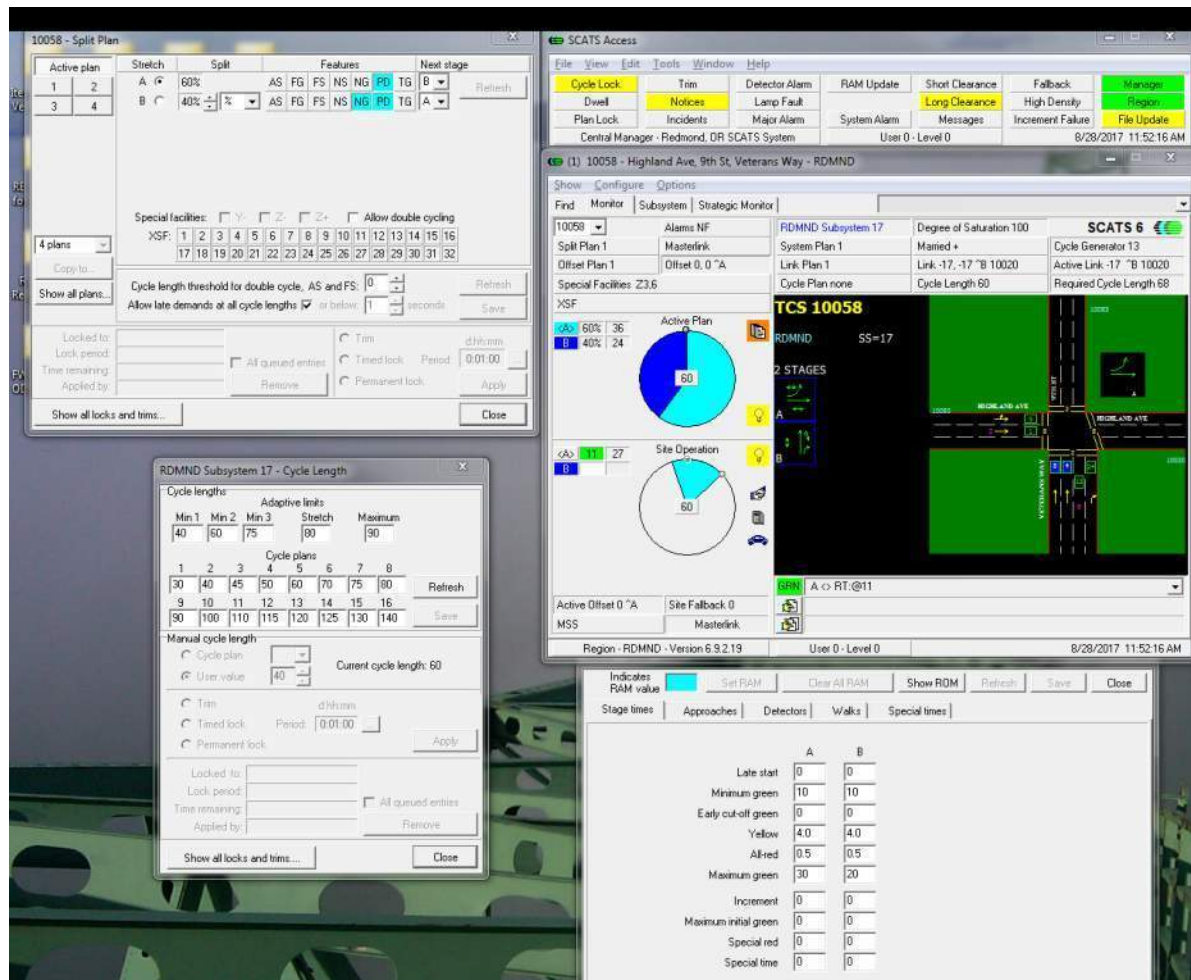
OR 126 (SW Highland Ave)/SW 15th St



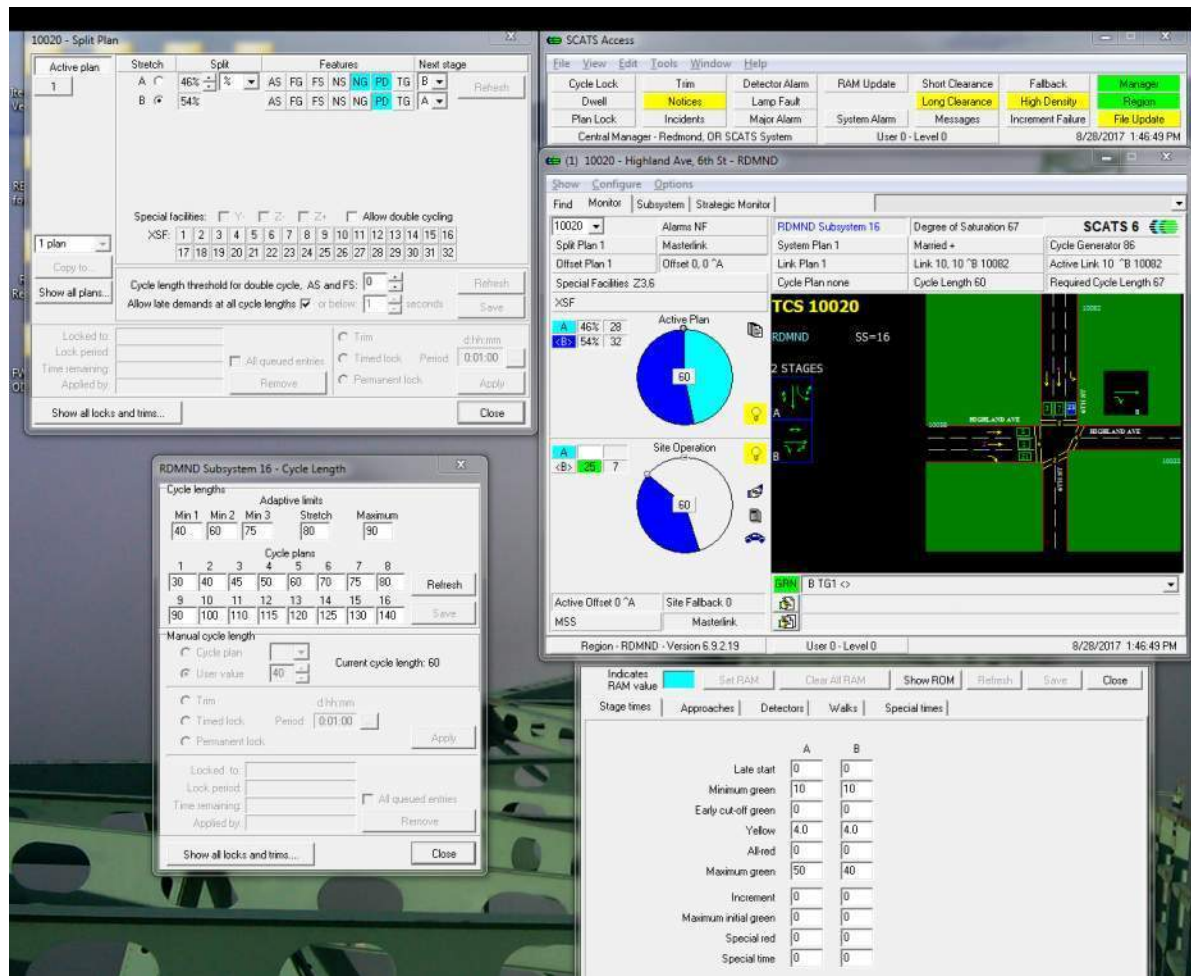
OR 126 (SW Highland Ave)/SW 11th St



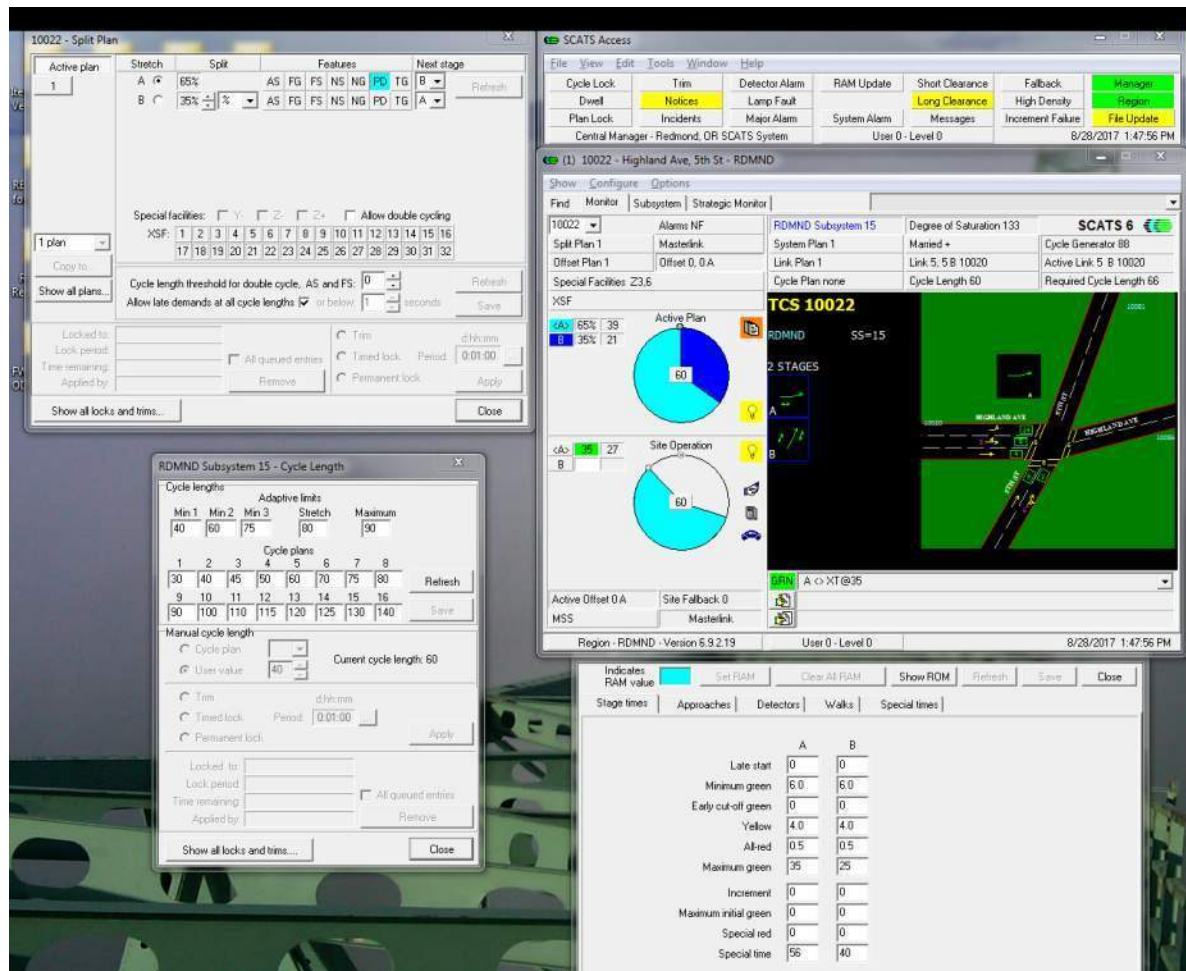
OR 126 (SW Highland Ave)/SW 9th St



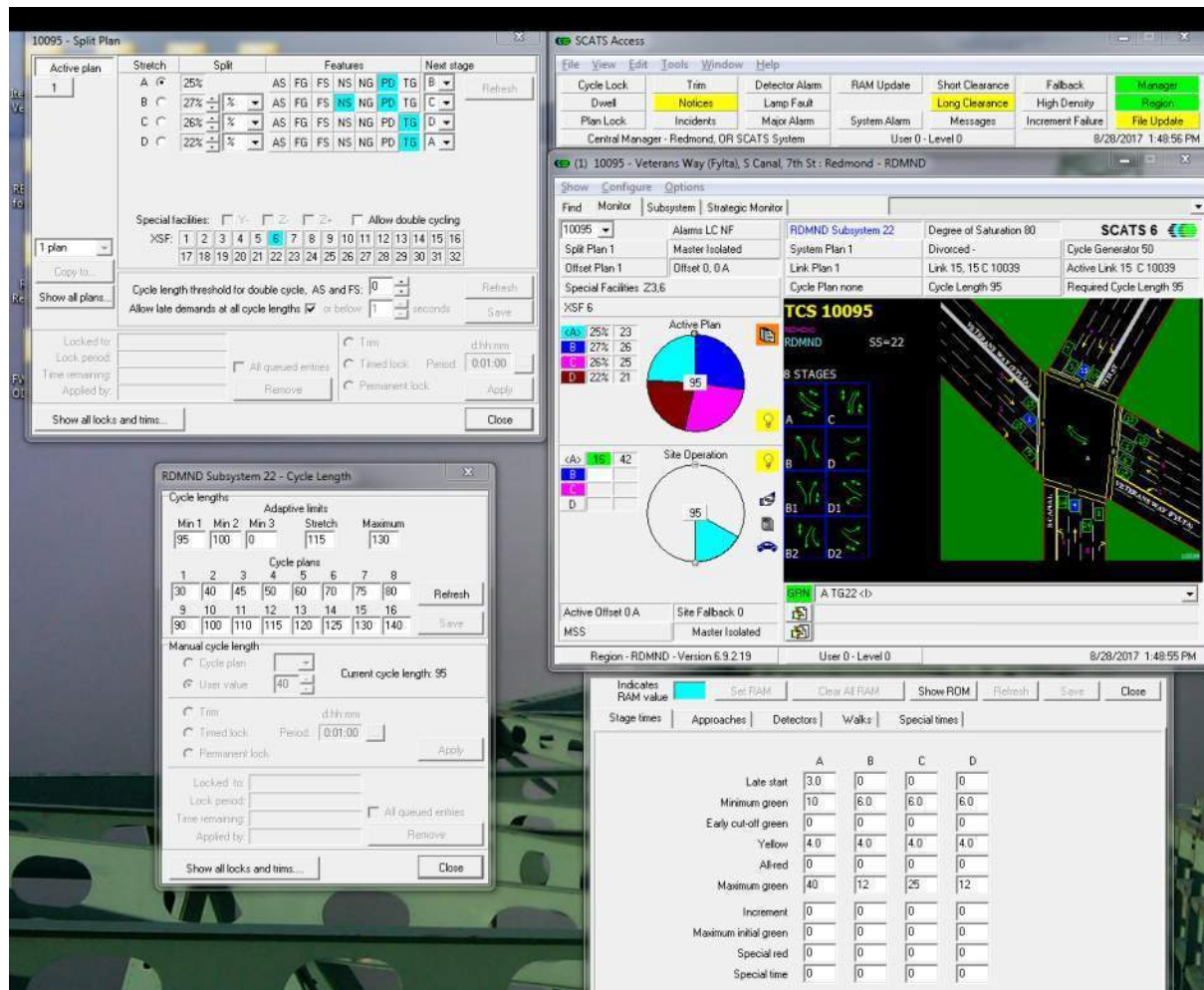
OR 126 (SW Highland Ave)/SW 6th St



OR 126 (SW Highland Ave)/SW 5th St



SW Veterans Way/Canal Blvd



SW Veterans Way/US 97

10039 - Split Plan

Active plan	Stretch	Split	Features	Next stage
1	A 34%	AS	FG FS NS NG PD TG	B
	B 22%	AS	FG FS NS NG PD TG	C
	C 22%	AS	FG FS NS NG PD TG	D
	D 22%	AS	FG FS NS NG PD TG	A

Special facilities: ☐ Y ☐ Z ☐ Z- ☐ Allow double cycling

XSF: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

Cycle length threshold for double cycle, AS and FS: 0 seconds

Allow late demands at all cycle lengths ☒ or below 1 seconds

Locked to: Lock period: Time remaining: Applied by:

Trim: d h:mm
Timed lock: Period: 0:01:00
Permanent lock: Apply

Show all locks and times... Close

RDMND Subsystem 23 - Cycle Length

Cycle lengths					Adaptive limits				
Min 1	Min 2	Min 3	Stretch	Maximum					
85	90	0		100	150				

Cycle plans

1	2	3	4	5	6	7	8
30	40	45	50	60	70	75	80
9	10	11	12	13	14	15	16
90	100	110	115	120	125	130	140

Manual cycle length: ☐ Cycle plan ☒ User value 40 Current cycle length: 110

Trim: d h:mm
Timed lock: Period: 0:01:00
Permanent lock: Apply

Locked to: Lock period: Time remaining: Applied by:

Show all locks and times... Close

SCATS Access

File View Edit Tools Window Help

Cycle Lock: Trim Detector Alarm RAM Update Short Clearance Falback Manage
Dwell: Notices Lamp Fault Long Clearance High Density Precon
Plan Lock: Incidents Major Alarm System Alarm Messages Increment Failure File Update

Central Manager - Redmond, OR SCATS System User 0 - Level 0 8/28/2017 1:50:21 PM

(1) 10039 - Veterans Way (Fylta), Hwy 97 (Fylta) : Redmond - RDMND

Show Configure Options

Find Monitor Subsystem Strategic Monitor

10039 Alarms IH NF RDMND Subsystem 23 Degree of Saturation 92 SCATS 6
Split Plan 1 Masterlink System Plan 1 Married + Cycle Generator 54
Offset Plan 4 Offset 0, 0 "A Link Plan 4 Link 40, 40 "A 10086 Active Link 40 "A 10086
Special Facilities 23,5,6 Cycle Plan none Cycle Length 110 Required Cycle Length 110

XSF

AS 34% 39
B 22% 26
C 22% 26
D 22% 26

Active Plan

Site Operation

Active Offset 0 "A Site Falback 0
MSS Masterlink

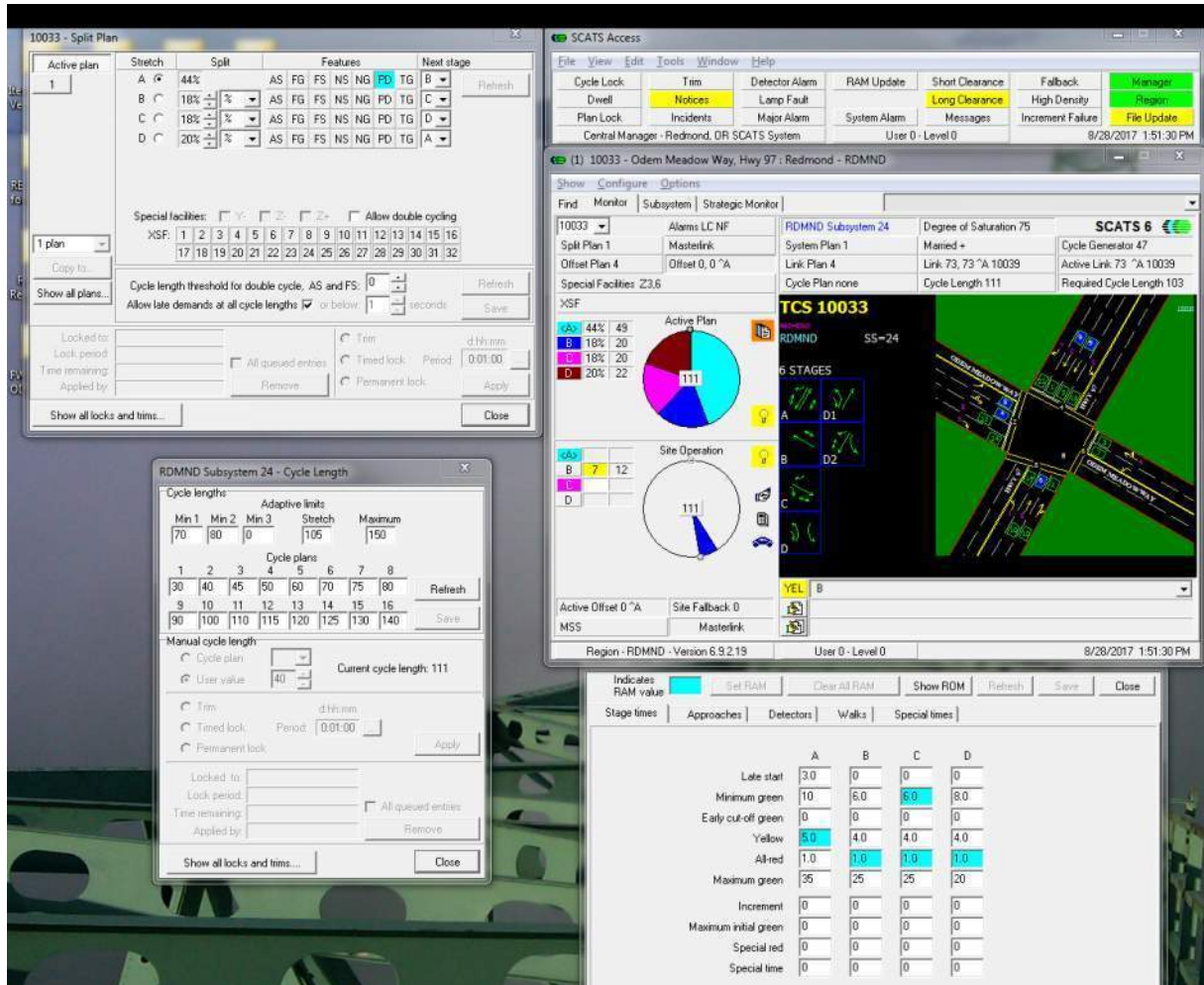
Region - RDMND - Version 6.9.2.19 User 0 - Level 0 8/28/2017 1:50:20 PM

Indicates RAM value Set RAM Clear All RAM Show RDM Refresh Save Close

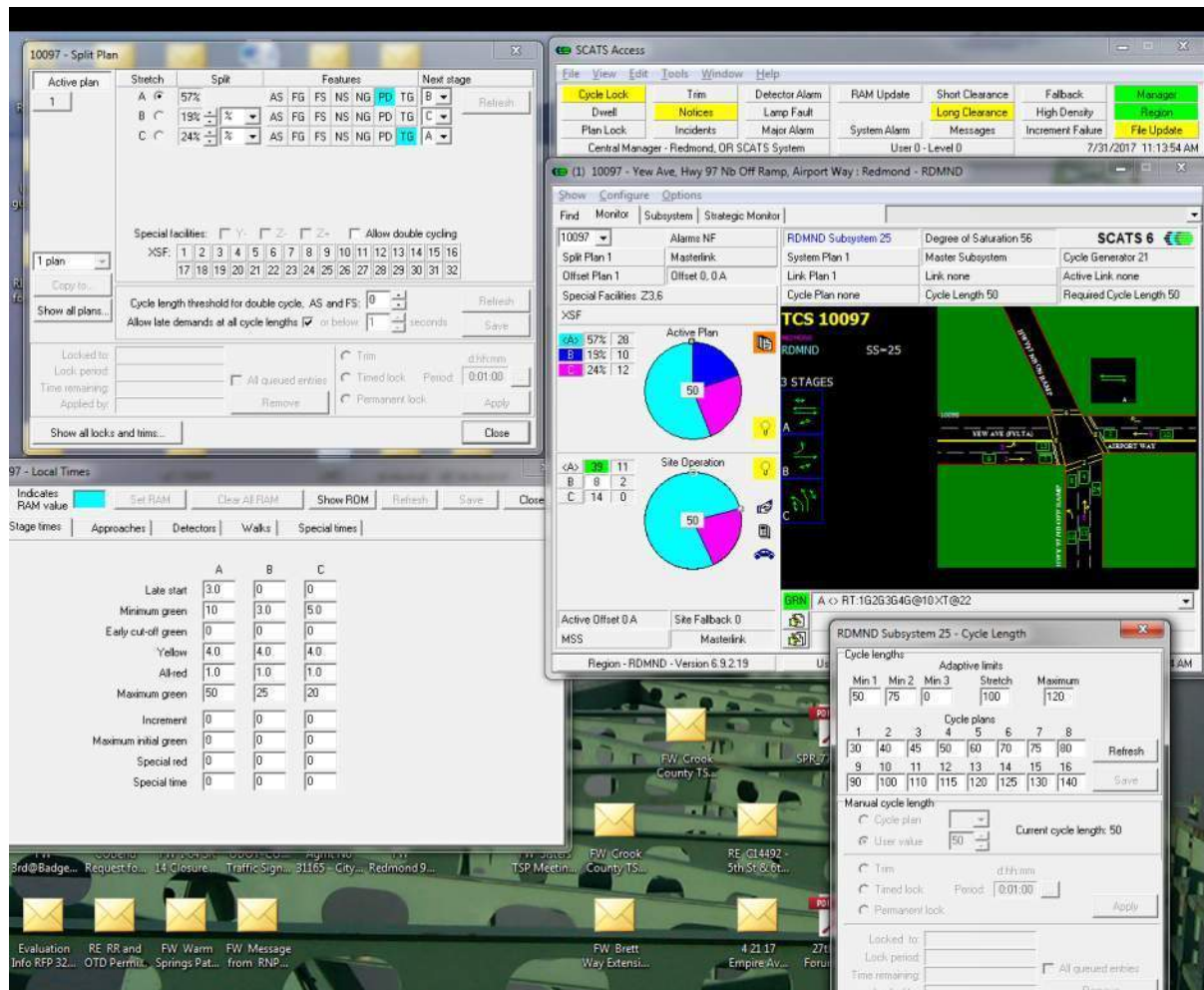
Stage times Approaches Detectors Walks Special times

	A	B	C	D
Late start	3.0	0	3.0	0
Minimum green	20	6.0	6.0	12
Early cut-off green	0	0	0	0
Yellow	4.5	4.0	4.0	4.0
All-red	0.5	0.5	0.5	0.5
Maximum green	45	15	20	20
Increment	0	0	0	0
Maximum initial green	0	0	0	0
Special red	0	0	0	0
Special time	0	0	0	0

SW Odem Medo Way/US 97



NB US 97 at Yew Avenue



SB US 97 at Yew Avenue

The screenshot displays the SCATS 6 traffic control software interface, specifically the configuration window for the intersection of SB US 97 at Yew Avenue. The interface is divided into several panels:

- 10098 - Split Plan:** This panel shows the active plan (1) and the split plan configuration. It includes a table for the split plan with columns for the split (A, B, C), the percentage (57%, 19%, 24%), and the features (AS, FG, FS, NS, NG, PD, TG). The next stage is also indicated.
- SCATS Access:** This panel shows the system status and user information. It includes a menu bar (File, View, Edit, Tools, Window, Help) and a toolbar with buttons for Cycle Lock, Tim, Detector Alarm, RAM Update, Short Clearance, Fallback, Messages, Dwell, Notices, Lamp Fault, Long Clearance, High Density, Regen, Plan Lock, Incidents, Major Alarm, System Alarm, Messages, Increment Failure, and File Update. The user is identified as User 0 - Level 0, and the system is Central Manager - Redmond, OR SCATS System.
- 10098 - Yew Ave, Hwy 97 Sb On Ramp, Hwy 97 Sb Off Ramp: Redmond - RDMND:** This panel shows the intersection details and the active plan. It includes a table for the active plan with columns for the split (A, B, C), the percentage (57%, 19%, 24%), and the features (AS, FG, FS, NS, NG, PD, TG). The next stage is also indicated.
- Local Times:** This panel shows the local times for the intersection. It includes a table for the local times with columns for the time (Late start, Minimum green, Early cut-off green, Yellow, All-red, Maximum green, Increment, Maximum initial green, Special red, Special time) and the values (A, B, C).
- SCATS 6:** This panel shows the system status and user information. It includes a menu bar (File, View, Edit, Tools, Window, Help) and a toolbar with buttons for Cycle Lock, Tim, Detector Alarm, RAM Update, Short Clearance, Fallback, Messages, Dwell, Notices, Lamp Fault, Long Clearance, High Density, Regen, Plan Lock, Incidents, Major Alarm, System Alarm, Messages, Increment Failure, and File Update. The user is identified as User 0 - Level 0, and the system is Central Manager - Redmond, OR SCATS System.
- RDMND Subsystem 26 - Cycle Length:** This panel shows the cycle length configuration. It includes a table for the cycle length with columns for the cycle length (Min 1, Min 2, Min 3, Sketch, Maximum) and the values (50, 75, 100, 120). The current cycle length is 50.

<i>Regio</i>			
Monday, August 28, 2017 14:47			
Intersection Name	1 - 19th at Rimrock		Local ID 1
Intersection Telephone Number			
System Name	158 - 19th at Rimrock (Isolated)		System ID 158
Controller Type	Voyage - C1-C11		
Controller Serial Number			Installation Date
Programmed by			Programmed Date
Graphic Map Background		Phase Rotation Diagram	

Control Data (next/2/2)													
Controller Function and Timing (next/2/1, next/2/2)													
Security, Sequence, Initialization													
Security Code	****	0 = disabled, or 1000-9999											
Sequence	1	0 = sequential, 1 = quad left turn, 2-6 = special A-E, 7 = lead lag											
				Lead Lag (next/2/2/3)									
				Phases 1 - 2		Phases 3 - 4		Phases 5 - 6		Phases 7 - 8			
0 = no reversal, 1 = reversal, 2 = by coord plan or clock													
Initialization and Flash (next/2/2/5)													
	Initialization		Flash Entry		Flash Exit								
Ring 1 Phase	1		2		1		phase 1-8						
Ring 2 Phase	5		6		5		phase 1-8						
Interval	2		0		0		0 = red, 1 = yellow, 2 = green						
Power up Flash	0.0	0.0 - 25.5 seconds			First All Red	6.0	0.0 - 25.5 seconds						
Soft Flash (next/2/2/5)													
Phase	1	2	3	4	5	6	7	8	0 = dark, 1=flash yel WIG, 2 = flash yel WAG, 3 = flash red WIG, 4 = flash red WAG				
	3	4	3	4	3	4	3	4					
Overlap	A	B	C	D	E	F	G	H	I	J	K	L	same as phase
	3	4	3	4	3	4	3	4	3	4	3	4	
Internal Logic Output	1	2	3	4	5	6	7	8	9	10	11	12	0 = normal, 1 = dark, 2 = flash WIG
	0	0	0	0	0	0	0	0	0	0	0	0	

Per Phase Functions (next/2/2/3, next/2/2/1)									
	1	2	3	4	5	6	7	8	
Phases Used	X	X	X	X	X	X	X	X	X = on
Restricted Phases									X = on (Sequence 2, 6, 7 only)
Exclusive Phases									X = on (Sequence 7 only)
Yellow Lock									X = on
Min Recall		X				X			
Max Recall									
Ped Recall									
Red Lock									
Max Out Recall Inhibit	X		X	X	X		X	X	
Soft Recall		X				X			
Free Walk Rest									
Conditional Ped	X		X		X		X		
Disable Inhibit Max Termination									
Call to Non Act 1									
Call to Non Act 2									
Dual Entry (next/2/2/9/3)									
Mode	1	0 = off, 1 = on, 2 = Not Used, 3 = by coord plan, 4 = by time clock circuit 61							
Dual Entry Phase -->	1	2	3	4	5	6	7	8	
Phase	0	0	0	8	0	0	0	4	0 = none, 1-8 = phase 1-8
Conditional Service, Five Section Head									
Conditional Service (next/2/2/9/3)			5 Section Head Logic (next/2/2/9/4)						
	Mode	CS Max Time	X Omits Y		Anti-Trap			Yellow Blanking LT	
Phase			X : Y		Trap Protected Phase		Next Phase	Phase	
Phase 1	0	0	6 : 1	0	1		< (5)	1	
Phase 3	0	0	8 : 3	0	3		< (7)	3	
Phase 5	0	0	2 : 5	0	5		< (1)	5	X
Phase 7	0	0	4 : 7	0	7		< (3)	7	
0 = off, 1 = C.S.On. 2 = C.S. on by TOD circuit 57, 3 = N/A, 4 = C.S. and C.R. On, 5 = C.R. on by TOD circuit 57.			0=off, 1=side call, 2=no side call		X = On				

Phase Times (next/2/2/2, next/2/2/9/5)									
	1	2	3	4	5	6	7	8	
Movement	<i>WBLT</i>	<i>EB</i>	<i>NBLT</i>	<i>SB</i>	<i>EBLT</i>	<i>WB</i>	<i>SBLT</i>	<i>NB</i>	
Minimum Green	6	10	6	6	6	10	6	6	0 - 255 sec
Passage	2.0	3.5	2.0	3.0	2.0	3.5	2.0	3.0	0.0 - 25.5 sec
Yellow	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.0 - 25.5 sec
Red Clearance	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0 - 25.5 sec or 0 - 255 sec
Max 1	12	30	15	35	10	30	15	35	0 - 255 sec
Max 2	10	30	12	20	20	30	10	20	0 - 255 sec
Walk	0	7	0	7	0	7	0	7	0 - 255 sec
Ped Clear	0	16	0	16	0	16	0	16	0 - 255 sec
Seconds Per Actuation	0.0	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0 - 25.5 sec
Time Before Reduction	6	10	6	6	6	10	6	6	0 - 255 sec
Time to Reduce	6	20	6	6	6	20	6	6	0 - 255 sec
Minimum Gap	1.0	2.5	1.0	2.0	1.5	3.2	1.5	1.5	0.0 - 25.5 sec
Max Variable Initial	7	20	7	7	7	20	7	7	0 - 255 sec
Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec
Auto Max Limit	0	0	0	0	0	0	0	0	0 - 255 sec
Inhibit Min Yellow									X = On
Red Decimal Off									X = On
Advance Walk	0	0	0	0	0	0	0	0	0 - 255 sec
Other Controller Functions (next/2/2/9)									
Phase -->	1	2	3	4	5	6	7	8	
Inhibit Simultaneous Gap Out	X		X	X	X		X	X	X = On
Last Car Passage	2	0 = recall phase, 1 = last car passage, 2 = NOT recall - Not last car passage							
Red Revert (+2 seconds)	3.0	0 - 25.5 sec							
Auto Ped Clear	X	X = On							
Flashing Don't Walk Into Yellow		X = On							
Soft Recall / Red Rest Delay	0.0	0 - 25.5 sec							
Ped Pushbutton	0	0 - 5 sec, 0 = disable							
Advance Flash Rate	0	0 = disable, 1 = 120 FPM							
Change Sequence		X = On (After a download with a power on - off cycle)							
Phase -->	1	2	3	4	5	6	7	8	
Red Clear Extension Detector	0	0	0	0	0	0	0	0	0 = none 1 - 32 = detector 1 - 32
Red Clear Extension Red Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 25.5 sec.

Local Detectors (next/2/2/4)								
Detector Data								
	Yellow Lock	Detector Inhibit	Call Phase	Extend Phase	Switch Phase	Delay Time	Stretch / Disconnect Time	Delay or Disconnect Mode
Detector 1 - I1 NBLT*			1	1	0	0	0.0	0
Detector 2 - I9U NBLT			2	2	0	0	0.0	0
Detector 3 - I5 EBLT*			3	3	0	0	0.0	0
Detector 4 - I9L EBLT			2	2	0	0	0.0	0
Detector 5 - J1 SBLT*			5	5	0	0	0.0	0
Detector 6 - J9U SBLT			5	5	0	0	0.0	0
Detector 7 - J5 WBLT*			7	7	0	0	0.0	0
Detector 8 - J9L WBLT			4	4	0	0	0.0	0
Detector 9 - I2U SBBK*			2	2	0	0	0.0	0
Detector 10 - I2L SBFT			2	2	0	0	0.0	0
Detector 11 - I3U			7	7	0	0	0.0	0
Detector 12 - I3L			7	7	0	0	0.0	0
Detector 13 - I4			2	2	0	0	0.0	0
Detector 14 - I6U WBRT*			0	4	0	0	0.0	0
Detector 15 - I6L			4	4	0	0	0.0	0
Detector 16 - I7U WBRT			0	4	0	0	0.0	0
Detector 17 - I7L WB			1	1	0	0	0.0	0
Detector 18 - I8			8	8	0	0	0.0	0
Detector 19 - J2U NBBK*			6	6	0	0	0.0	0
Detector 20 - J2L NB			6	6	0	0	0.0	0
Detector 21 - J3U			0	0	0	0	0.0	0
Detector 22 - J3L			0	0	0	0	0.0	0
Detector 23 - J4			0	0	0	0	0.0	0
Detector 24 - J6U EBBK*			8	8	0	0	0.0	0
Detector 25 - J6L EBBIKE			0	8	0	0	0.0	0
Detector 26 - J7U EB			8	8	0	0	0.0	0
Detector 27 - J7L			0	0	0	0	0.0	0
Detector 28 - J8			0	0	0	0	0.0	0
Detector 29 -			0	0	0	0	0.0	0
Detector 30 -			0	0	0	0	0.0	0
Detector 31 -			0	0	0	0	0.0	0
Detector 32 -			0	0	0	0	0.0	0

yellow lock, detector inhibit, - X = On; call, extend, phase - 0 = none 1 - 8 = phase 1 - 8; delay time - 0 - 255 sec
stretch / disconnect time - 0.0 - 25.5 sec.; delay or disconnect Mode - 0 - 13

Detector Plans (next/2/2/4/5)									
Loop Number									
Plan Detectors									
Detector Plan 1	Call Phase	0	0	0	0	0	0	0	0 - 32, 0 = none, 1 - 32 = detectors 1 - 32
	Extend Phase	0	0	0	0	0	0	0	0 - 8, 0 = none, 1 - 8 = phase 1 - 8
	Switch Phase	0	0	0	0	0	0	0	
	Delay Time	0	0	0	0	0	0	0	
	Stretch/Disconnect Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 255 sec
	Delay/ Disconnect Mode	0	0	0	0	0	0	0	0 - 13
	Call Phase	0	0	0	0	0	0	0	0 - 8, 0 = none, 1 - 8 = phase 1 - 8
Detector Plan 2	Extend Phase	0	0	0	0	0	0	0	
	Switch Phase	0	0	0	0	0	0	0	
	Delay Time	0	0	0	0	0	0	0	
	Stretch/Disconnect Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Delay/ Disconnect Mode	0	0	0	0	0	0	0	
Detector Plan 3	Call Phase	0	0	0	0	0	0	0	0 - 8, 0 = none, 1 - 8 = phase 1 - 8
	Extend Phase	0	0	0	0	0	0	0	
	Switch Phase	0	0	0	0	0	0	0	
	Delay Time	0	0	0	0	0	0	0	
	Stretch/Disconnect Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 255 sec
	Delay/ Disconnect Mode	0	0	0	0	0	0	0	0 - 13

Detector Fail Monitor (next/2/2/4/3)					Detectors 33-64 (next/2/2/4/6)					
	Fail Monitor Enable	Recall Phase	Min Counts	Max Counts		Call Phase	Extend Phase			
Detector 1 - I1 NBLT*		0	0	0	Detector 33 -	0	0			
Detector 2 - I9U NBLT		0	0	0	Detector 34 -	0	0			
Detector 3 - I5 EBLT*		0	0	0	Detector 35 -	0	0			
Detector 4 - I9L EBLT		0	0	0	Detector 36 -	0	0			
Detector 5 - J1 SBLT*		0	0	0	Detector 37 -	0	0			
Detector 6 - J9U SBLT		0	0	0	Detector 38 -	0	0			
Detector 7 - J5 WBLT*		0	0	0	Detector 39 -	0	0			
Detector 8 - J9L WBLT		0	0	0	Detector 40 -	0	0			
Detector 9 - I2U SBBK*		0	0	0	Detector 41 -	0	0			
Detector 10 - I2L SBFT		0	0	0	Detector 42 -	0	0			
Detector 11 - I3U		0	0	0	Detector 43 -	0	0			
Detector 12 - I3L		0	0	0	Detector 44 -	0	0			
Detector 13 - I4		0	0	0	Detector 45 -	0	0			
Detector 14 - I6U WBRT*		0	0	0	Detector 46 -	0	0			
Detector 15 - I6L		0	0	0	Detector 47 -	0	0			
Detector 16 - I7U WBRT		0	0	0	Detector 48 -	0	0			
Detector 17 - I7L WB		0	0	0	Detector 49 -	0	0			
Detector 18 - I8		0	0	0	Detector 50 -	0	0			
Detector 19 - J2U NBBK*		0	0	0	Detector 51 -	0	0			
Detector 20 - J2L NB		0	0	0	Detector 52 -	0	0			
Detector 21 - J3U		0	0	0	Detector 53 -	0	0			
Detector 22 - J3L		0	0	0	Detector 54 -	0	0			
Detector 23 - J4		0	0	0	Detector 55 -	0	0			
Detector 24 - J6U EBBK*		0	0	0	Detector 56 -	0	0			
Detector 25 - J6L EBBIKE		0	0	0	Detector 57 -	0	0			
Detector 26 - J7U EB		0	0	0	Detector 58 -	0	0			
Detector 27 - J7L		0	0	0	Detector 59 -	0	0			
Detector 28 - J8		0	0	0	Detector 60 -	0	0			
Detector 29 -		0	0	0	Detector 61 -	0	0			
Detector 30 -		0	0	0	Detector 62 -	0	0			
Detector 31 -		0	0	0	Detector 63 -	0	0			
Detector 32 -		0	0	0	Detector 64 -	0	0			
fail monitor enable - X = On, recall phase - 0 = none 1 - 8 = phase 1 - 8, min, max					call / extend phase - 0 = none 1 - 8 = phase 1 - 8					
Detector Fail Sample Period (all detectors)			0		0 - 255 minutes					
Video Fail Inputs (next/2/2/4/3) -->		1	2	3	4	5	6	7	8	0 = none, 1 - 8 = phase 1 - 8
Phase Recalled		0	0	0	0	0	0	0	0	
System Detectors (next/2/2/4/4)										
System Detectors -->		1	2	3	4	5	6	7	8	0 = none, 1 - 32 = phase 1 - 32
Local Detector		0	0	0	0	0	0	0	0	

Overlaps / FYLTA (next/2/2/8)														
Vehicle Overlaps		Phase or Movement	Phases								Extension Green	Clearance		A - D 0 = none 1 = overlap 2 = 60 FPM 3 = Not ped 4=Comp. Ph. 5=Prevent. Ext. 6=Not Veh. 7=Adv. FF E - L 0 = no Overlap 1 = Overlap Green, Yellow Red
			1	2	3	4	5	6	7	8		Yellow	Red	
Overlaps	A		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	B		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	C		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	D		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	E		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	F		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	G		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	H		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	I		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	J		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	K		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	L		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
Not Ped - Ped Overlaps (next/2/2/8/5)														
Ped Overlaps -->		A	B	C	D	E	F	G	H	X = Nor Ped Ped Overlap				
Overlaps	A													
	B													
	C													
	D													
Advance Warning (next/2/2/8/3)														
			E	F	G	H	I	J	K	L	0 = disabled, 1 = enabled 0 = none, 1 - overlap E, 2 = overlap F, etc. 0 - 99 seconds			
Enable			0	0	0	0	0	0	0	0				
1st Conditional Overlap			0	0	0	0	0	0	0	0				
2nd Conditional Overlap			0	0	0	0	0	0	0	0				
Advance Deactivation Delay			0	0	0	0	0	0	0	0				
Ped Overlaps (next/2/2/8/5)														
Phase -->		1	2	3	4	5	6	7	8	Walk	Ped Clear	Ped Recall	Phase, Ped Recall: X = on Walk, Ped Clear: 0 - 255 seconds	
Ped Overlap	A									0	0			
	B									0	0			
	C									0	0			
	D									0	0			
	E									0	0			
	F									0	0			
	G									0	0			
	H									0	0			
Flashing Yellow Left Turn Arrow (FYLTA) (next/2/2/8/6)														
Phase Pairs -->		1 - 2	3 - 4	5 - 6	7 - 8	0 = off, 3 = 3 outputs, 4 = 4 outputs, 5 = 5 outputs 0 = off, 1 = on, 2 = on, place call across barrier X = on, odd phase must be omitted 0.0 or 2.0 - 25.5 sec 0.0 - 25.5 sec 0 = off, 1 = max out, 2 = yellow lock								
Enable		4	4	4	4									
Even Omits Odd		0	0	0	0									
Detector Switch Odd / Even														
Red Transition		3.0	3.0	3.0	3.0									
Red Extension		0.0	0.0	0.0	0.0									
Return to GLTA		0	0	0	0									
Flashing Yellow Left Turn Arrow (FYLTA) - Continued on last page														

Service Plans (next/2/2/6)									
Service Plan 1	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 2	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 3	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 4	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 5	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 6	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.

Service Plans Cont.									
Phase -->		1	2	3	4	5	6	7	8
Service Plan 7	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Phase -->		1	2	3	4	5	6	7	8
Service Plan 8	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Max Plans (next/2/2/7)									
Phase -->		1	2	3	4	5	6	7	8
Max Plan 1	Normal Max	0	0	0	0	0	0	0	0 - 255 sec
	Fail Max	0	0	0	0	0	0	0	
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Auto Max Limit	0	0	0	0	0	0	0	0 - 255 sec
Max Plan 2	Normal Max	0	0	0	0	0	0	0	0 - 255 sec
	Fail Max	0	0	0	0	0	0	0	
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Auto Max Limit	0	0	0	0	0	0	0	0 - 255 sec
Max Plan 3	Normal Max	0	0	0	0	0	0	0	0 - 255 sec
	Fail Max	0	0	0	0	0	0	0	
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Auto Max Limit	0	0	0	0	0	0	0	0 - 255 sec
Max Plan 4	Normal Max	0	0	0	0	0	0	0	0 - 255 sec
	Fail Max	0	0	0	0	0	0	0	
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Auto Max Limit	0	0	0	0	0	0	0	0 - 255 sec
Max Plan 5	Normal Max	0	0	0	0	0	0	0	0 - 255 sec
	Fail Max	0	0	0	0	0	0	0	
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Auto Max Limit	0	0	0	0	0	0	0	0 - 255 sec
Max Plan 6	Normal Max	0	0	0	0	0	0	0	0 - 255 sec
	Fail Max	0	0	0	0	0	0	0	
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Auto Max Limit	0	0	0	0	0	0	0	0 - 255 sec
Max Plan 7	Normal Max	0	0	0	0	0	0	0	0 - 255 sec
	Fail Max	0	0	0	0	0	0	0	
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Auto Max Limit	0	0	0	0	0	0	0	0 - 255 sec
Max Plan 8	Normal Max	0	0	0	0	0	0	0	0 - 255 sec
	Fail Max	0	0	0	0	0	0	0	
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Auto Max Limit	0	0	0	0	0	0	0	0 - 255 sec

Coordination Data (next/2/3)

Coordination Modes (next/2/3/1, next/2/3/4/1, next/2/3/4/3)

Flash Mode	0	0=off, 1=on, 33=time clock, 34=comm, 35=hardwire, 36=NWS Set only, 37=AB3418 / NTCIP S
Coordination Plan Mode	0	0=free, 1-32 = coord plan 1-32, 33=time clock, 34=comm, 35=hardwire, 36=NWS Set only, 37-
Offset Seeking Mode	2	0=add only, 1= dwell, 2=fastway
Late Ped	0	0 = off, 1 = on
Coord Walk Rest	0	0 = off, 1 = on, 2 = by TOD circuit 160, 3 = end of walk, 4 = coord ped during perms
Repeated Phase Service	0	0=off, 1=on (no coord ped), 2=on (beginning green coord ped), 3=on (coord ped always)
Zero Mode (TS2 only)	1	0=start of main street, 1=end of main street, 2=by TOD circuit 144

Phase -->	1	2	3	4	5	6	7	8	0 = service allowed 1 = service prevented
Omit Phase During Repeated Phase Service	0	0	0	0	0	0	0	0	
Auto Permissive Min Green	0	0	0	0	0	0	0	0	0 - 255 seconds

Coordination Plans (next/2/3/2)

Coord Plan	Coordination Phases		Cycle Length	Offset Time	Min Cycle Length Dwell Time	Permissive	Service Plan	Max Plan
	Ring 1	Ring 2						
1 -	0	0	0	0	0	0	0	0
2 -	0	0	0	0	0	0	0	0
3 -	0	0	0	0	0	0	0	0
4 -	0	0	0	0	0	0	0	0
5 -	0	0	0	0	0	0	0	0
6 -	0	0	0	0	0	0	0	0
7 -	0	0	0	0	0	0	0	0
8 -	0	0	0	0	0	0	0	0
9 -	0	0	0	0	0	0	0	0
10 -	0	0	0	0	0	0	0	0
11 -	0	0	0	0	0	0	0	0
12 -	0	0	0	0	0	0	0	0
13 -	0	0	0	0	0	0	0	0
14 -	0	0	0	0	0	0	0	0
15 -	0	0	0	0	0	0	0	0
16 -	0	0	0	0	0	0	0	0
17 -	0	0	0	0	0	0	0	0
18 -	0	0	0	0	0	0	0	0
19 -	0	0	0	0	0	0	0	0
20 -	0	0	0	0	0	0	0	0
21 -	0	0	0	0	0	0	0	0
22 -	0	0	0	0	0	0	0	0
23 -	0	0	0	0	0	0	0	0
24 -	0	0	0	0	0	0	0	0
25 -	0	0	0	0	0	0	0	0
26 -	0	0	0	0	0	0	0	0
27 -	0	0	0	0	0	0	0	0
28 -	0	0	0	0	0	0	0	0
29 -	0	0	0	0	0	0	0	0
30 -	0	0	0	0	0	0	0	0
31 -	0	0	0	0	0	0	0	0
32 -	0	0	0	0	0	0	0	0
0 - 8			0 - 255 sec.				0 - 8	

Coordination Plans cont.										
Coord Plan	* = Force Offs / Split Times (TS2)								* = Yield Points / Actuated Times (TS2)	
	1	2	3	4	5	6	7	8	Ring 1	Ring 2
1 -	0	0	0	0	0	0	0	0	0	0
2 -	0	0	0	0	0	0	0	0	0	0
3 -	0	0	0	0	0	0	0	0	0	0
4 -	0	0	0	0	0	0	0	0	0	0
5 -	0	0	0	0	0	0	0	0	0	0
6 -	0	0	0	0	0	0	0	0	0	0
7 -	0	0	0	0	0	0	0	0	0	0
8 -	0	0	0	0	0	0	0	0	0	0
9 -	0	0	0	0	0	0	0	0	0	0
10 -	0	0	0	0	0	0	0	0	0	0
11 -	0	0	0	0	0	0	0	0	0	0
12 -	0	0	0	0	0	0	0	0	0	0
13 -	0	0	0	0	0	0	0	0	0	0
14 -	0	0	0	0	0	0	0	0	0	0
15 -	0	0	0	0	0	0	0	0	0	0
16 -	0	0	0	0	0	0	0	0	0	0
17 -	0	0	0	0	0	0	0	0	0	0
18 -	0	0	0	0	0	0	0	0	0	0
19 -	0	0	0	0	0	0	0	0	0	0
20 -	0	0	0	0	0	0	0	0	0	0
21 -	0	0	0	0	0	0	0	0	0	0
22 -	0	0	0	0	0	0	0	0	0	0
23 -	0	0	0	0	0	0	0	0	0	0
24 -	0	0	0	0	0	0	0	0	0	0
25 -	0	0	0	0	0	0	0	0	0	0
26 -	0	0	0	0	0	0	0	0	0	0
27 -	0	0	0	0	0	0	0	0	0	0
28 -	0	0	0	0	0	0	0	0	0	0
29 -	0	0	0	0	0	0	0	0	0	0
30 -	0	0	0	0	0	0	0	0	0	0
31 -	0	0	0	0	0	0	0	0	0	0
32 -	0	0	0	0	0	0	0	0	0	0
0 - 255 sec * = force offs and yield points										

Circuit Mapping (next/2/3/3)																	
Circuit Map	Coord Plan	Time Clock Circuit		Time Clock Circuit		Time Clock Circuit		Time Clock Circuit		Time Clock Circuit		Time Clock Circuit		Time Clock Circuit		Time Clock Circuit	
1	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
2	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
3	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
4	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
5	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
6	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
7	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
8	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
9	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
10	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
11	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
12	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
13	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
14	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
15	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
16	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
17	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
18	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
19	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
20	34	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U

coord plan - 0 = free, 1 - 32 = coord plan 1 - 32, 33 = any, 34 none selected
time clock circuits - 0 = not used, or circuits 6 - 196

Dynamic Phase Length (next/2/3/4/4)									
Phase -->	1	2	3	4	5	6	7	8	
Back Detector	0	0	0	0	0	0	0	0	0 = none, 1-32 = detector 1-32
Lane Factor	0	0	0	0	0	0	0	0	0 = none, 1.0 - 5.0
Check Out Detector	0	0	0	0	0	0	0	0	0 = none, 1-32 = detector 1-32
Coord Delta Force Off	Set A	0	0	0	0	0	0	0	0 - 255 sec
	Set B	0	0	0	0	0	0	0	
	Set C	0	0	0	0	0	0	0	
	Set D	0	0	0	0	0	0	0	
Free Delta Max	Set A	0	0	0	0	0	0	0	
	Set B	0	0	0	0	0	0	0	
	Set C	0	0	0	0	0	0	0	
	Set D	0	0	0	0	0	0	0	

Platoon Progression (next/2/3/4/5)													
Entry Local Only					Master Local Only								
Platoon Max	0	0 - 255 sec			Smoothing Factor	0.0	0.0 - 1.0						
Min Platoon Green	0	0 - 255 sec											
Entry Detector Gap	0.0	0.0 - 25.5											
Min Platoon Cycle	0	0 - 255 sec											
Inbound							Outbound						
Only for Entry Inbound Local or Master Local							Only for Entry Outbound Local or Master Local						
Entry IB Local also Last OB Local	0	0 - 50					Entry OB Local also Last IB Local	0	0 - 50				
Speed	0	0 - 55 mph					Speed	0	0 - 55 mph				
Distance from Entry Local	0	0 - 65000 feet					Distance from Entry Local	0	0 - 65000 feet				
Entry Local Only							Entry Local Only						
Distance from Entry Local Detector	0	0 - 999 feet					Distance from Entry Local Detector	0	0 - 999 feet				
Entry Local Detector	0	0	0 - 32				Entry Local Detector	0	0	0 - 32			
Master Local							Master Local						
Master Mid - System Critical Detectors	0	0	0 - 16				Master Mid - System Critical Detectors	0	0	0 - 16			
Force Off Percents													
Inbound	1	3	4	5	7	8	Outbound	1	3	4	5	7	8
Split 1	0	0	0	0	0	0	Split 1	0	0	0	0	0	0
Split 2	0	0	0	0	0	0	Split 2	0	0	0	0	0	0
	0 - 100 %							0 - 100 %					

Time of Day Data (next/2/4)

Day Program (next/2/4/1)

	Day Prog.	Time	Coord Plan	Coord Plan or Circuit	State On / Off		Day Prog.	Time	Coord Plan	Coord Plan or Circuit	State On/Off
1						51					
2						52					
3						53					
4						54					
5						55					
6						56					
7						57					
8						58					
9						59					
10						60					
11						61					
12						62					
13						63					
14						64					
15						65					
16						66					
17						67					
18						68					
19						69					
20						70					
21						71					
22						72					
23						73					
24						74					
25						75					
26						76					
27						77					
28						78					
29						79					
30						80					
31						81					
32						82					
33						83					
34						84					
35						85					
36						86					
37						87					
38						88					
39						89					
40						90					
41						91					
42						92					
43						93					
44						94					
45						95					
46						96					
47						97					
48						98					
49						99					
50						100					
	1 - 15	hh : mm	X = on	coord plan 0 - 32 or circuit 1-196	X = on		1 - 15	hh : mm	X = on	coord plan 0 - 32 or circuit 1-196	X = on

Day Program cont.												
	Day Prog.	Time	Coord Plan	Coord Plan or Circuit	State On / Off		Day Prog.	Time	Coord Plan	Coord Plan or Circuit	State On / Off	
101						151						
102						152						
103						153						
104						154						
105						155						
106						156						
107						157						
108						158						
109						159						
110						160						
111						161						
112						162						
113						163						
114						164						
115						165						
116						166						
117						167						
118						168						
119						169						
120						170						
121						171						
122						172						
123						173						
124						174						
125						175						
126						176						
127						177						
128						178						
129						179						
130						180						
131						181						
132						182						
133						183						
134						184						
135						185						
136						186						
137						187						
138						188						
139						189						
140						190						
141						191						
142						192						
143						193						
144						194						
145						195						
146						196						
147						197						
148						198						
149						199						
150						200						
	1 - 15	hh : mm	X = on	coord plan 0 - 32 or circuit 1-196	X = on		1 - 15	hh : mm	X = on	coord plan 0 - 32 or circuit 1-196	X = on	

Week Program (next/2/4/2)							
	Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1
0 = none, 1 - 15 = day plan							
Exception Days (next/2/4/6)							
	DOW		WOM		DOM	MOY	Day Prog.
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
	0-10		0 - 5		0-31	0-12	0 - 15
Time Clock References (next/2/4/5)							
Synch reference Mode					0		0 = time
Synch Reference Time					00:00		00:00
Daylight Savings Enable					X		X = on
Reset Time					00:00		00:00

[illegible]

Circuit Overrides (next/2/4/4)							
1 - Coord Line 1	CL1	TOD	On / Off / TOD	51 - Ped Omit 3	PO3	TOD	On / Off / TOD
2 - Coord Line 2	CL2	TOD		52 - Ped Omit 4	PO4	TOD	
3 - Coord Line 4	CL4	TOD		53 - Ped Omit 5	PO5	TOD	
4 - Coord Line 8	CL8	TOD		54 - Ped Omit 6	PO6	TOD	
5 - Coord Line 16	C16	TOD		55 - Ped Omit 7	PO7	TOD	
6 - Coord Operation	CRD	TOD		56 - Ped Omit 8	PO8	TOD	
7 - Soft Flash	SFL	TOD		57 - Conditional Service	CVS	On	
8 - Enable System Relays	ESR	TOD		58 - Inhibit Simultaneous Gap Out	ISG	On	
9 - Call to Non Act 1	CN1	TOD		59 - Inhibit Hardwire	HWI	TOD	
10 - Call to Non Act 2	CN2	TOD		60 - Ped Override Mode	POM	TOD	
11 - Walk Rest Modifier	WRM	TOD		61 - Dual Entry	DLE	On	
12 - Min Recall	MIN	TOD		62 - Exclusive Ped	EPD	TOD	
13 - Max 2 Both Rings	MX2	TOD		63 - Call to Time Clock Mode	CTC	TOD	
14 - Coord Inhibit Max Ring 1, 2	IMT	TOD		64 - Dual Enhanced Ped	DEP	TOD	
15 - Enable Service Log	ESL	TOD		65 - Service Plan 1	SP1	TOD	
16 - Call to Free	CTF	TOD		66 - Service Plan 2	SP2	TOD	
17 - TOD Output 1	TO1	TOD		67 - Service Plan 3	SP3	TOD	
18 - TOD Output 2	TO2	TOD		68 - Service Plan 4	SP4	TOD	
19 - TOD Output 3	TO3	TOD		69 - Service Plan 5	SP5	TOD	
20 - TOD Output 4	TO4	TOD		70 - Service Plan 6	SP6	TOD	
21 - TOD Output 5	TO5	TOD		71 - Service Plan 7	SP7	TOD	
22 - TOD Output 6	TO6	TOD		72 - Service Plan 8	SP8	TOD	
23 - TOD Output 7	TO7	TOD		73 - Max Plan 1	MP1	TOD	
24 - TOD Output 8	TO8	TOD		74 - Max Plan 2	MP2	TOD	
25 - Vehicle Call Phase 1	VC1	TOD		75 - Max Plan 3	MP3	TOD	
26 - Vehicle Call Phase 2	VC2	TOD		76 - Max Plan 4	MP4	TOD	
27 - Vehicle Call Phase 3	VC3	TOD		77 - Max Plan 5	MP5	TOD	
28 - Vehicle Call Phase 4	VC4	TOD		78 - Max Plan 6	MP6	TOD	
29 - Vehicle Call Phase 5	VC5	TOD		79 - Max Plan 7	MP7	TOD	
30 - Vehicle Call Phase 6	VC6	TOD		80 - Max Plan 8	MP8	TOD	
31 - Vehicle Call Phase 7	VC7	TOD		81 - Transit Priority Max Group 1	TG1	TOD	
32 - Vehicle Call Phase 8	VC8	TOD		82 - Transit Priority Max Group 2	TG2	TOD	
33 - Ped Call Phase 1	PC1	TOD		83 - Transit Priority Max Group 3	TG3	TOD	
34 - Ped Call Phase 2	PC2	TOD		84 - Transit Priority Max Group 4	TG4	TOD	
35 - Ped Call Phase 3	PC3	TOD		85 - Transit Priority Max Group 5	TG5	TOD	
36 - Ped Call Phase 4	PC4	TOD		86 - Transit Priority Max Group 6	TG6	TOD	
37 - Ped Call Phase 5	PC5	TOD		87 - Transit Priority Max Group 7	TG7	TOD	
38 - Ped Call Phase 6	PC6	TOD		88 - Transit Priority Max Group 8	TG8	TOD	
39 - Ped Call Phase 7	PC7	TOD		89 - Inhibit Volume Density 1	IV1	TOD	
40 - Ped Call Phase 8	PC8	TOD		90 - Inhibit Volume Density 2	IV2	TOD	
41 - Vehicle Omit 1	VO1	TOD		91 - Inhibit Volume Density 3	IV3	TOD	
42 - Vehicle Omit 2	VO2	TOD		92 - Inhibit Volume Density 4	IV4	TOD	
43 - Vehicle Omit 3	VO3	TOD		93 - Inhibit Volume Density 5	IV5	TOD	
44 - Vehicle Omit 4	VO4	TOD		94 - Inhibit Volume Density 6	IV6	TOD	
45 - Vehicle Omit 5	VO5	TOD		95 - Inhibit Volume Density 7	IV7	TOD	
46 - Vehicle Omit 6	VO6	TOD		96 - Inhibit Volume Density 8	IV8	TOD	
47 - Vehicle Omit 7	VO7	TOD		97 - Lag 1	LG1	TOD	
48 - Vehicle Omit 8	VO8	TOD		98 - Lag 3	LG3	TOD	
49 - Ped Omit 1	PO1	TOD		99 - Lag 5	LG5	TOD	
50 - Ped Omit 2	PO2	TOD		100 - Lag 7	LG7	TOD	

Circuit Overrides cont.							
101 - Inhibit Overlap A	OLA	TOD	On / Off / TOD	151 - Coord Hold 7	HD7	TOD	On / Off / TOD
102 - Inhibit Overlap B	OLB	TOD		152 - Coord Hold 8	HD8	TOD	
103 - Inhibit Overlap C	OLC	TOD		153 - PE Priority Return B	PRB	TOD	
104 - Inhibit Overlap D	OLD	TOD		154 - PE Priority Return C	PRC	TOD	
105 - Enable Schedule A Phone 1	AT1	TOD		155 - PE Priority Return D	PRD	TOD	
106 - Enable Schedule A Phone 2	AT2	TOD		156 - PE Priority Return E	PRE	TOD	
107 - Enable Schedule B Phone 1	BT1	TOD		157 - Platoon Inbound	PPI	TOD	
108 - Enable Schedule B Phone 2	BT2	TOD		158 - Platoon Outbound	PPO	TOD	
109 - Enable Schedule C Phone 1	CT1	TOD		159 - Platoon Spl 2	PS2	TOD	
110 - Enable Schedule C Phone 2	CT2	TOD		160 - Coord Walk Rest	CWR	TOD	
111 - Enable Volume to Call Phone 1	VT1	TOD		161 - Dynamic Phase Length Short Inhibit 1	SI1	TOD	
112 - Enable Volume to Call Phone 2	VT2	TOD		162 - Dynamic Phase Length Short Inhibit 2	SI2	TOD	
113 - Enable Volume Logging	EVL	On		163 - Dynamic Phase Length Short Inhibit 3	SI3	TOD	
114 - Enable MOE Logging	EML	On		164 - Dynamic Phase Length Short Inhibit 4	SI4	TOD	
115 - Detector Low Threshold Inhibit	DLI	TOD		165 - Dynamic Phase Length Short Inhibit 5	SI5	TOD	
116 - Detector Continue Presence Inhibit	DPI	TOD		166 - Dynamic Phase Length Short Inhibit 6	SI6	TOD	
117 - Inhibit Detector Based on Programming	IND	TOD		167 - Dynamic Phase Length Short Inhibit 7	SI7	TOD	
118 - Inhibit Detector Delay	IDD	TOD		168 - Dynamic Phase Length Short Inhibit 8	SI8	TOD	
119 - Inhibit Conditional Ped	ICP	TOD		169 - Coord Late Left Turn 1	CT1	TOD	
120 - Inhibit Transit Priority	ITP	TOD		170 - Coord Late Left Turn 3	CT3	TOD	
121 - Red Rest Ring 1,2	RRM	TOD		171 - Coord Late Left Turn 5	CT5	TOD	
122 - Enable Transcend	TRA	TOD		172 - Coord Late Left Turn 7	CT7	TOD	
123 - Omit Red Clear Ring 1,2	ORC	TOD		173 - Dynamic Phase Length Enable A	DPA	TOD	
124 - Not Used	NJU	TOD		174 - Dynamic Phase Length Enable B	DPB	TOD	
125 - Ped Recycle Ring 1,2	PCY	TOD		175 - Dynamic Phase Length Enable C	DPC	TOD	
126 - Not Used	NJU	TOD		176 - Dynamic Phase Length Enable D	DPD	TOD	
127 - Enable MOE Log to Call Phone 1	MT1	TOD		177 - Proactive Plan Select Average	PSA	TOD	
128 - Enable MOE Log to Call Phone 2	MT2	TOD		178 - Proactive Plan Select Inbound	PSI	TOD	
129 - Transit Inhibit Short Time 1	IS1	TOD		179 - Proactive Plan Select Outbound	PSO	TOD	
130 - Transit Inhibit Short Time 2	IS2	TOD		180 - Split Variant Inbound	SVI	TOD	
131 - Transit Inhibit Short Time 3	IS3	TOD		181 - Split Variant Outbound	SVO	TOD	
132 - Transit Inhibit Short Time 4	IS4	TOD		182 - Disable Coord Walk Rest Ring 1	DW1	TOD	
133 - Transit Inhibit Short Time 5	IS5	TOD		183 - Disable Coord Walk Rest Ring 2	DW2	TOD	
134 - Transit Inhibit Short Time 6	IS6	TOD		184 - Proactive Plan Select New Look	NLK	TOD	
135 - Transit Inhibit Short Time 7	IS7	TOD		185 - Disable Red Clearance Extension	DRX	TOD	
136 - Transit Inhibit Short Time 8	IS8	TOD		186 - Detector Plan Line 1	DL1	TOD	
137 - Enable Transit Priority Logging	ETL	TOD		187 - Detector Plan Line 2	DL2	TOD	
138 - Disable Flashing Yellow Arrow 1	DF1	TOD		188 - Disable LRT 1 Vertical Flashing Bar	DV1	TOD	
139 - Disable Flashing Yellow Arrow 3	DF3	TOD		189 - Disable LRT 2 Vertical Flashing Bar	DV2	TOD	
140 - Disable Flashing Yellow Arrow 5	DF5	TOD		190 - Disable LRT 3 Vertical Flashing Bar	DV3	TOD	
141 - Disable Flashing Yellow Arrow 7	DF7	TOD		191 - Disable LRT 4 Vertical Flashing Bar	DV4	TOD	
142 - Disable Auto Max	DAM	TOD		192 - Datakey Enable	DKE	TOD	
143 - Disable Repeat Phase Service	DRS	TOD		193 - Dynamic Phase Reversal Enable 1	DR1	TOD	
144 - Coord End of Main Street	EMS	TOD		194 - Dynamic Phase Reversal Enable 3	DR3	TOD	
145 - Coord Hold 1	HD1	TOD		195 - Dynamic Phase Reversal Enable 5	DR5	TOD	
146 - Coord Hold 2	HD2	TOD		196 - Dynamic Phase Reversal Enable 7	DR7	TOD	
147 - Coord Hold 3	HD3	TOD		197 - Enable Coord Logging	ECL	On	
148 - Coord Hold 4	HD4	TOD		198 - Disable Gap FYLTA 1,3,5,7	DGF	TOD	
149 - Coord Hold 5	HD5	TOD		199 - Coordination Auto Walk	CAW	TOD	
150 - Coord Hold 6	HD6	TOD		200 - Enable Coordinated Auto Max	ECM	TOD	

Preemption Data (next/2/5)

Sequence (next/2/5/1 - 8)							Instructions
Sequences / Intervals	Instruction	Phases Serviced	Interval Time	Hold On Input	Outputs On	Output Mode	
1	1	0	25	1	1	0	0 - Service Phases
	2	98		0	0	0	1-9 = Special Interval 1-9
	3	0		0	0	0	10 - Preempt Sequence Allows FYLTA
	4	0		0	0	0	11 - Preempt Interval Disables FYLTA
	5	0		0	0	0	15 - Alternate Trap Protection
	6	0		0	0	0	90 - Go to all Red
	7	0		0	0	0	91 - Soft Flash On
	8	0		0	0	0	92 - Soft Flash Off
	9	0		0	0	0	93 - Enable Ped
	10	0		0	0	0	94 - Disable Peds
2	1	0	47	1	1	0	95 - Priority Return
	2	98		0	0	0	96 - Enable Coordination with peds
	3	0		0	0	0	97 - Enable Coordination without peds
	4	0		0	0	0	98 - Return with NO Calls
	5	0		0	0	0	99 - Return with Vehicle Calls
	6	0		0	0	0	100 - jump to step in Interval Time
	7	0		0	0	0	101 - Use Interval Time as Resettable Gap
	8	0		0	0	0	Timer
	9	0		0	0	0	196 - Coord Re-synch with Peds
	10	0		0	0	0	197 - Coord Re-synch without Peds
3	1	0	16	1	1	0	200 - Light Rail Train phase without Peds
	2	98		0	0	0	201 - Light Rail Train phase with Peds
	3	0		0	0	0	202 - Return to highest queue/delay phase
	4	0		0	0	0	(this uses the Dynamic Phase Length
	5	0		0	0	0	Back Detectors)
	6	0		0	0	0	216 - Light Rail Train Coord Re-synch with
	7	0		0	0	0	Peds
	8	0		0	0	0	217 - Light Rail Train Coord Re-synch
	9	0		0	0	0	without Peds
	10	0		0	0	0	
4	1	0	38	1	1	0	
	2	98		0	0	0	
	3	0		0	0	0	
	4	0		0	0	0	
	5	0		0	0	0	Phases Serviced - phases 1 - 8
	6	0		0	0	0	
	7	0		0	0	0	Interval Time - 0 - 255 sec or interval 1 - 10
	8	0		0	0	0	
	9	0		0	0	0	Hold on Input:
	10	0		0	0	0	0 = Do not hold
5	1	0		0	0	0	1 = Hold
	2	0		0	0	0	2 = Ped Service to Rest in Walk
	3	0		0	0	0	
	4	0		0	0	0	Outputs On - output 1 - 8
	5	0		0	0	0	
	6	0		0	0	0	Output Modes -
	7	0		0	0	0	0 = all steady on
	8	0		0	0	0	1 = all flash together
	9	0		0	0	0	2 = odd flashes WIG, even flashes WAG
	10	0		0	0	0	3 = 1 - 4 steady on, 5 - 8 all flash together

Sequence cont.											
Sequences / Intervals		Instruction	Phases Serviced	Interval Time	Hold On Input	Outputs On	Output Mode				
6	1	0	12345678	0	1		0				
	2	98		0	0		0				
	3	0		0	0		0				
	4	0		0	0		0				
	5	0		0	0		0				
	6	0		0	0		0				
	7	0		0	0		0				
	8	0		0	0		0				
	9	0		0	0		0				
	10	0		0	0		0				
7	1	0		0	0		0				
	2	0		0	0		0				
	3	0		0	0		0				
	4	0		0	0		0				
	5	0		0	0		0				
	6	0		0	0		0				
	7	0		0	0		0				
	8	0		0	0		0				
	9	0		0	0		0				
	10	0		0	0		0				
8	1	0		0	0		0				
	2	0		0	0		0				
	3	0		0	0		0				
	4	0		0	0		0				
	5	0		0	0		0				
	6	0		0	0		0				
	7	0		0	0		0				
	8	0		0	0		0				
	9	0		0	0		0				
	10	0		0	0		0				
Sequence Timing (next/2/5/0)											
Sequence -- >			1	2	3	4	5	6	7	8	
Input Memory											X = on
Input Priority			6	6	6	6	0	0	0	0	0 = lowest, - 8 = highest
Entry (Transition) Parameters	Min Green		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0 - 25.5 sec
	Walk		0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0 would time the normal function time
	Ped Clear		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	
	Overlap Yellow		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0 - 25.5 sec
	Overlap Red		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Delay to Preempt		0	0	0	0	0	0	0	0	
	Delay Ped Omit		0	0	0	0	0	0	0	0	0 - 255 sec
	Delay Phase Omit		0	0	0	0	0	0	0	0	
Min Reservice			0	0	0	0	0	0	0	0	0 - 255 min
Overlap Inhibits	A										X = inhibit
	B										
	C										
	D										
Exit Parameters	Exit to Coord Plan Offset by X		0	0	0	0	0	0	0	0	0 - 20
	Exit Coord Plan Time		0	0	0	0	0	0	0	0	0 - 60 min
	Exit to Max Plan		0	0	0	0	0	0	0	0	0 - 8
	Exit Free Time		0	0	0	0	0	0	0	0	0 - 60 min
	Override Time		0	0	0	0	0	0	0	0	
	Fail Time		0	0	0	0	0	0	0	0	
	Exit Mode Time		0	0	0	0	0	0	0	0	

Priority Return and Special Intervals (next/2/5/0/6, next/2/5/9)														
Phase / Overlap -->		1	2	3	4	5	6	7	8	A	B	C	D	
Priority Return	Enable	0	0 = disabled, 1 = enabled, 2 = enabled, skip preemption phases on exit											
	A (max)	0	0	0	0	0	0	0	0	0 - 100% of currently used max				
	B (max)	0	0	0	0	0	0	0	0					
	C (max)	0	0	0	0	0	0	0	0					
	D (max)	0	0	0	0	0	0	0	0					
	E (max)	0	0	0	0	0	0	0	0					
	Ped Clear	0	0	0	0	0	0	0	0	0	0 - 100% of currently used ped clearance			
Queue Delay Recovery		0	0	0	0	0	0	0	0	0 - 255 sec.				
Special Intervals	1	0	0	0	0	0	0	0	0	0	0	0	0	0 = Dark 1 = green don't walk 2 = green walk 3 = green flashing don't walk 4 = yellow 5 = red 6 = flashing yellow WIG 7 = flashing yellow WAG 8 = flashing red WIG 9 = flashing red WAG 10 = walk only 11=flashing don't walk only
	2	0	0	0	0	0	0	0	0	0	0	0	0	
	3	0	0	0	0	0	0	0	0	0	0	0	0	
	4	0	0	0	0	0	0	0	0	0	0	0	0	
	5	0	0	0	0	0	0	0	0	0	0	0	0	
	6	0	0	0	0	0	0	0	0	0	0	0	0	
	7	0	0	0	0	0	0	0	0	0	0	0	0	
	8	0	0	0	0	0	0	0	0	0	0	0	0	
	9	0	0	0	0	0	0	0	0	0	0	0	0	
Light Rail Train (next/2/5/0/7)														
Light Rail Train -->		1	2	3	4									
Associated Preempt		0	0	0	0	0 = none, preempt 1 - 8								
Time to Green		0	0	0	0	0 - 255 sec								
Horizontal Bar Flash Time		0.0	0.0	0.0	0.0	0.0 - 25.5 sec								
Vertical Bar Flash Time		0.0	0.0	0.0	0.0									
Min Duration		0	0	0	0	0 - 255 sec								

Communications Data (next/2/6)

1st Central Phone Number			2nd Central Phone Number				
Modem Setup String		<i>AT&F&N6&W0Y0</i>		Intersection Name			
Subnet Mask		<i>0.0.0.0</i>		<i>Rimrock at W. Antler</i>			
IP (ethernet) Port		<i>0</i>					
Central Port		<i>0</i>					
System Mode		<i>0</i>					
System Port		<i>0</i>		Alternate System Port			
				<i>0</i>			
System ID	<i>158</i>	AB3418e Physical Address	<i>0</i>	IP Address	<i>0.0.0.0</i>		
Local ID	<i>1</i>	AB3418e Group Address	<i>0</i>	Gateway Address	<i>0.0.0.0</i>		
Baud Rates		Flow Control		Port Use			
Port 1 (Slot A2 Upper)		<i>0</i>		<i>Suggested Use - FSK</i>			
Port 2 (Slot A2 Lower)		<i>0</i>		<i>modem to central</i>			
Port 3 (Slot A1 Upper)		<i>0</i>		<i>Suggested Use - Modem to Central</i>			
Port 4 (Slot A1 Lower or C50S)		<i>2</i>		<i>Suggested Use - RS232 to Laptop</i>			
0 = 1200, 1 = 2400, 2 = 9600, 3 = 19200 baud		0 = off, 1 = on					
Reports							
Volume Log Period		<i>15</i>	minute	Volume/Occ Log Period	<i>0</i> second		
		MOE Log Period					
		<i>60</i> minute					
0 = disabled, 1,2,3,4,5,6,10,12,15,20,30,60 minutes							
Function Schedule Mapping (next/2/6/7)							
Alarm 1		<i>0</i>	0 = none 1 = schedule A 2 = schedule B 3 = schedule C 4 = schedule R	Soft Flash		<i>2</i>	0 = none 1 = schedule A 2 = schedule B 3 = schedule C 4 = schedule R
Alarm 2		<i>0</i>		Manual Control Enable (MCE)		<i>2</i>	
Alarm 3		<i>0</i>		Emergency or Railroad Preempt		<i>1</i>	
Alarm 4		<i>0</i>		Not Used		<i>0</i>	
Alarm 5		<i>0</i>		Cycle Failure		<i>2</i>	
Not Used		<i>0</i>		Coordination Failure		<i>2</i>	
Not Used		<i>0</i>		Keyboard use / Data Changed		<i>2</i>	
Not Used		<i>0</i>		Coord Running / Free		<i>0</i>	
Power On / Off		<i>2</i>		Cabinet Door		<i>2</i>	
Checksum Failure		<i>2</i>		Extended Ped Pushbutton		<i>0</i>	
Video / Detector Failure		<i>2</i>	Monitor Status		<i>2</i>		
Master to Local Comm Lost		<i>0</i>	Red Extension		<i>0</i>		

Miscellaneous Data

Transit Priority (next/2/7)										
	1	2	3	4	5	6	7	8		
Phases									Phases 1 - 8 (max of 2 compatible phases)	
PE Enable (6.25Hz TP call on PE)									X = 6.25 Hz signal will activate TP	
Priority	0	0	0	0	0	0	0	0	0 - 8, 8 = highest	
Memory									X = on	
Delay Time	0	0	0	0	0	0	0	0	0 - 255 sec	
Minimum Reservice Time (per input)	0	0	0	0	0	0	0	0	0 - 255 min	
Override Time	0	0	0	0	0	0	0	0	0 - 255 sec	
Bus Extend	0	0	0	0	0	0	0	0	0 - 255 sec	
Minimum Reservice Time (all inputs)	0	0 - 255 min								
Free Operation Mode	0	0 = use shortest of max 1 or 2, 1 - 8 = use max time of group 1 - 8, 9 = use time of day								
Transit Priority Alternate Force Off Plans										
Current Coord Plan	1	2	3	4	5	6	7	8	0 = none 17 - 32 = coord plan 17 - 32	
Alternate TP Force Off Plan	0	0	0	0	0	0	0	0		
Current Coord Plan	9	10	11	12	13	14	15	16		
Alternate TP Force Off Plan	0	0	0	0	0	0	0	0		
Group Timing										
Phase -->	1	2	3	4	5	6	7	8	0 - 255 sec 0 would time the normal function time	
Group 1	Max Times	0	0	0	0	0	0	0		0
	Walk Times	0	0	0	0	0	0	0		0
Group 2	Max Times	0	0	0	0	0	0	0		0
	Walk Times	0	0	0	0	0	0	0		0
Group 3	Max Times	0	0	0	0	0	0	0		0
	Walk Times	0	0	0	0	0	0	0		0
Group 4	Max Times	0	0	0	0	0	0	0		0
	Walk Times	0	0	0	0	0	0	0		0
Group 5	Max Times	0	0	0	0	0	0	0		0
	Walk Times	0	0	0	0	0	0	0		0
Group 6	Max Times	0	0	0	0	0	0	0		0
	Walk Times	0	0	0	0	0	0	0		0
Group 7	Max Times	0	0	0	0	0	0	0		0
	Walk Times	0	0	0	0	0	0	0		0
Group 8	Max Times	0	0	0	0	0	0	0		0
	Walk Times	0	0	0	0	0	0	0	0	
Truck Priority (next/2/7/9)										
Truck Priority-->	1	2	3	4						
Associated Transit Priority	0	0	0	0	0 = none 1 - 8 = transit priority 1 - 8					
Leading Detector	0	0	0	0	0 = none, 1 - 32 = detector 1 - 32					
Trailing Detector	0	0	0	0						
Stop Bar Distance	0	0	0	0	0 - 999 feet					
Trap Distance	0	0	0	0	0.0 - 99.9 feet					
Minimum Speed	0	0	0	0	0 - 100 mph					
Minimum Length	0	0	0	0	0 - 255 feet					
Downhill Grade	0	0	0	0	0 - 20 %					
Uphill Grade	0	0	0	0						
Undersized Vehicle					X = Enabled					
Change I/O		X = On (After a download with a power on - off cycle)								

Inputs (Non Default I/O is offset to the right) (next/2/8/1)											
C1-39	101	VD9	C1-55	15	VD5	C1-67	22	PED2	C11-15	254	N/U
C1-40	113	VD19	C1-56	11	VD1	C1-68	26	PED6	C11-16	254	N/U
C1-41	106	VD14	C1-57	17	VD7	C1-69	24	PED4	C11-17	254	N/U
C1-42	118	VD24	C1-58	13	VD3	C1-70	28	PED8	C11-18	254	N/U
C1-43	102	VD10	C1-59	16	VD6	C1-71	151	PE1	C11-19	254	N/U
C1-44	114	VD20	C1-60	12	VD2	C1-72	152	PE2	C11-20	254	N/U
C1-45	107	VD15	C1-61	18	VD8	C1-73	153	PE3	C11-21	254	N/U
C1-46	161	VD25	C1-62	14	VD4	C1-74	154	PE4	C11-22	254	N/U
C1-47	105	VD13	C11-10	254	N/U	C1-75	254	N/U	C11-23	254	N/U
C1-48	117	VD23	C11-11	254	N/U	C1-76	104	VD12	C11-24	254	N/U
C1-49	112	VD18	C11-12	254	N/U	C1-77	116	VD22	C11-25	254	N/U
C1-50	164	VD28	C11-13	254	N/U	C1-78	111	VD17	C11-26	254	N/U
C1-51	254	N/U	C1-63	103	VD11	C1-79	163	VD27	C11-27	254	N/U
C1-52	155	PE5	C1-64	115	VD21	C1-80	82	IADV	C11-28	254	N/U
C1-53	85	MCE	C1-65	108	VD16	C1-81	137	MONS	C11-29	254	N/U
C1-54	254	N/U	C1-66	162	VD26	C1-82	62	ST1	C11-30	254	N/U

Outputs (Non Default I/O is offset to the right) (next/2/8/2)											
C1-2	44	4DWK	C1-19	48	8DWK	C1-35	215	FYA1	C1-91	41	1DWK
C1-3	64	4WLK	C1-20	68	8WLK	C1-36	217	FYA5	C1-93	61	1WLK
C1-4	14	4RED	C1-21	18	8RED	C1-37	216	FYA3	C1-94	106	OLBR
C1-5	24	4YEL	C1-22	28	8YEL	C1-38	218	FYA7	C1-95	105	OLBY
C1-6	34	4GRN	C1-23	38	8GRN	C1-100	53	3PCL	C1-96	104	OLBG
C1-7	13	3RED	C1-24	17	7RED	C1-101	51	1PCL	C1-97	103	OLAR
C1-8	222	FYC3	C1-25	224	FYC7	C1-102	187	SFL	C1-98	102	OLAY
C1-9	33	3GRN	C1-26	37	7GRN	C1-103	147	WDOG	C1-99	101	OLAG
C1-10	42	2DWK	C1-27	46	6DWK	C1-83	43	3DWK	C11-1	254	N/U
C1-11	62	2WLK	C1-28	66	6WLK	C1-84	63	3WLK	C11-2	254	N/U
C1-12	12	2RED	C1-29	16	6RED	C1-85	116	OLDR	C11-3	254	N/U
C1-13	22	2YEL	C1-30	26	6YEL	C1-86	115	OLDY	C11-4	254	N/U
C1-15	32	2GRN	C1-31	36	6GRN	C1-87	114	OLDG	C11-5	254	N/U
C1-16	11	1RED	C1-32	15	5RED	C1-88	113	OLCR	C11-6	254	N/U
C1-17	221	FYC1	C1-33	223	FYC5	C1-89	112	OLCY	C11-7	254	N/U
C1-18	31	1GRN	C1-34	35	5GRN	C1-90	111	OLCG	C11-8	254	N/U

Internal Logic (next/2/9)			
Step	Inst.	Description	Comment
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Internal Logic cont.			
Step	Inst.	Description	Comment
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Internal Logic cont.			
Step	Inst.	Description	Comment
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Internal Logic cont.			
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Internal Logic cont.				
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256				

FYLTA - Continued (next/2/2/8/6)						
Phase Pairs -->		1 - 2	3 - 4	5 - 6	7 - 8	
Gap-Dependent FYLTA (next/2/2/8/6-A)	Detector Input	0	0	0	0	0 = disable, 1 - 64 detectors
	Min Delay	0	0	0	0	0 - 255 sec
	Detector Gap	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Max Delay	0	0	0	0	0 - 255 sec
	Not Ped	0	0	0	0	0 - 255 sec
FYLTA Gap-Dependent Plans (next/2/2/8/6)						
Phase Pairs -->		1 - 2	3 - 4	5 - 6	7 - 8	
FYLTA Gap-Dependent Plan A	Detector Input	0	0	0	0	0 = disable, 1 - 64 detectors
	Min Delay	0	0	0	0	0 - 255 sec
	Detector Gap	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Max Delay	0	0	0	0	0 - 255 sec
	Not Ped	0	0	0	0	0 - 255 sec
FYLTA Gap-Dependent Plan B	Detector Input	0	0	0	0	0 = disable, 1 - 64 detectors
	Min Delay	0	0	0	0	0 - 255 sec
	Detector Gap	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Max Delay	0	0	0	0	0 - 255 sec
	Not Ped	0	0	0	0	0 - 255 sec
FYLTA Gap-Dependent Plan C	Detector Input	0	0	0	0	0 = disable, 1 - 64 detectors
	Min Delay	0	0	0	0	0 - 255 sec
	Detector Gap	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Max Delay	0	0	0	0	0 - 255 sec

	Not Ped	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 - 255 sec											
FYLTA Gap-Dependent Plan D	Detector Input	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 = disable, 1 - 64 detectors											
	Min Delay	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 - 255 sec											
	Detector Gap	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	0 - 25.5 sec											
	Max Delay	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 - 255 sec											
	Not Ped	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 - 255 sec											
Preemption - Continued																	
Railroad Communications (IEEE 1570) (next/2/5/0/8)																	
		ATC			Wayside												
Railroad Number		<i>0</i>			<i>0</i>			0 - 999, represents railroad									
Railroad Line Number		<i>0</i>			<i>0</i>			0 - 999, represents railroad line									
Group Number		<i>0</i>			<i>0</i>			0 - 999, represents physical group of equipment									
Subnode Number		<i>0</i>			<i>0</i>			0 - 99, subnode within physical group of equipment									
Device Number		<i>0</i>			<i>0</i>			0 - 99, device within physical group of equipment									
Associated Preempt		<i>0</i>						0 - 8									
Communication Port		<i>0</i>						0 - 4									
Reports - Continued																	
Reports - Service Delay Modes (next/2/6/0)																	
Phase -->		1	2	3	4	5	6	7	8								
Mode		<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 = disable, 1 = enable, 2 = Ped, 3 = Veh/P							
Ped Overlap -->		A	B	C	D	E	F	G	H								
Mode		<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 = disable, 1 = enable							
Detector -->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Enable	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	
Detector -->	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
Enable	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	
Detector -->	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
Enable	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	
Detector -->	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	
Enable	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	

<i>Regio</i>			
Monday, August 28, 2017 14:48			
Intersection Name	<i>1 - South Canal at Odem Medo</i>		Local ID <i>1</i>
Intersection Telephone Number			
System Name	<i>154 - Odem Medo</i>		System ID <i>154</i>
Controller Type	<i>Voyage - C1-C11</i>		
Controller Serial Number			Installation Date
Programmed by			Programmed Date
Graphic Map Background		Phase Rotation Diagram	

Control Data (next/2/2)

Controller Function and Timing (next/2/1, next/2/2)

Security, Sequence, Initialization

Security Code	<i>****</i>	0 = disabled, or 1000-9999
Sequence	<i>2</i>	0 = sequential, 1 = quad left turn, 2-6 = special A-E, 7 = lead lag

	Lead Lag (next/2/2/3)			
	Phases 1 - 2	Phases 3 - 4	Phases 5 - 6	Phases 7 - 8
	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
0 = no reversal, 1 = reversal, 2 = by coord plan or clock				

Initialization and Flash (next/2/2/5)

	Initialization	Flash Entry	Flash Exit	
Ring 1 Phase	<i>1</i>	<i>2</i>	<i>1</i>	phase 1-8
Ring 2 Phase	<i>5</i>	<i>6</i>	<i>5</i>	phase 1-8
Interval	<i>0</i>	<i>0</i>	<i>0</i>	0 = red, 1 = yellow, 2 = green
Power up Flash	<i>0.0</i>	0.0 - 25.5 seconds	First All Red	<i>6.0</i> 0.0 - 25.5 seconds

Soft Flash (next/2/2/5)

Phase	1	2	3	4	5	6	7	8	0 = dark, 1=flash yel WIG, 2 = flash yel WAG, 3 = flash red WIG, 4 = flash red WAG				
	3	4	3	4	3	4	3	4					
Overlap	A	B	C	D	E	F	G	H	I	J	K	L	same as phase
	3	4	3	4	3	4	3	4	3	4	3	4	
Internal Logic Output	1	2	3	4	5	6	7	8	9	10	11	12	0 = normal, 1 = dark, 2 = flash WIG
	0	0	0	0	0	0	0	0	0	0	0	0	

Per Phase Functions (next/2/2/3, next/2/2/1)									
	1	2	3	4	5	6	7	8	
Phases Used	X	X		X	X	X		X	X = on
Restricted Phases									X = on (Sequence 2, 6, 7 only)
Exclusive Phases									X = on (Sequence 7 only)
Yellow Lock									X = on
Min Recall		X				X			
Max Recall									
Ped Recall									
Red Lock									
Max Out Recall Inhibit	X			X	X			X	
Soft Recall									
Free Walk Rest									
Conditional Ped									
Disable Inhibit Max Termination									
Call to Non Act 1									
Call to Non Act 2									
Dual Entry (next/2/2/9/3)									
Mode	0	0 = off, 1 = on, 2 = Not Used, 3 = by coord plan, 4 = by time clock circuit 61							
Dual Entry Phase -->	1	2	3	4	5	6	7	8	
Phase	0	0	0	0	0	0	0	0	0 = none, 1-8 = phase 1-8
Conditional Service, Five Section Head									
Conditional Service (next/2/2/9/3)			5 Section Head Logic (next/2/2/9/4)						
	Mode	CS Max Time	X Omits Y		Anti-Trap			Yellow Blanking LT	
Phase 1	0	0	X : Y		Trap Protected Phase		Next Phase	Phase	
Phase 3	0	0	6 : 1	0	1		< (5)	1	
Phase 5	0	0	8 : 3	0	3		< (7)	3	
Phase 7	0	0	2 : 5	0	5		< (1)	5	
0 = off, 1 = C.S.On. 2 = C.S. on by TOD circuit 57, 3 = N/A, 4 = C.S. and C.R. On, 5 = C.R. on by TOD circuit 57.			4 : 7	0	7		< (3)	7	
			0=off, 1=side call, 2=no side call		X = On				

Phase Times (next/2/2/2, next/2/2/9/5)									
	1	2	3	4	5	6	7	8	
Movement	<i>SBLT</i>	<i>NB</i>		<i>EB</i>	<i>NBLT</i>	<i>SB</i>		<i>WB</i>	
Minimum Green	6	10	0	8	6	10	0	5	0 - 255 sec
Passage	2.0	3.0	0.0	2.0	2.0	3.0	0.0	2.0	0.0 - 25.5 sec
Yellow	4.0	4.0	4.0	4.0	4.0	4.0	0.0	4.0	0.0 - 25.5 sec
Red Clearance	1.0	1.0	0.0	1.0	1.0	1.0	0.0	1.0	0.0 - 25.5 sec or 0 - 255 sec
Max 1	12	35	0	12	10	35	0	20	0 - 255 sec
Max 2	10	20	0	15	10	20	0	15	0 - 255 sec
Walk	0	7	0	7	0	7	0	7	0 - 255 sec
Ped Clear	0	15	0	15	0	15	0	15	0 - 255 sec
Seconds Per Actuation	0.0	1.1	0.0	0.0	0.0	1.1	0.0	0.0	0.0 - 25.5 sec
Time Before Reduction	6	10	0	5	6	10	0	6	0 - 255 sec
Time to Reduce	6	20	0	5	6	20	0	6	0 - 255 sec
Minimum Gap	1.5	2.0	0.0	1.5	1.5	2.0	0.0	1.5	0.0 - 25.5 sec
Max Variable Initial	6	10	0	5	6	10	0	8	0 - 255 sec
Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec
Auto Max Limit	0	0	0	0	0	0	0	0	0 - 255 sec
Inhibit Min Yellow									X = On
Red Decimal Off									X = On
Advance Walk	0	4	0	4	0	0	0	4	0 - 255 sec
Other Controller Functions (next/2/2/9)									
Phase -->	1	2	3	4	5	6	7	8	
Inhibit Simultaneous Gap Out	X			X	X			X	X = On
Last Car Passage	2	0 = recall phase, 1 = last car passage, 2 = NOT recall - Not last car passage							
Red Revert (+2 seconds)	3.0	0 - 25.5 sec							
Auto Ped Clear	X	X = On							
Flashing Don't Walk Into Yellow		X = On							
Soft Recall / Red Rest Delay	0.0	0 - 25.5 sec							
Ped Pushbutton	0	0 - 5 sec, 0 = disable							
Advance Flash Rate	0	0 = disable, 1 = 120 FPM							
Change Sequence		X = On (After a download with a power on - off cycle)							
Phase -->	1	2	3	4	5	6	7	8	
Red Clear Extension Detector	0	0	0	0	0	0	0	0	0 = none 1 - 32 = detector 1 - 32
Red Clear Extension Red Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 25.5 sec.

Local Detectors (next/2/2/4)									
Detector Data									
	Yellow Lock	Detector Inhibit	Call Phase	Extend Phase	Switch Phase	Delay Time	Stretch / Disconnect Time	Delay or Disconnect Mode	
Detector 1 - I1SBLT(11)			1	1	0	0	0.0	0	
Detector 2 - I9USB (9)			1	1	0	0	0.0	0	
Detector 3 - I5			3	3	0	0	0.0	0	
Detector 4 - I9L			3	3	0	0	0.0	0	
Detector 5 - J1NBLT (9)			5	5	0	20	0.0	0	
Detector 6 - J9U			5	5	0	0	0.0	0	
Detector 7 - J5			7	7	0	0	0.0	0	
Detector 8 - J9L			7	7	0	0	0.0	0	
Detector 9 - I2UNB (3)			2	2	0	0	0.0	0	
Detector 10 - I2L			2	2	0	0	0.0	0	
Detector 11 - I3UNBA (1)			2	2	0	0	0.0	0	
Detector 12 - I3LNBO			0	2	0	15	0.0	0	
Detector 13 - I4			2	0	0	0	0.0	0	
Detector 14 - I6U			4	4	0	0	0.0	0	
Detector 15 - I6L			4	4	0	0	0.0	0	
Detector 16 - I7UEB (1)			4	4	0	0	0.0	0	
Detector 17 - I7L			0	4	0	0	0.0	0	
Detector 18 - I8			4	0	0	0	0.0	0	
Detector 19 - J2U			6	6	0	0	0.0	0	
Detector 20 - J2LSBA (7)			6	6	0	0	0.0	0	
Detector 21 - J3USB (5)			6	6	0	0	0.0	0	
Detector 22 - J3LSBbike			0	6	0	0	0.0	0	
Detector 23 - J4			6	0	0	0	0.0	0	
Detector 24 - J6UWBT(7)			8	8	0	0	0.0	0	
Detector 25 - J6LWBTB(8)			8	8	0	0	0.0	0	
Detector 26 - J7UWBRTB			8	8	0	12	0.0	0	
Detector 27 - J7LWBTHB			0	8	0	0	0.0	0	
Detector 28 - J8			8	0	0	0	0.0	0	
Detector 29 -			0	0	0	0	0.0	0	
Detector 30 -			0	0	0	0	0.0	0	
Detector 31 -			0	0	0	0	0.0	0	
Detector 32 -			0	0	0	0	0.0	0	
yellow lock, detector inhibit, - X = On; call, extend, phase - 0 = none 1 - 8 = phase 1 - 8 ; delay time - 0 - 255 sec stretch / disconnect time - 0.0 - 25.5 sec.; delay or disconnect Mode - 0 -13									
Detector Plans (next/2/2/4/5)									
Loop Number									
Plan Detectors		0	0	0	0	0	0	0	0 - 32, 0 = none, 1 -3 2 = detectors 1 - 32
Detector Plan 1	Call Phase	0	0	0	0	0	0	0	0 - 8, 0 = none, 1 - 8 = phase 1 - 8
	Extend Phase	0	0	0	0	0	0	0	
	Switch Phase	0	0	0	0	0	0	0	
	Delay Time	0	0	0	0	0	0	0	0 - 255 sec
	Stretch/Disconnect Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec
	Delay/ Disconnect Mode	0	0	0	0	0	0	0	0 - 13
Detector Plan 2	Call Phase	0	0	0	0	0	0	0	0 - 8, 0 = none, 1 - 8 = phase 1 - 8
	Extend Phase	0	0	0	0	0	0	0	
	Switch Phase	0	0	0	0	0	0	0	
	Delay Time	0	0	0	0	0	0	0	0 - 255 sec
	Stretch/Disconnect Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec
	Delay/ Disconnect Mode	0	0	0	0	0	0	0	0 - 13
Detector Plan 3	Call Phase	0	0	0	0	0	0	0	0 - 8, 0 = none, 1 - 8 = phase 1 - 8
	Extend Phase	0	0	0	0	0	0	0	
	Switch Phase	0	0	0	0	0	0	0	
	Delay Time	0	0	0	0	0	0	0	0 - 255 sec
	Stretch/Disconnect Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec
	Delay/ Disconnect Mode	0	0	0	0	0	0	0	0 - 13

Detector Fail Monitor (next/2/2/4/3)					Detectors 33-64 (next/2/2/4/6)					
	Fail Monitor Enable	Recall Phase	Min Counts	Max Counts		Call Phase	Extend Phase			
Detector 1 - I1SBLT(11)		0	0	0	Detector 33 -	0	0			
Detector 2 - I9USB (9)		0	0	0	Detector 34 -	0	0			
Detector 3 - I5		0	0	0	Detector 35 -	0	0			
Detector 4 - I9L		0	0	0	Detector 36 -	0	0			
Detector 5 - J1NBLT (9)		0	0	0	Detector 37 -	0	0			
Detector 6 - J9U		0	0	0	Detector 38 -	0	0			
Detector 7 - J5		0	0	0	Detector 39 -	0	0			
Detector 8 - J9L		0	0	0	Detector 40 -	0	0			
Detector 9 - I2UNB (3)		0	0	0	Detector 41 -	0	0			
Detector 10 - I2L		0	0	0	Detector 42 -	0	0			
Detector 11 - I3UNBA (1)		0	0	0	Detector 43 -	0	0			
Detector 12 - I3LNBO		0	0	0	Detector 44 -	0	0			
Detector 13 - I4		0	0	0	Detector 45 -	0	0			
Detector 14 - I6U		0	0	0	Detector 46 -	0	0			
Detector 15 - I6L		0	0	0	Detector 47 -	0	0			
Detector 16 - I7UEB (1)		0	0	0	Detector 48 -	0	0			
Detector 17 - I7L		0	0	0	Detector 49 -	0	0			
Detector 18 - I8		0	0	0	Detector 50 -	0	0			
Detector 19 - J2U		0	0	0	Detector 51 -	0	0			
Detector 20 - J2LSBA (7)		0	0	0	Detector 52 -	0	0			
Detector 21 - J3USB (5)		0	0	0	Detector 53 -	0	0			
Detector 22 - J3LSBbike		0	0	0	Detector 54 -	0	0			
Detector 23 - J4		0	0	0	Detector 55 -	0	0			
Detector 24 - J6UWBT(7)		0	0	0	Detector 56 -	0	0			
Detector 25 - J6LWBTB(8)		0	0	0	Detector 57 -	0	0			
Detector 26 - J7UWBRTB		0	0	0	Detector 58 -	0	0			
Detector 27 - J7LWBTHB		0	0	0	Detector 59 -	0	0			
Detector 28 - J8		0	0	0	Detector 60 -	0	0			
Detector 29 -		0	0	0	Detector 61 -	0	0			
Detector 30 -		0	0	0	Detector 62 -	0	0			
Detector 31 -		0	0	0	Detector 63 -	0	0			
Detector 32 -		0	0	0	Detector 64 -	0	0			
fail monitor enable - X = On, recall phase - 0 = none 1 - 8 = phase 1 - 8, min, max					call / extend phase - 0 = none 1 - 8 = phase 1 - 8					
Detector Fail Sample Period (all detectors)			0		0 - 255 minutes					
Video Fail Inputs (next/2/2/4/3) -->		1	2	3	4	5	6	7	8	0 = none, 1 - 8 = phase 1 - 8
Phase Recalled		0	0	0	0	0	0	0	0	
System Detectors (next/2/2/4/4)										
System Detectors -->		1	2	3	4	5	6	7	8	0 = none, 1 - 32 = phase 1 - 32
Local Detector		0	0	0	0	0	0	0	0	

Overlaps / FYLTA (next/2/2/8)														
Vehicle Overlaps		Phase or Movement	Phases								Extension Green	Clearance		A - D 0 = none 1 = overlap 2 = 60 FPM 3 = Not ped 4=Comp. Ph. 5=Prevent. Ext. 6=Not Veh. 7=Adv. FF E - L 0 = no Overlap 1 = Overlap Green, Yellow Red
			1	2	3	4	5	6	7	8		Yellow	Red	
Overlaps	A		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	B		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	C		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	D		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	E		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	F		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	G		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	H		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	I		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	J		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	K		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
	L		0	0	0	0	0	0	0	0	0.0	0.0	0.0	
Not Ped - Ped Overlaps (next/2/2/8/5)														
Ped Overlaps -->		A	B	C	D	E	F	G	H	X = Nor Ped Ped Overlap				
Overlaps	A													
	B													
	C													
	D													
Advance Warning (next/2/2/8/3)														
			E	F	G	H	I	J	K	L	0 = disabled, 1 = enabled 0 = none, 1 - overlap E, 2 = overlap F, etc. 0 - 99 seconds			
Enable			0	0	0	0	0	0	0	0				
1st Conditional Overlap			0	0	0	0	0	0	0	0				
2nd Conditional Overlap			0	0	0	0	0	0	0	0				
Advance Deactivation Delay			0	0	0	0	0	0	0	0				
Ped Overlaps (next/2/2/8/5)														
Phase -->		1	2	3	4	5	6	7	8	Walk	Ped Clear	Ped Recall	Phase, Ped Recall: X = on Walk, Ped Clear: 0 - 255 seconds	
Ped Overlap	A				X				X	7	15			
	B									0	0			
	C									0	0			
	D									0	0			
	E									0	0			
	F									0	0			
	G									0	0			
H									0	0				
Flashing Yellow Left Turn Arrow (FYLTA) (next/2/2/8/6)														
Phase Pairs -->		1 - 2	3 - 4	5 - 6	7 - 8	0 = off, 3 = 3 outputs, 4 = 4 outputs, 5 = 5 outputs 0 = off, 1 = on, 2 = on, place call across barrier X = on, odd phase must be omitted 0.0 or 2.0 - 25.5 sec 0.0 - 25.5 sec 0 = off, 1 = max out, 2 = yellow lock								
Enable		4	0	4	0									
Even Omits Odd		1	0	1	0									
Detector Switch Odd / Even		X	X	X	X									
Red Transition		3.0	2.0	3.0	2.0									
Red Extension		3.0	0.0	3.0	0.0									
Return to GLTA		0	0	0	0									
Flashing Yellow Left Turn Arrow (FYLTA) - Continued on last page														

Service Plans (next/2/2/6)									
Service Plan 1	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 2	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 3	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 4	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 5	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 6	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.

Service Plans Cont.									
Service Plan 7	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Service Plan 8	Phase -->	1	2	3	4	5	6	7	8
	Call Mode	0	0	0	0	0	0	0	0
	0 = actuated, 1 = omit, 2 = CNA, 3 = min recall, 4 = max recall, 5 = soft recall, 6 = ped recall, 7 = omit ped, 8 = red rest								
	Minimum Green	0	0	0	0	0	0	0	0 - 255 sec.
	Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 or 3.0 - 25.5
	Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec.
	Walk	0	0	0	0	0	0	0	0 - 255 sec.
	Pedestrian Clearance	0	0	0	0	0	0	0	0 - 255 sec.
Max Plans (next/2/2/7)									
Max Plan 1	Phase -->	1	2	3	4	5	6	7	8
	Normal Max	0	0	0	0	0	0	0	0
	Fail Max	0	0	0	0	0	0	0	0
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Plan 2	Auto Max Limit	0	0	0	0	0	0	0	0
	Normal Max	0	0	0	0	0	0	0	0
	Fail Max	0	0	0	0	0	0	0	0
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Plan 3	Auto Max Limit	0	0	0	0	0	0	0	0
	Normal Max	0	0	0	0	0	0	0	0
	Fail Max	0	0	0	0	0	0	0	0
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Plan 4	Auto Max Limit	0	0	0	0	0	0	0	0
	Normal Max	0	0	0	0	0	0	0	0
	Fail Max	0	0	0	0	0	0	0	0
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Plan 5	Auto Max Limit	0	0	0	0	0	0	0	0
	Normal Max	0	0	0	0	0	0	0	0
	Fail Max	0	0	0	0	0	0	0	0
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Plan 6	Auto Max Limit	0	0	0	0	0	0	0	0
	Normal Max	0	0	0	0	0	0	0	0
	Fail Max	0	0	0	0	0	0	0	0
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Plan 7	Auto Max Limit	0	0	0	0	0	0	0	0
	Normal Max	0	0	0	0	0	0	0	0
	Fail Max	0	0	0	0	0	0	0	0
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Plan 8	Auto Max Limit	0	0	0	0	0	0	0	0
	Normal Max	0	0	0	0	0	0	0	0
	Fail Max	0	0	0	0	0	0	0	0
	Auto Max Adjust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Auto Max Limit	0	0	0	0	0	0	0	0
	Auto Max Limit	0	0	0	0	0	0	0	0

Coordination Data (next/2/3)

Coordination Modes (next/2/3/1, next/2/3/4/1, next/2/3/4/3)

Flash Mode	<i>33</i>	0=off, 1=on, 33=time clock, 34=comm, 35=hardwire, 36=NWS Set only, 37=AB3418 / NTCIP S
Coordination Plan Mode	<i>0</i>	0=free, 1-32 = coord plan 1-32, 33=time clock, 34=comm, 35=hardwire, 36=NWS Set only, 37=
Offset Seeking Mode	<i>2</i>	0=add only, 1=dwel, 2=fastway
Late Ped	<i>0</i>	0 = off, 1 = on
Coord Walk Rest	<i>0</i>	0 = off, 1 = on, 2 = by TOD circuit 160, 3 = end of walk, 4 = coord ped during perms
Repeated Phase Service	<i>0</i>	0=off, 1=on (no coord ped), 2=on (beginning green coord ped), 3=on (coord ped always)
Zero Mode (TS2 only)	<i>1</i>	0=start of main street, 1=end of main street, 2=by TOD circuit 144

Phase -->	1	2	3	4	5	6	7	8	0 = service allowed 1 = service prevented
Omit Phase During Repeated Phase Service	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	
Auto Permissive Min Green	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 - 255 seconds

Coordination Plans (next/2/3/2)

Coord Plan	Coordination Phases		Cycle Length	Offset Time	Min Cycle Length Dwell Time	Permissive	Service Plan	Max Plan
	Ring 1	Ring 2						
1 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
2 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
3 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
4 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
5 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
6 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
7 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
8 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
9 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
10 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
11 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
12 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
13 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
14 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
15 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
16 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
17 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
18 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
19 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
20 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
21 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
22 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
23 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
24 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
25 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
26 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
27 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
28 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
29 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
30 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
31 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
32 -	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
0 - 8			0 - 255 sec.				0 - 8	

Coordination Plans cont.										
Coord Plan	* = Force Offs / Split Times (TS2)								* = Yield Points / Actuated Times (TS2)	
	1	2	3	4	5	6	7	8	Ring 1	Ring 2
1 -	0	0	0	0	0	0	0	0	0	0
2 -	0	0	0	0	0	0	0	0	0	0
3 -	0	0	0	0	0	0	0	0	0	0
4 -	0	0	0	0	0	0	0	0	0	0
5 -	0	0	0	0	0	0	0	0	0	0
6 -	0	0	0	0	0	0	0	0	0	0
7 -	0	0	0	0	0	0	0	0	0	0
8 -	0	0	0	0	0	0	0	0	0	0
9 -	0	0	0	0	0	0	0	0	0	0
10 -	0	0	0	0	0	0	0	0	0	0
11 -	0	0	0	0	0	0	0	0	0	0
12 -	0	0	0	0	0	0	0	0	0	0
13 -	0	0	0	0	0	0	0	0	0	0
14 -	0	0	0	0	0	0	0	0	0	0
15 -	0	0	0	0	0	0	0	0	0	0
16 -	0	0	0	0	0	0	0	0	0	0
17 -	0	0	0	0	0	0	0	0	0	0
18 -	0	0	0	0	0	0	0	0	0	0
19 -	0	0	0	0	0	0	0	0	0	0
20 -	0	0	0	0	0	0	0	0	0	0
21 -	0	0	0	0	0	0	0	0	0	0
22 -	0	0	0	0	0	0	0	0	0	0
23 -	0	0	0	0	0	0	0	0	0	0
24 -	0	0	0	0	0	0	0	0	0	0
25 -	0	0	0	0	0	0	0	0	0	0
26 -	0	0	0	0	0	0	0	0	0	0
27 -	0	0	0	0	0	0	0	0	0	0
28 -	0	0	0	0	0	0	0	0	0	0
29 -	0	0	0	0	0	0	0	0	0	0
30 -	0	0	0	0	0	0	0	0	0	0
31 -	0	0	0	0	0	0	0	0	0	0
32 -	0	0	0	0	0	0	0	0	0	0
0 - 255 sec * = force offs and yield points										

Circuit Mapping (next/2/3/3)																	
Circuit Map	Coord Plan	Time Clock Circuit		Time Clock Circuit		Time Clock Circuit		Time Clock Circuit		Time Clock Circuit		Time Clock Circuit		Time Clock Circuit		Time Clock Circuit	
1	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
2	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
3	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
4	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
5	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
6	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
7	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
8	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
9	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
10	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
11	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
12	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
13	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
14	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
15	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
16	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
17	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
18	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
19	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U
20	0	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U	0	N/U

coord plan - 0 = free, 1 - 32 = coord plan 1 - 32, 33 = any, 34 none selected
time clock circuits - 0 = not used, or circuits 6 - 196

Dynamic Phase Length (next/2/3/4/4)									
Phase -->	1	2	3	4	5	6	7	8	
Back Detector	0	0	0	0	0	0	0	0	0 = none, 1-32 = detector 1-32
Lane Factor	0	0	0	0	0	0	0	0	0 = none, 1.0 - 5.0
Check Out Detector	0	0	0	0	0	0	0	0	0 = none, 1-32 = detector 1-32
Coord Delta Force Off	Set A	0	0	0	0	0	0	0	0 - 255 sec
	Set B	0	0	0	0	0	0	0	
	Set C	0	0	0	0	0	0	0	
	Set D	0	0	0	0	0	0	0	
Free Delta Max	Set A	0	0	0	0	0	0	0	
	Set B	0	0	0	0	0	0	0	
	Set C	0	0	0	0	0	0	0	
	Set D	0	0	0	0	0	0	0	

Platoon Progression (next/2/3/4/5)													
Entry Local Only			Master Local Only										
Platoon Max	0	0 - 255 sec	Smoothing Factor	0.0	0.0 - 1.0								
Min Platoon Green	0	0 - 255 sec											
Entry Detector Gap	0.0	0.0 - 25.5											
Min Platoon Cycle	0	0 - 255 sec											
Inbound			Outbound										
Only for Entry Inbound Local or Master Local			Only for Entry Outbound Local or Master Local										
Entry IB Local also Last OB Local	0	0 - 50	Entry OB Local also Last IB Local	0	0 - 50								
Speed			Speed										
		0 - 55 mph			0 - 55 mph								
Distance from Entry Local			Distance from Entry Local										
		0 - 65000 feet			0 - 65000 feet								
Entry Local Only			Entry Local Only										
Distance from Entry Local Detector	0	0 - 999 feet	Distance from Entry Local Detector	0	0 - 999 feet								
Entry Local Detector	0	0 - 32	Entry Local Detector	0	0 - 32								
Master Local			Master Local										
Master Mid - System Critical Detectors	0	0 - 16	Master Mid - System Critical Detectors	0	0 - 16								
Force Off Percents													
Inbound	1	3	4	5	7	8	Outbound	1	3	4	5	7	8
Split 1	0	0	0	0	0	0	Split 1	0	0	0	0	0	0
Split 2	0	0	0	0	0	0	Split 2	0	0	0	0	0	0
0 - 100 %						0 - 100 %							

Time of Day Data (next/2/4)

Day Program (next/2/4/1)												
	Day Prog.	Time	Coord Plan	Coord Plan or Circuit	State On / Off		Day Prog.	Time	Coord Plan	Coord Plan or Circuit	State On/Off	
1						51						
2						52						
3						53						
4						54						
5						55						
6						56						
7						57						
8						58						
9						59						
10						60						
11						61						
12						62						
13						63						
14						64						
15						65						
16						66						
17						67						
18						68						
19						69						
20						70						
21						71						
22						72						
23						73						
24						74						
25						75						
26						76						
27						77						
28						78						
29						79						
30						80						
31						81						
32						82						
33						83						
34						84						
35						85						
36						86						
37						87						
38						88						
39						89						
40						90						
41						91						
42						92						
43						93						
44						94						
45						95						
46						96						
47						97						
48						98						
49						99						
50						100						
	1 - 15	hh : mm	X = on	coord plan 0 - 32 or circuit 1-196	X = on		1 - 15	hh : mm	X = on	coord plan 0 - 32 or circuit 1-196	X = on	

Day Program cont.													
	Day Prog.	Time	Coord Plan	Coord Plan or Circuit		State On / Off		Day Prog.	Time	Coord Plan	Coord Plan or Circuit		State On / Off
101							151						
102							152						
103							153						
104							154						
105							155						
106							156						
107							157						
108							158						
109							159						
110							160						
111							161						
112							162						
113							163						
114							164						
115							165						
116							166						
117							167						
118							168						
119							169						
120							170						
121							171						
122							172						
123							173						
124							174						
125							175						
126							176						
127							177						
128							178						
129							179						
130							180						
131							181						
132							182						
133							183						
134							184						
135							185						
136							186						
137							187						
138							188						
139							189						
140							190						
141							191						
142							192						
143							193						
144							194						
145							195						
146							196						
147							197						
148							198						
149							199						
150							200						
	1 - 15	hh : mm	X = on	coord plan 0 - 32 or circuit 1-196		X = on		1 - 15	hh : mm	X = on	coord plan 0 - 32 or circuit 1-196		X = on

Week Program (next/2/4/2)								Year Program (next/2/4/3)			
	Sun	Mon	Tue	Wed	Thu	Fri	Sat	From Date	To Date	Week Program	
1	1	1	1	1	1	1	1	01/01/2017	12/31/2017	1	
2	1	1	1	1	1	1	1				
3	1	1	1	1	1	1	1				
4	1	1	1	1	1	1	1				
5	1	1	1	1	1	1	1				
6	1	1	1	1	1	1	1				
7	1	1	1	1	1	1	1				
8	1	1	1	1	1	1	1				
9	1	1	1	1	1	1	1				
10	1	1	1	1	1	1	1				
0 = none, 1 - 15 = day plan											
Exception Days (next/2/4/6)											
	DOW	WOM	DOM	MOY	Day Prog.						
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
	0-10	0 - 5	0-31	0-12	0 - 15						
Time Clock References (next/2/4/5)											
Synch reference Mode				0		0 = timed, 1 = by event		Exception day headings - DOW = Day of Week, WOM = Week of Month, DOM = Day of Month, MOY = Month of Year			
Synch Reference Time				00:00		00:00 - 23:59					
Daylight Savings Enable				X		X = on					
Reset Time				00:00		00:00 - 23:59					

Circuit Overrides (next/2/4/4)							
1 - Coord Line 1	CL1	TOD	On / Off / TOD	51 - Ped Omit 3	PO3	TOD	On / Off / TOD
2 - Coord Line 2	CL2	TOD		52 - Ped Omit 4	PO4	TOD	
3 - Coord Line 4	CL4	TOD		53 - Ped Omit 5	PO5	TOD	
4 - Coord Line 8	CL8	TOD		54 - Ped Omit 6	PO6	TOD	
5 - Coord Line 16	C16	TOD		55 - Ped Omit 7	PO7	TOD	
6 - Coord Operation	CRD	TOD		56 - Ped Omit 8	PO8	TOD	
7 - Soft Flash	SFL	TOD		57 - Conditional Service	CVS	TOD	
8 - Enable System Relays	ESR	TOD		58 - Inhibit Simultaneous Gap Out	ISG	On	
9 - Call to Non Act 1	CN1	TOD		59 - Inhibit Hardwire	HWI	TOD	
10 - Call to Non Act 2	CN2	TOD		60 - Ped Override Mode	POM	On	
11 - Walk Rest Modifier	WRM	TOD		61 - Dual Entry	DLE	TOD	
12 - Min Recall	MIN	Off		62 - Exclusive Ped	EPD	TOD	
13 - Max 2 Both Rings	MX2	TOD		63 - Call to Time Clock Mode	CTC	TOD	
14 - Coord Inhibit Max Ring 1, 2	IMT	TOD		64 - Dual Enhanced Ped	DEP	TOD	
15 - Enable Service Log	ESL	TOD		65 - Service Plan 1	SP1	TOD	
16 - Call to Free	CTF	TOD		66 - Service Plan 2	SP2	TOD	
17 - TOD Output 1	TO1	TOD		67 - Service Plan 3	SP3	TOD	
18 - TOD Output 2	TO2	TOD		68 - Service Plan 4	SP4	TOD	
19 - TOD Output 3	TO3	TOD		69 - Service Plan 5	SP5	TOD	
20 - TOD Output 4	TO4	TOD		70 - Service Plan 6	SP6	TOD	
21 - TOD Output 5	TO5	TOD		71 - Service Plan 7	SP7	TOD	
22 - TOD Output 6	TO6	TOD		72 - Service Plan 8	SP8	TOD	
23 - TOD Output 7	TO7	TOD		73 - Max Plan 1	MP1	TOD	
24 - TOD Output 8	TO8	TOD		74 - Max Plan 2	MP2	TOD	
25 - Vehicle Call Phase 1	VC1	TOD		75 - Max Plan 3	MP3	TOD	
26 - Vehicle Call Phase 2	VC2	TOD		76 - Max Plan 4	MP4	TOD	
27 - Vehicle Call Phase 3	VC3	TOD		77 - Max Plan 5	MP5	TOD	
28 - Vehicle Call Phase 4	VC4	TOD		78 - Max Plan 6	MP6	TOD	
29 - Vehicle Call Phase 5	VC5	TOD		79 - Max Plan 7	MP7	TOD	
30 - Vehicle Call Phase 6	VC6	TOD		80 - Max Plan 8	MP8	TOD	
31 - Vehicle Call Phase 7	VC7	TOD		81 - Transit Priority Max Group 1	TG1	TOD	
32 - Vehicle Call Phase 8	VC8	TOD		82 - Transit Priority Max Group 2	TG2	TOD	
33 - Ped Call Phase 1	PC1	TOD		83 - Transit Priority Max Group 3	TG3	TOD	
34 - Ped Call Phase 2	PC2	TOD		84 - Transit Priority Max Group 4	TG4	TOD	
35 - Ped Call Phase 3	PC3	TOD		85 - Transit Priority Max Group 5	TG5	TOD	
36 - Ped Call Phase 4	PC4	TOD		86 - Transit Priority Max Group 6	TG6	TOD	
37 - Ped Call Phase 5	PC5	TOD		87 - Transit Priority Max Group 7	TG7	TOD	
38 - Ped Call Phase 6	PC6	TOD		88 - Transit Priority Max Group 8	TG8	TOD	
39 - Ped Call Phase 7	PC7	TOD		89 - Inhibit Volume Density 1	IV1	TOD	
40 - Ped Call Phase 8	PC8	TOD		90 - Inhibit Volume Density 2	IV2	TOD	
41 - Vehicle Omit 1	VO1	TOD		91 - Inhibit Volume Density 3	IV3	TOD	
42 - Vehicle Omit 2	VO2	TOD		92 - Inhibit Volume Density 4	IV4	TOD	
43 - Vehicle Omit 3	VO3	TOD		93 - Inhibit Volume Density 5	IV5	TOD	
44 - Vehicle Omit 4	VO4	TOD		94 - Inhibit Volume Density 6	IV6	TOD	
45 - Vehicle Omit 5	VO5	TOD		95 - Inhibit Volume Density 7	IV7	TOD	
46 - Vehicle Omit 6	VO6	TOD		96 - Inhibit Volume Density 8	IV8	TOD	
47 - Vehicle Omit 7	VO7	TOD		97 - Lag 1	LG1	TOD	
48 - Vehicle Omit 8	VO8	TOD		98 - Lag 3	LG3	TOD	
49 - Ped Omit 1	PO1	TOD		99 - Lag 5	LG5	TOD	
50 - Ped Omit 2	PO2	TOD		100 - Lag 7	LG7	TOD	

Circuit Overrides cont.							
101 - Inhibit Overlap A	OLA	TOD	On / Off / TOD	151 - Coord Hold 7	HD7	TOD	On / Off / TOD
102 - Inhibit Overlap B	OLB	TOD		152 - Coord Hold 8	HD8	TOD	
103 - Inhibit Overlap C	OLC	TOD		153 - PE Priority Return B	PRB	TOD	
104 - Inhibit Overlap D	OLD	TOD		154 - PE Priority Return C	PRC	TOD	
105 - Enable Schedule A Phone 1	AT1	TOD		155 - PE Priority Return D	PRD	TOD	
106 - Enable Schedule A Phone 2	AT2	TOD		156 - PE Priority Return E	PRE	TOD	
107 - Enable Schedule B Phone 1	BT1	TOD		157 - Platoon Inbound	PPI	TOD	
108 - Enable Schedule B Phone 2	BT2	TOD		158 - Platoon Outbound	PPO	TOD	
109 - Enable Schedule C Phone 1	CT1	TOD		159 - Platoon Spl 2	PS2	TOD	
110 - Enable Schedule C Phone 2	CT2	TOD		160 - Coord Walk Rest	CWR	TOD	
111 - Enable Volume to Call Phone 1	VT1	TOD		161 - Dynamic Phase Length Short Inhibit 1	SI1	TOD	
112 - Enable Volume to Call Phone 2	VT2	TOD		162 - Dynamic Phase Length Short Inhibit 2	SI2	TOD	
113 - Enable Volume Logging	EVL	On		163 - Dynamic Phase Length Short Inhibit 3	SI3	TOD	
114 - Enable MOE Logging	EML	On		164 - Dynamic Phase Length Short Inhibit 4	SI4	TOD	
115 - Detector Low Threshold Inhibit	DLI	TOD		165 - Dynamic Phase Length Short Inhibit 5	SI5	TOD	
116 - Detector Continue Presence Inhibit	DPI	TOD		166 - Dynamic Phase Length Short Inhibit 6	SI6	TOD	
117 - Inhibit Detector Based on Programming	IND	TOD		167 - Dynamic Phase Length Short Inhibit 7	SI7	TOD	
118 - Inhibit Detector Delay	IDD	TOD		168 - Dynamic Phase Length Short Inhibit 8	SI8	TOD	
119 - Inhibit Conditional Ped	ICP	TOD		169 - Coord Late Left Turn 1	CT1	TOD	
120 - Inhibit Transit Priority	ITP	TOD		170 - Coord Late Left Turn 3	CT3	TOD	
121 - Red Rest Ring 1,2	RRM	TOD		171 - Coord Late Left Turn 5	CT5	TOD	
122 - Enable Transcend	TRA	TOD		172 - Coord Late Left Turn 7	CT7	TOD	
123 - Omit Red Clear Ring 1,2	ORC	TOD		173 - Dynamic Phase Length Enable A	DPA	TOD	
124 - Not Used	NU	TOD		174 - Dynamic Phase Length Enable B	DPB	TOD	
125 - Ped Recycle Ring 1,2	PCY	TOD		175 - Dynamic Phase Length Enable C	DPC	TOD	
126 - Not Used	NU	TOD		176 - Dynamic Phase Length Enable D	DPD	TOD	
127 - Enable MOE Log to Call Phone 1	MT1	TOD		177 - Proactive Plan Select Average	PSA	TOD	
128 - Enable MOE Log to Call Phone 2	MT2	TOD		178 - Proactive Plan Select Inbound	PSI	TOD	
129 - Transit Inhibit Short Time 1	IS1	TOD		179 - Proactive Plan Select Outbound	PSO	TOD	
130 - Transit Inhibit Short Time 2	IS2	TOD		180 - Split Variant Inbound	SVI	TOD	
131 - Transit Inhibit Short Time 3	IS3	TOD		181 - Split Variant Outbound	SVO	TOD	
132 - Transit Inhibit Short Time 4	IS4	TOD		182 - Disable Coord Walk Rest Ring 1	DW1	TOD	
133 - Transit Inhibit Short Time 5	IS5	TOD		183 - Disable Coord Walk Rest Ring 2	DW2	TOD	
134 - Transit Inhibit Short Time 6	IS6	TOD		184 - Proactive Plan Select New Look	NLK	TOD	
135 - Transit Inhibit Short Time 7	IS7	TOD		185 - Disable Red Clearance Extension	DRX	TOD	
136 - Transit Inhibit Short Time 8	IS8	TOD		186 - Detector Plan Line 1	DL1	TOD	
137 - Enable Transit Priority Logging	ETL	TOD		187 - Detector Plan Line 2	DL2	TOD	
138 - Disable Flashing Yellow Arrow 1	DF1	TOD		188 - Disable LRT 1 Vertical Flashing Bar	DV1	TOD	
139 - Disable Flashing Yellow Arrow 3	DF3	TOD		189 - Disable LRT 2 Vertical Flashing Bar	DV2	TOD	
140 - Disable Flashing Yellow Arrow 5	DF5	TOD		190 - Disable LRT 3 Vertical Flashing Bar	DV3	TOD	
141 - Disable Flashing Yellow Arrow 7	DF7	TOD		191 - Disable LRT 4 Vertical Flashing Bar	DV4	TOD	
142 - Disable Auto Max	DAM	TOD		192 - Datakey Enable	DKE	On	
143 - Disable Repeat Phase Service	DRS	TOD		193 - Dynamic Phase Reversal Enable 1	DR1	TOD	
144 - Coord End of Main Street	EMS	TOD		194 - Dynamic Phase Reversal Enable 3	DR3	TOD	
145 - Coord Hold 1	HD1	TOD		195 - Dynamic Phase Reversal Enable 5	DR5	TOD	
146 - Coord Hold 2	HD2	TOD		196 - Dynamic Phase Reversal Enable 7	DR7	TOD	
147 - Coord Hold 3	HD3	TOD		197 - Enable Coord Logging	ECL	On	
148 - Coord Hold 4	HD4	TOD		198 - Disable Gap FYLTA 1,3,5,7	DGF	TOD	
149 - Coord Hold 5	HD5	TOD		199 - Coordination Auto Walk	CAW	TOD	
150 - Coord Hold 6	HD6	TOD		200 - Enable Coordinated Auto Max	ECM	TOD	

Preemption Data (next/2/5)

Sequence (next/2/5/1 - 8)								Instructions 0 - Service Phases 1-9 = Special Interval 1-9 10 - Preempt Sequence Allows FYLTA 11 - Preempt Interval Disables FYLTA 15 - Alternate Trap Protection 90 - Go to all Red 91 - Soft Flash On 92 - Soft Flash Off 93 - Enable Ped 94 - Disable Peds 95 - Priority Return 96 - Enable Coordination with peds 97 - Enable Coordination without peds 98 - Return with NO Calls 99 - Return with Vehicle Calls 100 - jump to step in Interval Time 101 - Use Interval Time as Resettable Gap Timer 196 - Coord Re-synch with Peds 197 - Coord Re-synch without Peds 200 - Light Rail Train phase without Peds 201 - Light Rail Train phase with Peds 202 - Return to highest queue/delay phase (this uses the Dynamic Phase Length Back Detectors) 216 - Light Rail Train Coord Re-synch with Peds 217 - Light Rail Train Coord Re-synch without Peds
Sequences / Intervals		Instruction	Phases Serviced	Interval Time	Hold On Input	Outputs On	Output Mode	
1	1	197	25	0	1		0	
	2	98		0	0		0	
	3	0		0	0		0	
	4	0		0	0		0	
	5	0		0	0		0	
	6	0		0	0		0	
	7	0		0	0		0	
	8	0		0	0		0	
	9	0		0	0		0	
	10	0		0	0		0	
2	1	0		0	0		0	
	2	0		0	0		0	
	3	0		0	0		0	
	4	0		0	0		0	
	5	0		0	0		0	
	6	0		0	0		0	
	7	0		0	0		0	
	8	0		0	0		0	
	9	0		0	0		0	
	10	0		0	0		0	
3	1	197	16	0	1		0	
	2	98		0	0		0	
	3	0		0	0		0	
	4	0		0	0		0	
	5	0		0	0		0	
	6	0		0	0		0	
	7	0		0	0		0	
	8	0		0	0		0	
	9	0		0	0		0	
	10	0		0	0		0	
4	1	197	8	0	1		0	
	2	98		0	0		0	
	3	0		0	0		0	
	4	0		0	0		0	
	5	0		0	0		0	
	6	0		0	0		0	
	7	0		0	0		0	
	8	0		0	0		0	
	9	0		0	0		0	
	10	0		0	0		0	
5	1	0		0	0		0	
	2	0		0	0		0	
	3	0		0	0		0	
	4	0		0	0		0	
	5	0		0	0		0	
	6	0		0	0		0	
	7	0		0	0		0	
	8	0		0	0		0	
	9	0		0	0		0	
	10	0		0	0		0	

Phases Serviced - phases 1 - 8

Interval Time - 0 - 255 sec or interval 1 - 10

Hold on Input:
0 = Do not hold
1 = Hold
2 = Ped Service to Rest in Walk

Outputs On - output 1 - 8

Output Modes -
0 = all steady on
1 = all flash together
2 = odd flashes WIG, even flashes WAG
3 = 1 - 4 steady on, 5 - 8 all flash together

Sequence cont.											
Sequences / Intervals		Instruction	Phases Serviced	Interval Time	Hold On Input	Outputs On	Output Mode				
6	1	0		0	0		0				
	2	0		0	0		0				
	3	0		0	0		0				
	4	0		0	0		0				
	5	0		0	0		0				
	6	0		0	0		0				
	7	0		0	0		0				
	8	0		0	0		0				
	9	0		0	0		0				
	10	0		0	0		0				
7	1	0		0	0		0				
	2	0		0	0		0				
	3	0		0	0		0				
	4	0		0	0		0				
	5	0		0	0		0				
	6	0		0	0		0				
	7	0		0	0		0				
	8	0		0	0		0				
	9	0		0	0		0				
	10	0		0	0		0				
8	1	0		0	0		0				
	2	0		0	0		0				
	3	0		0	0		0				
	4	0		0	0		0				
	5	0		0	0		0				
	6	0		0	0		0				
	7	0		0	0		0				
	8	0		0	0		0				
	9	0		0	0		0				
	10	0		0	0		0				
Sequence Timing (next/2/5/0)											
Sequence -- >		1	2	3	4	5	6	7	8		
Input Memory										X = on	
Input Priority		6	6	6	6	0	0	0	0	0 = lowest, - 8 = highest	
Entry (Transition) Parameters	Min Green	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec 0.0 would time the normal function time	
	Walk	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0		
	Ped Clear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Overlap Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 25.5 sec	
	Overlap Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 - 255 sec	
	Delay to Preempt	0	0	0	0	0	0	0	0		
	Delay Ped Omit	0	0	0	0	0	0	0	0		
	Delay Phase Omit	0	0	0	0	0	0	0	0		
Min Reservice	0	0	0	0	0	0	0	0	0 - 255 min		
Overlap Inhibits	A									X = inhibit	
	B										
	C										
	D										
Exit Parameters	Exit to Coord Plan Offset by X	0	0	0	0	0	0	0	0	0 - 20	
	Exit Coord Plan Time	0	0	0	0	0	0	0	0	0 - 60 min	
	Exit to Max Plan	0	0	0	0	0	0	0	0	0 - 8	
	Exit Free Time	0	0	0	0	0	0	0	0	0 - 60 min	
	Override Time	0	0	0	0	0	0	0	0		
	Fail Time	0	0	0	0	0	0	0	0		
	Exit Mode Time	0	0	0	0	0	0	0	0		

Priority Return and Special Intervals (next/2/5/0/6, next/2/5/9)													
Phase / Overlap -->		1	2	3	4	5	6	7	8	A	B	C	D
Priority Return	Enable	0	0 = disabled, 1 = enabled, 2 = enabled, skip preemption phases on exit										
	A (max)	0	0	0	0	0	0	0	0	0 - 100% of currently used max			
	B (max)	0	0	0	0	0	0	0	0				
	C (max)	0	0	0	0	0	0	0	0				
	D (max)	0	0	0	0	0	0	0	0				
	E (max)	0	0	0	0	0	0	0	0				
	Ped Clear	0	0	0	0	0	0	0	0	0 - 100% of currently used ped clearance			
Queue Delay Recovery		0	0	0	0	0	0	0	0	0 - 255 sec.			
Special Intervals	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0	0	0	0	0
	9	0	0	0	0	0	0	0	0	0	0	0	0
													0 = Dark 1 = green don't walk 2 = green walk 3 = green flashing don't walk 4 = yellow 5 = red 6 = flashing yellow WIG 7 = flashing yellow WAG 8 = flashing red WIG 9 = flashing red WAG 10 = walk only 11=flashing don't walk only
Light Rail Train (next/2/5/0/7)													
Light Rail Train -->		1	2	3	4								
Associated Preempt		0	0	0	0	0 = none, preempt 1 - 8							
Time to Green		0	0	0	0	0 - 255 sec							
Horizontal Bar Flash Time		0.0	0.0	0.0	0.0	0.0 - 25.5 sec							
Vertical Bar Flash Time		0.0	0.0	0.0	0.0								
Min Duration		0	0	0	0	0 - 255 sec							

Communications Data (next/2/6)

1st Central Phone Number				2nd Central Phone Number			
Modem Setup String				Intersection Name <i>South Canal at Odem Medo</i>			
Subnet Mask		<i>255.255.255.192</i>					
IP (ethernet) Port		<i>25000</i>					
Central Port		<i>6</i>					
System Mode		<i>0</i>					
System Port		<i>0</i>		Alternate System Port		<i>0</i>	
System ID	<i>154</i>	AB3418e Physical Address		<i>1</i>	IP Address		<i>10.12.64.67</i>
Local ID	<i>1</i>	AB3418e Group Address		<i>0</i>	Gateway Address		<i>10.12.64.65</i>
Baud Rates		Flow Control		Port Use			
Port 1 (Slot A2 Upper)		<i>0</i>		<i>Suggested Use - FSK</i>			
Port 2 (Slot A2 Lower)		<i>0</i>		<i>modem to central</i>			
Port 3 (Slot A1 Upper)		<i>0</i>		<i>Suggested Use - Modem to Central</i>			
Port 4 (Slot A1 Lower or C50S)		<i>2</i>		<i>Suggested Use - RS232 to Laptop</i>			
0 = 1200, 1 = 2400, 2 = 9600, 3 = 19200 baud				0 = off, 1 = on			
Reports							
Volume Log Period		<i>60</i>	minute	Volume/Occ Log Period		<i>0</i>	second
				MOE Log Period		<i>30</i>	minute
0 = disabled, 1,2,3,4,5,6,10,12,15,20,30,60 minutes							
Function Schedule Mapping (next/2/6/7)							
Alarm 1		<i>0</i>	0 = none 1 = schedule A 2 = schedule B 3 = schedule C 4 = schedule R	Soft Flash		<i>3</i>	0 = none 1 = schedule A 2 = schedule B 3 = schedule C 4 = schedule R
Alarm 2		<i>0</i>		Manual Control Enable (MCE)		<i>3</i>	
Alarm 3		<i>0</i>		Emergency or Railroad Preempt		<i>1</i>	
Alarm 4		<i>0</i>		Not Used		<i>0</i>	
Alarm 5		<i>0</i>		Cycle Failure		<i>2</i>	
Not Used		<i>0</i>		Coordination Failure		<i>2</i>	
Not Used		<i>0</i>		Keyboard use / Data Changed		<i>2</i>	
Not Used		<i>0</i>		Coord Running / Free		<i>3</i>	
Power On / Off		<i>2</i>		Cabinet Door		<i>2</i>	
Checksum Failure		<i>2</i>		Extended Ped Pushbutton		<i>0</i>	
Video / Detector Failure		<i>2</i>	Monitor Status		<i>2</i>		
Master to Local Comm Lost		<i>0</i>	Red Extension		<i>0</i>		

Miscellaneous Data

Transit Priority (next/2/7)

	1	2	3	4	5	6	7	8	
Phases									Phases 1 - 8 (max of 2 compatible phases)
PE Enable (6.25Hz TP call on PE)									X = 6.25 Hz signal will activate TP
Priority	0	0	0	0	0	0	0	0	0 - 8, 8 = highest
Memory									X = on
Delay Time	0	0	0	0	0	0	0	0	0 - 255 sec
Minimum Reservice Time (per input)	0	0	0	0	0	0	0	0	0 - 255 min
Override Time	0	0	0	0	0	0	0	0	0 - 255 sec
Bus Extend	0	0	0	0	0	0	0	0	0 - 255 sec
Minimum Reservice Time (all inputs)	0	0 - 255 min							
Free Operation Mode	0	0 = use shortest of max 1 or 2, 1 - 8 = use max time of group 1 - 8, 9 = use time of day							

Transit Priority Alternate Force Off Plans

Current Coord Plan	1	2	3	4	5	6	7	8	0 = none 17 - 32 = coord plan 17 - 32
Alternate TP Force Off Plan	0	0	0	0	0	0	0	0	
Current Coord Plan	9	10	11	12	13	14	15	16	
Alternate TP Force Off Plan	0	0	0	0	0	0	0	0	

Group Timing

	Phase -->	1	2	3	4	5	6	7	8	
Group 1	Max Times	0	0	0	0	0	0	0	0	0 - 255 sec 0 would time the normal function time
	Walk Times	0	0	0	0	0	0	0	0	
Group 2	Max Times	0	0	0	0	0	0	0	0	
	Walk Times	0	0	0	0	0	0	0	0	
Group 3	Max Times	0	0	0	0	0	0	0	0	
	Walk Times	0	0	0	0	0	0	0	0	
Group 4	Max Times	0	0	0	0	0	0	0	0	
	Walk Times	0	0	0	0	0	0	0	0	
Group 5	Max Times	0	0	0	0	0	0	0	0	
	Walk Times	0	0	0	0	0	0	0	0	
Group 6	Max Times	0	0	0	0	0	0	0	0	
	Walk Times	0	0	0	0	0	0	0	0	
Group 7	Max Times	0	0	0	0	0	0	0	0	
	Walk Times	0	0	0	0	0	0	0	0	
Group 8	Max Times	0	0	0	0	0	0	0	0	
	Walk Times	0	0	0	0	0	0	0	0	

Truck Priority (next/2/7/9)

Truck Priority-->	1	2	3	4	
Associated Transit Priority	0	0	0	0	0 = none 1 - 8 = transit priority 1 - 8
Leading Detector	0	0	0	0	0 = none, 1 - 32 = detector 1 - 32
Trailing Detector	0	0	0	0	
Stop Bar Distance	0	0	0	0	0 - 999 feet
Trap Distance	0	0	0	0	0.0 - 99.9 feet
Minimum Speed	0	0	0	0	0 - 100 mph
Minimum Length	0	0	0	0	0 - 255 feet
Downhill Grade	0	0	0	0	0 - 20 %
Uphill Grade	0	0	0	0	
Undersized Vehicle					X = Enabled

Change I/O

X = On (After a download with a power on - off cycle)

Inputs (Non Default I/O is offset to the right) (next/2/8/1)											
C1-39	101	VD9	C1-55	15	VD5	C1-67	22	PED2	C11-15	254	N/U
C1-40	113	VD19	C1-56	11	VD1	C1-68	26	PED6	C11-16	254	N/U
C1-41	106	VD14	C1-57	17	VD7	C1-69	24	PED4	C11-17	254	N/U
C1-42	118	VD24	C1-58	13	VD3	C1-70	28	PED8	C11-18	254	N/U
C1-43	102	VD10	C1-59	16	VD6	C1-71	151	PE1	C11-19	254	N/U
C1-44	114	VD20	C1-60	12	VD2	C1-72	152	PE2	C11-20	254	N/U
C1-45	107	VD15	C1-61	18	VD8	C1-73	153	PE3	C11-21	254	N/U
C1-46	161	VD25	C1-62	14	VD4	C1-74	154	PE4	C11-22	254	N/U
C1-47	105	VD13	C11-10	254	N/U	C1-75	254	N/U	C11-23	254	N/U
C1-48	117	VD23	C11-11	254	N/U	C1-76	104	VD12	C11-24	254	N/U
C1-49	112	VD18	C11-12	254	N/U	C1-77	116	VD22	C11-25	254	N/U
C1-50	164	VD28	C11-13	254	N/U	C1-78	111	VD17	C11-26	254	N/U
C1-51	199	PEDI	C1-63	103	VD11	C1-79	163	VD27	C11-27	254	N/U
C1-52	155	PE5	C1-64	115	VD21	C1-80	82	IADV	C11-28	254	N/U
C1-53	85	MCE	C1-65	108	VD16	C1-81	137	MONS	C11-29	254	N/U
C1-54	254	N/U	C1-66	162	VD26	C1-82	62	ST1	C11-30	254	N/U

Outputs (Non Default I/O is offset to the right) (next/2/8/2)											
C1-2	44	4DWK	C1-19	48	8DWK	C1-35	215	FYA1	C1-91	41	1DWK
C1-3	64	4WLK	C1-20	68	8WLK	C1-36	217	FYA5	C1-93	61	1WLK
C1-4	14	4RED	C1-21	18	8RED	C1-37	133	TO3	C1-94	106	OLBR
C1-5	24	4YEL	C1-22	28	8YEL	C1-38	134	TO4	C1-95	105	OLBY
C1-6	34	4GRN	C1-23	38	8GRN	C1-100	53	3PCL	C1-96	104	OLBG
C1-7	13	3RED	C1-24	17	7RED	C1-101	51	1PCL	C1-97	103	OLAR
C1-8	23	3YEL	C1-25	27	7YEL	C1-102	187	SFL	C1-98	102	OLAY
C1-9	33	3GRN	C1-26	37	7GRN	C1-103	147	WDOG	C1-99	101	OLAG
C1-10	42	2DWK	C1-27	46	6DWK	C1-83	43	3DWK	C11-1	254	N/U
C1-11	62	2WLK	C1-28	66	6WLK	C1-84	63	3WLK	C11-2	254	N/U
C1-12	12	2RED	C1-29	16	6RED	C1-85	116	OLDR	C11-3	254	N/U
C1-13	22	2YEL	C1-30	26	6YEL	C1-86	115	OLDY	C11-4	254	N/U
C1-15	32	2GRN	C1-31	36	6GRN	C1-87	114	OLDG	C11-5	254	N/U
C1-16	11	1RED	C1-32	15	5RED	C1-88	113	OLCR	C11-6	254	N/U
C1-17	221	FYC1	C1-33	223	FYC5	C1-89	112	OLCY	C11-7	254	N/U
C1-18	31	1GRN	C1-34	35	5GRN	C1-90	111	OLCG	C11-8	254	N/U

Internal Logic (next/2/9)			
Step	Inst.	Description	Comment
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Internal Logic cont.			
Step	Inst.	Description	Comment
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Internal Logic cont.			
Step	Inst.	Description	Comment
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Internal Logic cont.			
Step	Inst.	Description	Comment
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Internal Logic cont.				
Step	Inst.	Description	Comment	
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FYLTA - Continued (next/2/2/8/6)						
Phase Pairs -->		1 - 2	3 - 4	5 - 6	7 - 8	
Gap-Dependent FYLTA (next/2/2/8/6-A)	Detector Input	0	0	0	0	0 = disable, 1 - 64 detectors
	Min Delay	0	0	0	0	0 - 255 sec
	Detector Gap	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Max Delay	0	0	0	0	0 - 255 sec
	Not Ped	2	0	2	0	0 - 255 sec
FYLTA Gap-Dependent Plans (next/2/2/8/6)						
Phase Pairs -->		1 - 2	3 - 4	5 - 6	7 - 8	
FYLTA Gap-Dependent Plan A	Detector Input	0	0	0	0	0 = disable, 1 - 64 detectors
	Min Delay	0	0	0	0	0 - 255 sec
	Detector Gap	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Max Delay	0	0	0	0	0 - 255 sec
	Not Ped	0	0	0	0	0 - 255 sec
FYLTA Gap-Dependent Plan B	Detector Input	0	0	0	0	0 = disable, 1 - 64 detectors
	Min Delay	0	0	0	0	0 - 255 sec
	Detector Gap	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Max Delay	0	0	0	0	0 - 255 sec
	Not Ped	0	0	0	0	0 - 255 sec
FYLTA Gap-Dependent Plan C	Detector Input	0	0	0	0	0 = disable, 1 - 64 detectors
	Min Delay	0	0	0	0	0 - 255 sec
	Detector Gap	0.0	0.0	0.0	0.0	0 - 25.5 sec
	Max Delay	0	0	0	0	0 - 255 sec

	Not Ped	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 - 255 sec										
FYLTA Gap-Dependent Plan D	Detector Input	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 = disable, 1 - 64 detectors										
	Min Delay	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 - 255 sec										
	Detector Gap	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	0 - 25.5 sec										
	Max Delay	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 - 255 sec										
	Not Ped	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 - 255 sec										
Preemption - Continued																
Railroad Communications (IEEE 1570) (next/2/5/0/8)																
		ATC			Wayside											
Railroad Number		<i>0</i>			<i>0</i>			0 - 999, represents railroad								
Railroad Line Number		<i>0</i>			<i>0</i>			0 - 999, represents railroad line								
Group Number		<i>0</i>			<i>0</i>			0 - 999, represents physical group of equipment								
Subnode Number		<i>0</i>			<i>0</i>			0 - 99, subnode within physical group of equipment								
Device Number		<i>0</i>			<i>0</i>			0 - 99, device within physical group of equipment								
Associated Preempt		<i>0</i>					0 - 8									
Communication Port		<i>0</i>					0 - 4									
Reports - Continued																
Reports - Service Delay Modes (next/2/6/0)																
Phase -->		1	2	3	4	5	6	7	8							
Mode		<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 = disable, 1 = enable, 2 = Ped, 3 = Veh/P						
Ped Overlap -->		A	B	C	D	E	F	G	H							
Mode		<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	0 = disable, 1 = enable						
Detector -->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Enable	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Detector -->	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Enable	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Detector -->	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Enable	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Detector -->	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
Enable	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>

Appendix F – Existing PM Operational Analysis Worksheets

HCM Signalized Intersection Capacity Analysis

1: US-97 NB Ramps & SW Canal Blvd

2017 Peak Hour
04/03/2018

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Volume (vph)	159	398	7	166	261	74
Future Volume (vph)	159	398	7	166	261	74
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1733	1458	1421	1716	1630	1458
Flt Permitted	1.00	1.00	0.47	1.00	0.95	1.00
Satd. Flow (perm)	1733	1458	702	1716	1630	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	173	433	8	180	284	80
RTOR Reduction (vph)	0	298	0	0	0	55
Lane Group Flow (vph)	173	135	8	180	284	25
Heavy Vehicles (%)	1%	2%	17%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	6		5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	11.8	11.8	17.1	17.1	11.7	11.7
Effective Green, g (s)	11.8	11.8	17.1	17.1	11.7	11.7
Actuated g/C Ratio	0.31	0.31	0.45	0.45	0.31	0.31
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	540	455	332	776	504	451
v/s Ratio Prot	c0.10		0.00	c0.10	c0.17	
v/s Ratio Perm		0.09	0.01			0.02
v/c Ratio	0.32	0.30	0.02	0.23	0.56	0.05
Uniform Delay, d1	9.9	9.9	6.0	6.3	10.9	9.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.4	0.0	0.2	1.4	0.1
Delay (s)	10.3	10.2	6.0	6.5	12.4	9.2
Level of Service	B	B	A	A	B	A
Approach Delay (s)	10.2			6.5	11.7	
Approach LOS	B			A	B	
Intersection Summary						
HCM 2000 Control Delay			10.1		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.45			
Actuated Cycle Length (s)			37.8		Sum of lost time (s)	13.5
Intersection Capacity Utilization			39.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

2017 Peak Hour

1: US-97 NB Ramps & SW Canal Blvd

04/03/2018

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	173	433	8	180	284	80
v/c Ratio	0.29	0.55	0.02	0.28	0.51	0.15
Control Delay	12.0	4.9	7.1	8.9	14.0	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.0	4.9	7.1	8.9	14.0	4.2
Queue Length 50th (ft)	18	0	1	19	31	0
Queue Length 95th (ft)	88	55	7	61	137	23
Internal Link Dist (ft)	689			452	761	
Turn Bay Length (ft)			200			175
Base Capacity (vph)	1634	1399	412	1684	1444	1301
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.31	0.02	0.11	0.20	0.06
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

2: US-97 SB Ramps & NW Canal Blvd

2017 Peak Hour

04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 									 	
Traffic Volume (vph)	0	549	107	57	369	1	0	0	0	8	0	216
Future Volume (vph)	0	549	107	57	369	1	0	0	0	8	0	216
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5		4.5	4.5						4.5	4.5
Lane Util. Factor		0.95		1.00	1.00						1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Frt		0.98		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		3206		1662	1715						1662	1458
Flt Permitted		1.00		0.27	1.00						0.95	1.00
Satd. Flow (perm)		3206		477	1715						1662	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	597	116	62	401	1	0	0	0	9	0	235
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	0	194
Lane Group Flow (vph)	0	695	0	62	402	0	0	0	0	0	9	41
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	0%	0%	0%	0%	0%	2%
Turn Type		NA		pm+pt	NA					Perm	NA	Perm
Protected Phases		6		5	2						8	
Permitted Phases				2						8		8
Actuated Green, G (s)		18.2		26.2	26.2						7.4	7.4
Effective Green, g (s)		18.2		26.2	26.2						7.4	7.4
Actuated g/C Ratio		0.43		0.62	0.62						0.17	0.17
Clearance Time (s)		4.5		4.5	4.5						4.5	4.5
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1369		390	1054						288	253
v/s Ratio Prot		c0.22		0.01	c0.23							
v/s Ratio Perm				0.08							0.01	c0.03
v/c Ratio		0.51		0.16	0.38						0.03	0.16
Uniform Delay, d1		8.9		3.8	4.1						14.6	15.0
Progression Factor		1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2		0.3		0.2	0.2						0.0	0.3
Delay (s)		9.2		4.0	4.4						14.7	15.3
Level of Service		A		A	A						B	B
Approach Delay (s)		9.2			4.3			0.0			15.2	
Approach LOS		A			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			8.7			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			42.6			Sum of lost time (s)			13.5			
Intersection Capacity Utilization			43.2%			ICU Level of Service			A			
Analysis Period (min)			15									

c Critical Lane Group

Queues
2: US-97 SB Ramps & NW Canal Blvd

2017 Peak Hour
04/03/2018

	→	↘	←	↓	↙
Lane Group	EBT	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	713	62	402	9	235
v/c Ratio	0.49	0.13	0.40	0.03	0.52
Control Delay	10.6	4.3	5.9	16.4	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	4.3	5.9	16.4	7.8
Queue Length 50th (ft)	63	4	33	2	0
Queue Length 95th (ft)	123	17	94	11	46
Internal Link Dist (ft)	3583		689	648	
Turn Bay Length (ft)		250			275
Base Capacity (vph)	2252	477	1556	1337	1219
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.32	0.13	0.26	0.01	0.19
Intersection Summary					

Intersection

Intersection Delay, s/veh 16.2

Intersection LOS C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	115	53	315	170	88	74	69	258	47	44	6
Future Vol, veh/h	6	115	53	315	170	88	74	69	258	47	44	6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	3	0	1	0	0	0	0	1	0	0	0
Mvmt Flow	6	122	56	335	181	94	79	73	274	50	47	6
Number of Lanes	1	1	0	1	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay	13.6	18.9	14.3	12.9
HCM LOS	B	C	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	52%	0%	100%	0%	100%	0%	48%
Vol Thru, %	48%	0%	0%	68%	0%	66%	45%
Vol Right, %	0%	100%	0%	32%	0%	34%	6%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	143	258	6	168	315	258	97
LT Vol	74	0	6	0	315	0	47
Through Vol	69	0	0	115	0	170	44
RT Vol	0	258	0	53	0	88	6
Lane Flow Rate	152	274	6	179	335	274	103
Geometry Grp	7	7	7	7	7	7	6
Degree of Util (X)	0.31	0.484	0.014	0.353	0.654	0.477	0.221
Departure Headway (Hd)	7.328	6.352	7.793	7.105	7.14	6.369	7.695
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	493	571	460	508	509	568	467
Service Time	5.028	4.052	5.522	4.834	4.84	4.069	5.722
HCM Lane V/C Ratio	0.308	0.48	0.013	0.352	0.658	0.482	0.221
HCM Control Delay	13.3	14.9	10.6	13.7	22.3	14.7	12.9
HCM Lane LOS	B	B	B	B	C	B	B
HCM 95th-tile Q	1.3	2.6	0	1.6	4.7	2.6	0.8

HCM Signalized Intersection Capacity Analysis

4: NW 6th St & NW Maple Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	106	163	152	156	197	27	221	421	226	40	292	148
Future Volume (vph)	106	163	152	156	197	27	221	421	226	40	292	148
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1598	1733	1454	1646	1686		1646	3131		1539	3101	
Flt Permitted	0.53	1.00	1.00	0.52	1.00		0.32	1.00		0.34	1.00	
Satd. Flow (perm)	891	1733	1454	896	1686		559	3131		547	3101	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	116	179	167	171	216	30	243	463	248	44	321	163
RTOR Reduction (vph)	0	0	128	0	6	0	0	72	0	0	71	0
Lane Group Flow (vph)	116	179	39	171	240	0	243	639	0	44	413	0
Confl. Peds. (#/hr)	2		1	1		2	2					2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	1%	1%	1%	2%	0%	1%	1%	0%	8%	1%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6			2		
Actuated Green, G (s)	20.9	15.5	15.5	24.5	17.3		31.1	23.4		22.5	18.8	
Effective Green, g (s)	20.9	15.5	15.5	24.5	17.3		31.1	23.4		22.5	18.8	
Actuated g/C Ratio	0.32	0.23	0.23	0.37	0.26		0.47	0.35		0.34	0.28	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	338	405	339	412	439		398	1105		240	879	
v/s Ratio Prot	0.03	0.10		c0.05	c0.14		c0.08	0.20		0.01	0.13	
v/s Ratio Perm	0.08		0.03	0.11			c0.21			0.05		
v/c Ratio	0.34	0.44	0.12	0.42	0.55		0.61	0.58		0.18	0.47	
Uniform Delay, d1	16.8	21.7	20.0	14.8	21.1		11.5	17.4		14.9	19.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.8	0.2	0.7	1.4		2.8	0.7		0.4	0.4	
Delay (s)	17.4	22.5	20.2	15.5	22.5		14.3	18.2		15.3	20.0	
Level of Service	B	C	C	B	C		B	B		B	C	
Approach Delay (s)		20.4			19.6			17.2			19.6	
Approach LOS		C			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.8			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			66.3			Sum of lost time (s)			16.5			
Intersection Capacity Utilization			62.1%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
4: NW 6th St & NW Maple Ave

2017 Peak Hour
04/03/2018

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	116	179	167	171	246	243	711	44	484
v/c Ratio	0.31	0.46	0.36	0.42	0.53	0.63	0.58	0.14	0.54
Control Delay	16.0	26.2	6.7	17.8	26.5	20.9	17.7	11.7	18.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.0	26.2	6.7	17.8	26.5	20.9	17.7	11.7	18.4
Queue Length 50th (ft)	28	59	0	42	83	55	107	9	64
Queue Length 95th (ft)	70	129	43	99	172	#131	190	28	122
Internal Link Dist (ft)	3891				719		1235		3583
Turn Bay Length (ft)	200		200		100		100		100
Base Capacity (vph)	383	927	855	404	906	387	1654	323	1582
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.19	0.20	0.42	0.27	0.63	0.43	0.14	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection												
Int Delay, s/veh	6.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	137	20	8	19	2	13	26	30	76	19	25
Future Vol, veh/h	17	137	20	8	19	2	13	26	30	76	19	25
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	20	0	0	0	0	0	0	0	11	0
Mvmt Flow	21	171	25	10	24	3	16	33	38	95	24	31

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	26	0	0	198	0	0	301	274	188	308	286	25
Stage 1	-	-	-	-	-	-	228	228	-	45	45	-
Stage 2	-	-	-	-	-	-	73	46	-	263	241	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.61	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.61	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.61	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.099	3.3
Pot Cap-1 Maneuver	1601	-	-	1387	-	-	655	637	859	648	609	1057
Stage 1	-	-	-	-	-	-	779	719	-	974	840	-
Stage 2	-	-	-	-	-	-	942	861	-	747	690	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1601	-	-	1384	-	-	605	622	856	584	595	1057
Mov Cap-2 Maneuver	-	-	-	-	-	-	605	622	-	584	595	-
Stage 1	-	-	-	-	-	-	766	707	-	959	834	-
Stage 2	-	-	-	-	-	-	882	855	-	670	678	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	2.1	10.8	12.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	702	1601	-	-	1384	-	-	646
HCM Lane V/C Ratio	0.123	0.013	-	-	0.007	-	-	0.232
HCM Control Delay (s)	10.8	7.3	0	-	7.6	0	-	12.3
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.9

Intersection

Intersection Delay, s/veh	9.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Vol, veh/h	38	9	95	34	12	35	22	139	5	5	71	8
Future Vol, veh/h	38	9	95	34	12	35	22	139	5	5	71	8
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles, %	0	11	6	0	8	0	23	1	0	0	3	62
Mvmt Flow	44	10	110	40	14	41	26	162	6	6	83	9
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	8.6	8.4	10.1	8.8
HCM LOS	A	A	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	13%	27%	42%	7%	0%
Vol Thru, %	84%	6%	15%	93%	0%
Vol Right, %	3%	67%	43%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	166	142	81	76	8
LT Vol	22	38	34	5	0
Through Vol	139	9	12	71	0
RT Vol	5	95	35	0	8
Lane Flow Rate	193	165	94	88	9
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.274	0.203	0.122	0.131	0.012
Departure Headway (Hd)	5.117	4.418	4.67	5.317	4.63
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	699	811	765	672	769
Service Time	3.167	2.458	2.717	3.071	2.383
HCM Lane V/C Ratio	0.276	0.203	0.123	0.131	0.012
HCM Control Delay	10.1	8.6	8.4	8.9	7.4
HCM Lane LOS	B	A	A	A	A
HCM 95th-tile Q	1.1	0.8	0.4	0.4	0

Intersection												
Int Delay, s/veh	4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	42	0	56	0	82	71	40	39	0
Future Vol, veh/h	0	0	0	42	0	56	0	82	71	40	39	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	0	0	0	0	0	0	0	0	1	0	8	0
Mvmt Flow	0	0	0	51	0	67	0	99	86	48	47	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	318	327	47	285	285	142	47	0	0	184	0	0
Stage 1	143	143	-	142	142	-	-	-	-	-	-	-
Stage 2	175	184	-	143	143	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	639	595	1028	671	628	911	1573	-	-	1403	-	-
Stage 1	865	782	-	866	783	-	-	-	-	-	-	-
Stage 2	832	751	-	865	782	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	576	574	1028	653	606	911	1573	-	-	1403	-	-
Mov Cap-2 Maneuver	576	574	-	653	606	-	-	-	-	-	-	-
Stage 1	865	755	-	866	783	-	-	-	-	-	-	-
Stage 2	770	751	-	835	755	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	10.4	0	3.9
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1573	-	-	-	779	1403	-
HCM Lane V/C Ratio	-	-	-	-	0.152	0.034	-
HCM Control Delay (s)	0	-	-	0	10.4	7.7	0
HCM Lane LOS	A	-	-	A	B	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0.1	-

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Vol, veh/h	2	74	42	114	76	24	36	90	108	15	53	2
Future Vol, veh/h	2	74	42	114	76	24	36	90	108	15	53	2
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles, %	0	3	2	1	0	0	0	0	1	0	0	0
Mvmt Flow	2	85	48	131	87	28	41	103	124	17	61	2
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	9.8	10.1	10.4	9.3
HCM LOS	A	B	B	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	45%	0%	64%	0%	76%	0%	96%
Vol Right, %	0%	55%	0%	36%	0%	24%	0%	4%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	36	198	2	116	114	100	15	55
LT Vol	36	0	2	0	114	0	15	0
Through Vol	0	90	0	74	0	76	0	53
RT Vol	0	108	0	42	0	24	0	2
Lane Flow Rate	41	228	2	133	131	115	17	63
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.07	0.33	0.004	0.208	0.225	0.175	0.031	0.104
Departure Headway (Hd)	6.214	5.324	6.319	5.609	6.182	5.491	6.443	5.912
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	580	680	569	643	584	657	557	608
Service Time	3.914	3.024	4.031	3.321	3.882	3.191	4.164	3.632
HCM Lane V/C Ratio	0.071	0.335	0.004	0.207	0.224	0.175	0.031	0.104
HCM Control Delay	9.4	10.6	9.1	9.8	10.7	9.4	9.4	9.3
HCM Lane LOS	A	B	A	A	B	A	A	A
HCM 95th-tile Q	0.2	1.4	0	0.8	0.9	0.6	0.1	0.3

HCM Signalized Intersection Capacity Analysis

9: NW 19th St & W Antler Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	121	44	55	184	177	70	371	50	57	289	104
Future Volume (vph)	104	121	44	55	184	177	70	371	50	57	289	104
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1620	1658		1628	1733	1448	1662	1694		1662	1671	
Flt Permitted	0.50	1.00		0.65	1.00	1.00	0.37	1.00		0.26	1.00	
Satd. Flow (perm)	857	1658		1106	1733	1448	646	1694		453	1671	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	112	130	47	59	198	190	75	399	54	61	311	112
RTOR Reduction (vph)	0	16	0	0	0	129	0	5	0	0	14	0
Lane Group Flow (vph)	112	161	0	59	198	61	75	448	0	61	409	0
Confl. Peds. (#/hr)	12		2	2		12	1		4	4		1
Heavy Vehicles (%)	2%	1%	0%	2%	1%	0%	0%	1%	2%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	21.6	16.8		18.8	15.4	21.9	28.4	23.8		32.2	25.7	
Effective Green, g (s)	21.6	16.8		18.8	15.4	21.9	28.4	23.8		32.2	25.7	
Actuated g/C Ratio	0.32	0.25		0.27	0.22	0.32	0.41	0.35		0.47	0.38	
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	3.5		2.0	3.5	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	323	406		329	389	558	336	588		327	626	
v/s Ratio Prot	c0.02	0.10		0.01	c0.11	0.01	0.01	c0.26		c0.02	0.24	
v/s Ratio Perm	0.08			0.04		0.03	0.08			0.07		
v/c Ratio	0.35	0.40		0.18	0.51	0.11	0.22	0.76		0.19	0.65	
Uniform Delay, d1	17.3	21.6		18.7	23.2	16.4	12.7	19.8		11.2	17.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.8		0.1	1.2	0.0	0.1	5.8		0.1	2.5	
Delay (s)	17.6	22.4		18.8	24.5	16.5	12.8	25.6		11.3	20.2	
Level of Service	B	C		B	C	B	B	C		B	C	
Approach Delay (s)		20.5			20.3			23.8			19.1	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			21.1									
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			68.5									
Intersection Capacity Utilization			64.2%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues
9: NW 19th St & W Antler Ave

2017 Peak Hour
04/03/2018

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	112	177	59	198	190	75	453	61	423
v/c Ratio	0.33	0.40	0.16	0.52	0.32	0.20	0.78	0.19	0.64
Control Delay	19.3	24.3	17.0	30.9	4.7	11.0	30.3	11.0	23.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.3	24.3	17.0	30.9	4.7	11.0	30.3	11.0	23.3
Queue Length 50th (ft)	30	56	15	74	0	15	161	12	142
Queue Length 95th (ft)	74	126	44	152	40	40	299	34	268
Internal Link Dist (ft)	2545		3983				2700	5211	
Turn Bay Length (ft)	125		150		225	175		225	
Base Capacity (vph)	343	745	377	767	595	393	863	336	857
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.24	0.16	0.26	0.32	0.19	0.52	0.18	0.49
Intersection Summary									

HCM Signalized Intersection Capacity Analysis

10: SW 6th St & SW Black Butte Blvd

2017 Peak Hour

04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											  	
Traffic Volume (vph)	0	58	62	19	101	0	0	0	0	14	597	114
Future Volume (vph)	0	58	62	19	101	0	0	0	0	14	597	114
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0						5.0	
Lane Util. Factor		1.00			1.00						0.95	
Frpb, ped/bikes		1.00			1.00						1.00	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		0.93			1.00						0.98	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1628			1736						3196	
Flt Permitted		1.00			0.93						1.00	
Satd. Flow (perm)		1628			1626						3196	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	61	65	20	106	0	0	0	0	15	628	120
RTOR Reduction (vph)	0	49	0	0	0	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	77	0	0	126	0	0	0	0	0	739	0
Confl. Peds. (#/hr)	1					1	1			1	1	1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		8			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		8.5			8.5						16.1	
Effective Green, g (s)		8.5			8.5						16.1	
Actuated g/C Ratio		0.25			0.25						0.47	
Clearance Time (s)		5.0			5.0						5.0	
Vehicle Extension (s)		3.0			3.0						3.0	
Lane Grp Cap (vph)		399			399						1487	
v/s Ratio Prot		0.05										
v/s Ratio Perm					c0.08						0.23	
v/c Ratio		0.19			0.32						0.50	
Uniform Delay, d1		10.3			10.7						6.4	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.2			0.5						0.3	
Delay (s)		10.6			11.1						6.7	
Level of Service		B			B						A	
Approach Delay (s)		10.6			11.1			0.0			6.7	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			7.7			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			34.6			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			47.6%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2017 Peak Hour

10: SW 6th St & SW Black Butte Blvd

04/03/2018

	→	←	↓
Lane Group	EBT	WBT	SBT
Lane Group Flow (vph)	126	126	763
v/c Ratio	0.28	0.32	0.51
Control Delay	9.2	14.9	7.6
Queue Delay	0.0	0.0	0.0
Total Delay	9.2	14.9	7.6
Queue Length 50th (ft)	9	19	41
Queue Length 95th (ft)	44	61	86
Internal Link Dist (ft)	3983	187	3118
Turn Bay Length (ft)			
Base Capacity (vph)	1225	1207	2979
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.10	0.10	0.26
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

11: SW 5th St & SW Black Butte Blvd

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	16	0	0	26	8	110	771	6	0	0	0
Future Volume (vph)	58	16	0	0	26	8	110	771	6	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			1.00			1.00				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.97			1.00				
Flt Protected		0.96			1.00			0.99				
Satd. Flow (prot)		1684			1645			3267				
Flt Permitted		0.75			1.00			0.99				
Satd. Flow (perm)		1305			1645			3267				
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	66	18	0	0	30	9	125	876	7	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	84	0	0	31	0	0	1007	0	0	0	0
Confl. Peds. (#/hr)							2		1	1		2
Heavy Vehicles (%)	0%	0%	0%	0%	4%	0%	0%	1%	17%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		8			4			6				
Permitted Phases	8						6					
Actuated Green, G (s)		5.3			5.3			28.8				
Effective Green, g (s)		5.3			5.3			28.8				
Actuated g/C Ratio		0.12			0.12			0.65				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		156			197			2133				
v/s Ratio Prot					0.02							
v/s Ratio Perm		c0.06						0.31				
v/c Ratio		0.54			0.16			0.47				
Uniform Delay, d1		18.2			17.4			3.8				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		3.5			0.4			0.2				
Delay (s)		21.8			17.8			4.0				
Level of Service		C			B			A				
Approach Delay (s)		21.8			17.8			4.0			0.0	
Approach LOS		C			B			A			A	
Intersection Summary												
HCM 2000 Control Delay		5.8			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.48										
Actuated Cycle Length (s)		44.1			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		49.5%			ICU Level of Service			A				
Analysis Period (min)		15										

c Critical Lane Group

Queues

2017 Peak Hour

11: SW 5th St & SW Black Butte Blvd

04/03/2018

	→	←	↑
Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	84	39	1008
v/c Ratio	0.31	0.12	0.41
Control Delay	19.4	13.9	5.3
Queue Delay	0.0	0.0	0.0
Total Delay	19.4	13.9	5.3
Queue Length 50th (ft)	18	6	65
Queue Length 95th (ft)	53	26	124
Internal Link Dist (ft)	187	470	1008
Turn Bay Length (ft)			
Base Capacity (vph)	677	857	3011
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.12	0.05	0.33
Intersection Summary			

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	23	4	7	12	3	8	6	146	2	4	230	24
Future Vol, veh/h	23	4	7	12	3	8	6	146	2	4	230	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	0	0	0	0	25	50	4	0	50	8	4
Mvmt Flow	27	5	8	14	4	9	7	172	2	5	271	28

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	488	482	285	488	495	173	299	0	0	174	0	0
Stage 1	294	294	-	187	187	-	-	-	-	-	-	-
Stage 2	194	188	-	301	308	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.5	6.2	7.1	6.5	6.45	4.6	-	-	4.6	-	-
Critical Hdwy Stg 1	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4	3.3	3.5	4	3.525	2.65	-	-	2.65	-	-
Pot Cap-1 Maneuver	487	487	759	493	479	814	1033	-	-	1159	-	-
Stage 1	710	673	-	819	749	-	-	-	-	-	-	-
Stage 2	803	748	-	712	664	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	474	481	759	479	473	814	1033	-	-	1159	-	-
Mov Cap-2 Maneuver	474	481	-	479	473	-	-	-	-	-	-	-
Stage 1	704	670	-	812	743	-	-	-	-	-	-	-
Stage 2	784	742	-	696	661	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.6		11.8		0.3		0.1	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1033	-	-	515	558	1159	-
HCM Lane V/C Ratio	0.007	-	-	0.078	0.048	0.004	-
HCM Control Delay (s)	8.5	0	-	12.6	11.8	8.1	0
HCM Lane LOS	A	A	-	B	B	A	A
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0	-

HCM Signalized Intersection Capacity Analysis

13: SW 6th St & SW Evergreen Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											  	
Traffic Volume (vph)	0	54	15	94	59	0	0	0	0	86	621	29
Future Volume (vph)	0	54	15	94	59	0	0	0	0	86	621	29
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0						5.0	
Lane Util. Factor		1.00			1.00						0.95	
Frpb, ped/bikes		0.99			1.00						1.00	
Flpb, ped/bikes		1.00			0.99						1.00	
Frt		0.97			1.00						0.99	
Flt Protected		1.00			0.97						0.99	
Satd. Flow (prot)		1662			1683						3233	
Flt Permitted		1.00			0.77						0.99	
Satd. Flow (perm)		1662			1330						3233	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	61	17	106	66	0	0	0	0	97	698	33
RTOR Reduction (vph)	0	12	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	66	0	0	172	0	0	0	0	0	824	0
Confl. Peds. (#/hr)	21		19	19		21	16		26	26		16
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	1%	1%	3%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		8			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.2			11.2						19.3	
Effective Green, g (s)		11.2			11.2						19.3	
Actuated g/C Ratio		0.28			0.28						0.48	
Clearance Time (s)		5.0			5.0						5.0	
Vehicle Extension (s)		3.0			3.0						3.0	
Lane Grp Cap (vph)		459			367						1540	
v/s Ratio Prot		0.04										
v/s Ratio Perm					c0.13						0.25	
v/c Ratio		0.14			0.47						0.53	
Uniform Delay, d1		11.0			12.2						7.4	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.1			0.9						0.4	
Delay (s)		11.2			13.1						7.8	
Level of Service		B			B						A	
Approach Delay (s)		11.2			13.1			0.0			7.8	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			8.9			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			40.5			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			49.7%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
13: SW 6th St & SW Evergreen Ave

2017 Peak Hour
04/03/2018

	→	←	↓
Lane Group	EBT	WBT	SBT
Lane Group Flow (vph)	78	172	828
v/c Ratio	0.17	0.48	0.55
Control Delay	11.8	19.1	9.4
Queue Delay	0.0	0.0	0.0
Total Delay	11.8	19.1	9.4
Queue Length 50th (ft)	10	32	58
Queue Length 95th (ft)	41	94	129
Internal Link Dist (ft)	369	175	1004
Turn Bay Length (ft)			
Base Capacity (vph)	1080	855	2735
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.07	0.20	0.30
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

14: SW 5th St & SW Evergreen Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	108	0	0	121	235	28	645	28	0	0	0
Future Volume (vph)	35	108	0	0	121	235	28	645	28	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.99			1.00				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.91			0.99				
Flt Protected		0.99			1.00			1.00				
Satd. Flow (prot)		1703			1538			3296				
Flt Permitted		0.84			1.00			1.00				
Satd. Flow (perm)		1456			1538			3296				
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	39	120	0	0	134	261	31	717	31	0	0	0
RTOR Reduction (vph)	0	0	0	0	72	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	159	0	0	323	0	0	775	0	0	0	0
Confl. Peds. (#/hr)	2		3	3		2	1		1	1		1
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	3%	1%	0%	0%	2%	3%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		8			4			6				
Permitted Phases	8						6					
Actuated Green, G (s)		15.0			15.0			18.1				
Effective Green, g (s)		15.0			15.0			18.1				
Actuated g/C Ratio		0.35			0.35			0.42				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		506			535			1384				
v/s Ratio Prot					c0.21							
v/s Ratio Perm		0.11						0.24				
v/c Ratio		0.31			0.60			0.56				
Uniform Delay, d1		10.3			11.6			9.5				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		0.4			1.9			0.5				
Delay (s)		10.6			13.5			10.0				
Level of Service		B			B			A				
Approach Delay (s)		10.6			13.5			10.0			0.0	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			11.1			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			43.1			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			68.4%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2017 Peak Hour

14: SW 5th St & SW Evergreen Ave

04/03/2018

	→	←	↑
Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	159	395	779
v/c Ratio	0.32	0.66	0.57
Control Delay	13.5	15.3	12.4
Queue Delay	0.0	0.0	0.0
Total Delay	13.5	15.3	12.4
Queue Length 50th (ft)	26	51	66
Queue Length 95th (ft)	80	162	161
Internal Link Dist (ft)	175	838	646
Turn Bay Length (ft)			
Base Capacity (vph)	1087	1175	2346
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.15	0.34	0.33
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

15: US-97 & SW Evergreen Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	87	76	262	233	105	251	1053	185	86	922	28
Future Volume (vph)	50	87	76	262	233	105	251	1053	185	86	922	28
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1630	1602		1614	1617		1630	3107	1417	1646	3107	1488
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1630	1602		1614	1617		1630	3107	1417	1646	3107	1488
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	95	83	285	253	114	273	1145	201	93	1002	30
RTOR Reduction (vph)	0	24	0	0	12	0	0	0	114	0	0	20
Lane Group Flow (vph)	54	154	0	285	355	0	273	1145	87	93	1002	10
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	2%	1%	1%	3%	1%	8%	2%	7%	5%	1%	7%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Prot	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6	6	5	2	
Permitted Phases												2
Actuated Green, G (s)	7.2	20.4		24.6	37.8		22.6	57.5	57.5	10.2	45.1	45.1
Effective Green, g (s)	7.2	20.4		24.6	37.8		22.6	57.5	57.5	10.2	45.1	45.1
Actuated g/C Ratio	0.05	0.15		0.19	0.28		0.17	0.43	0.43	0.08	0.34	0.34
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	88	246		299	460		277	1346	613	126	1055	505
v/s Ratio Prot	0.03	0.10		c0.18	c0.22		c0.17	0.37	0.06	0.06	c0.32	
v/s Ratio Perm												0.01
v/c Ratio	0.61	0.63		0.95	0.77		0.99	0.85	0.14	0.74	0.95	0.02
Uniform Delay, d1	61.4	52.6		53.5	43.5		54.9	33.7	22.7	59.9	42.7	29.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.0	4.9		39.3	7.8		49.7	5.4	0.1	20.0	16.7	0.0
Delay (s)	73.4	57.5		92.8	51.3		104.6	39.1	22.8	80.0	59.4	29.1
Level of Service	E	E		F	D		F	D	C	E	E	C
Approach Delay (s)		61.2			69.5			48.1			60.3	
Approach LOS		E			E			D			E	
Intersection Summary												
HCM 2000 Control Delay			56.6			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			132.7			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			86.0%			ICU Level of Service			E			
Analysis Period (min)			15									

c Critical Lane Group

Queues
15: US-97 & SW Evergreen Ave

2017 Peak Hour
04/03/2018

										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	178	285	367	273	1145	201	93	1002	30
v/c Ratio	0.52	0.69	0.95	0.77	0.98	0.85	0.27	0.73	0.94	0.05
Control Delay	79.2	58.0	93.9	53.8	103.7	41.2	4.4	91.8	59.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.2	58.0	93.9	53.8	103.7	41.2	4.4	91.8	59.4	0.1
Queue Length 50th (ft)	45	123	240	285	232	445	0	78	428	0
Queue Length 95th (ft)	98	201	#475	407	#468	#681	51	#185	#665	0
Internal Link Dist (ft)		838		3278		1074			1019	
Turn Bay Length (ft)	150		450		275		575	350		100
Base Capacity (vph)	117	483	300	662	279	1355	731	131	1064	605
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.37	0.95	0.55	0.98	0.85	0.27	0.71	0.94	0.05

Intersection Summary

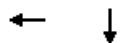
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

16: SW 11th St & SW Glacier Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	65	1202	0	0	0	0	0	31	18
Future Volume (vph)	0	0	0	65	1202	0	0	0	0	0	31	18
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5						4.5	
Lane Util. Factor					0.95						0.95	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					1.00						1.00	
Frt					1.00						0.94	
Flt Protected					1.00						1.00	
Satd. Flow (prot)					3255						3124	
Flt Permitted					1.00						1.00	
Satd. Flow (perm)					3255						3124	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	0	0	0	75	1382	0	0	0	0	0	36	21
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	20	0
Lane Group Flow (vph)	0	0	0	0	1454	0	0	0	0	0	37	0
Confl. Peds. (#/hr)	3		1	1		3	3		2	2		3
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA						NA	
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					47.5						3.6	
Effective Green, g (s)					47.5						3.6	
Actuated g/C Ratio					0.79						0.06	
Clearance Time (s)					4.5						4.5	
Vehicle Extension (s)					3.0						3.0	
Lane Grp Cap (vph)					2572						187	
v/s Ratio Prot											c0.01	
v/s Ratio Perm					0.45							
v/c Ratio					0.57						0.20	
Uniform Delay, d1					2.4						26.9	
Progression Factor					1.00						1.00	
Incremental Delay, d2					0.3						0.5	
Delay (s)					2.7						27.4	
Level of Service					A						C	
Approach Delay (s)		0.0			2.7			0.0			27.4	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			3.6									
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			60.1									
Intersection Capacity Utilization			54.8%									
Analysis Period (min)			15									
c Critical Lane Group												



Lane Group	WBT	SBT
Lane Group Flow (vph)	1457	57
v/c Ratio	0.52	0.15
Control Delay	3.3	21.2
Queue Delay	0.0	0.0
Total Delay	3.3	21.2
Queue Length 50th (ft)	88	6
Queue Length 95th (ft)	132	23
Internal Link Dist (ft)	472	448
Turn Bay Length (ft)		
Base Capacity (vph)	3253	1071
Starvation Cap Reductn	273	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.49	0.05
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

17: SW 9th St & SW Glacier Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	832	14	404	133	0	0	0	0
Future Volume (vph)	0	0	0	0	832	14	404	133	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5		4.5	4.5				
Lane Util. Factor					0.95		0.91	0.91				
Frpb, ped/bikes					1.00		1.00	1.00				
Flpb, ped/bikes					1.00		1.00	1.00				
Frt					1.00		1.00	1.00				
Flt Protected					1.00		0.95	0.97				
Satd. Flow (prot)					3252		1482	3053				
Flt Permitted					1.00		0.95	0.97				
Satd. Flow (perm)					3252		1482	3053				
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	0	0	0	0	990	17	481	158	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	0	81	81	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1006	0	159	318	0	0	0	0
Confl. Peds. (#/hr)	3					3	1					1
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					6			8				
Permitted Phases							8					
Actuated Green, G (s)					23.8		12.7	12.7				
Effective Green, g (s)					23.8		12.7	12.7				
Actuated g/C Ratio					0.52		0.28	0.28				
Clearance Time (s)					4.5		4.5	4.5				
Vehicle Extension (s)					3.0		3.0	3.0				
Lane Grp Cap (vph)					1701		413	852				
v/s Ratio Prot					c0.31							
v/s Ratio Perm							c0.11	0.10				
v/c Ratio					0.59		0.39	0.37				
Uniform Delay, d1					7.5		13.2	13.2				
Progression Factor					1.00		1.00	1.00				
Incremental Delay, d2					0.6		0.6	0.3				
Delay (s)					8.0		13.8	13.5				
Level of Service					A		B	B				
Approach Delay (s)		0.0			8.0			13.6			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			10.2		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			45.5		Sum of lost time (s)					9.0		
Intersection Capacity Utilization			73.2%		ICU Level of Service					D		
Analysis Period (min)			15									

c Critical Lane Group

Queues
17: SW 9th St & SW Glacier Ave

2017 Peak Hour
04/03/2018



Lane Group	WBT	NBL	NBT
Lane Group Flow (vph)	1007	240	399
v/c Ratio	0.60	0.49	0.43
Control Delay	9.9	12.6	12.1
Queue Delay	0.0	0.0	0.0
Total Delay	9.9	12.6	12.1
Queue Length 50th (ft)	80	27	30
Queue Length 95th (ft)	161	92	75
Internal Link Dist (ft)	765		275
Turn Bay Length (ft)			
Base Capacity (vph)	3155	1155	2353
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.32	0.21	0.17
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

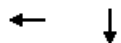
18: SW 6th St & SW Glacier Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	106	458	0	0	0	0	0	662	290
Future Volume (vph)	0	0	0	106	458	0	0	0	0	0	662	290
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5						4.5	
Lane Util. Factor					0.95						0.95	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					1.00						1.00	
Frt					1.00						0.95	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					3215						3137	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					3215						3137	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	114	492	0	0	0	0	0	712	312
RTOR Reduction (vph)	0	0	0	0	22	0	0	0	0	0	53	0
Lane Group Flow (vph)	0	0	0	0	584	0	0	0	0	0	971	0
Confl. Peds. (#/hr)			2	2			2		2	2		2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Perm	NA						NA	
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					17.6						28.5	
Effective Green, g (s)					17.6						28.5	
Actuated g/C Ratio					0.32						0.52	
Clearance Time (s)					4.5						4.5	
Vehicle Extension (s)					3.0						3.0	
Lane Grp Cap (vph)					1026						1622	
v/s Ratio Prot											c0.31	
v/s Ratio Perm					0.18							
v/c Ratio					0.57						0.60	
Uniform Delay, d1					15.6						9.3	
Progression Factor					1.00						1.00	
Incremental Delay, d2					0.7						0.6	
Delay (s)					16.3						9.9	
Level of Service					B						A	
Approach Delay (s)		0.0			16.3			0.0			9.9	
Approach LOS		A			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			12.3		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			55.1		Sum of lost time (s)					9.0		
Intersection Capacity Utilization			54.6%		ICU Level of Service					A		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
18: SW 6th St & SW Glacier Ave

2017 Peak Hour
04/03/2018



Lane Group	WBT	SBT
Lane Group Flow (vph)	606	1024
v/c Ratio	0.58	0.62
Control Delay	18.8	10.7
Queue Delay	0.0	0.0
Total Delay	18.8	10.7
Queue Length 50th (ft)	79	98
Queue Length 95th (ft)	170	203
Internal Link Dist (ft)	179	644
Turn Bay Length (ft)		
Base Capacity (vph)	2264	2858
Starvation Cap Reductn	173	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.29	0.36
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

19: SW 5th St & SW Glacier Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑	↑	↑	↑↑				
Traffic Volume (vph)	0	0	0	0	481	243	62	631	0	0	0	0
Future Volume (vph)	0	0	0	0	481	243	62	631	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5	4.5	4.5	4.5				
Lane Util. Factor					0.95	1.00	0.91	0.91				
Frpb, ped/bikes					1.00	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	1.00	1.00				
Frt					1.00	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	1.00				
Satd. Flow (prot)					3228	1440	1513	3183				
Flt Permitted					1.00	1.00	0.95	1.00				
Satd. Flow (perm)					3228	1440	1513	3183				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	523	264	67	686	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	110	27	9	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	523	154	33	684	0	0	0	0
Confl. Peds. (#/hr)	1					1			1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	3%	2%	0%	0%	0%	0%	0%	0%
Turn Type					NA	Perm	Perm	NA				
Protected Phases					4			6				
Permitted Phases						4	6					
Actuated Green, G (s)					15.8	15.8	17.6	17.6				
Effective Green, g (s)					15.8	15.8	17.6	17.6				
Actuated g/C Ratio					0.37	0.37	0.42	0.42				
Clearance Time (s)					4.5	4.5	4.5	4.5				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1202	536	628	1321				
v/s Ratio Prot					c0.16							
v/s Ratio Perm						0.11	0.02	0.21				
v/c Ratio					0.44	0.29	0.05	0.52				
Uniform Delay, d1					10.0	9.3	7.4	9.2				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					0.3	0.3	0.0	0.3				
Delay (s)					10.2	9.6	7.5	9.6				
Level of Service					B	A	A	A				
Approach Delay (s)		0.0			10.0			9.4			0.0	
Approach LOS		A			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			9.7		HCM 2000 Level of Service					A		
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			42.4		Sum of lost time (s)					9.0		
Intersection Capacity Utilization			64.7%		ICU Level of Service					C		
Analysis Period (min)			15									

c Critical Lane Group

Queues
19: SW 5th St & SW Glacier Ave

2017 Peak Hour
04/03/2018



Lane Group	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	523	264	60	693
v/c Ratio	0.44	0.41	0.09	0.53
Control Delay	12.2	6.6	4.7	11.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.2	6.6	4.7	11.3
Queue Length 50th (ft)	45	13	2	59
Queue Length 95th (ft)	104	63	21	133
Internal Link Dist (ft)	478			255
Turn Bay Length (ft)		125	75	
Base Capacity (vph)	2945	1328	1460	3067
Starvation Cap Reductn	0	0	0	55
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.18	0.20	0.04	0.23

Intersection Summary

HCM Signalized Intersection Capacity Analysis

20: US97 & Glacier Highland Ave

2017 Peak Hour
04/03/2018

										
Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER	
Lane Configurations	 		 	 	 					
Traffic Volume (vph)	381	243	454	1109	980	0	280	0	0	
Future Volume (vph)	381	243	454	1109	980	0	280	0	0	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.5	4.5	4.5	5.5	5.5		5.5			
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95		1.00			
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00			
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00			
Frt	1.00	0.85	1.00	1.00	1.00		0.85			
Flt Protected	0.95	1.00	0.95	1.00	1.00		1.00			
Satd. Flow (prot)	3131	1473	3162	3167	3137		1458			
Flt Permitted	0.95	1.00	0.95	1.00	1.00		1.00			
Satd. Flow (perm)	3131	1473	3162	3167	3137		1458			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	
Adj. Flow (vph)	401	256	478	1167	1032	0	304	0	0	
RTOR Reduction (vph)	0	206	0	0	0	0	121	0	0	
Lane Group Flow (vph)	401	50	478	1167	1032	0	183	0	0	
Confl. Bikes (#/hr)						1				
Heavy Vehicles (%)	3%	1%	2%	5%	6%	3%	2%	2%	2%	
Turn Type	Prot	Perm	Prot	NA	NA		Perm			
Protected Phases	8		1	6	2					
Permitted Phases		3					2			
Actuated Green, G (s)	20.2	20.2	22.6	72.9	45.8		45.8			
Effective Green, g (s)	20.2	20.2	22.6	72.9	45.8		45.8			
Actuated g/C Ratio	0.20	0.20	0.22	0.71	0.44		0.44			
Clearance Time (s)	4.5	4.5	4.5	5.5	5.5		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0			
Lane Grp Cap (vph)	613	288	693	2239	1393		647			
v/s Ratio Prot	c0.13		c0.15	0.37	c0.33					
v/s Ratio Perm		0.03					0.13			
v/c Ratio	0.65	0.17	0.69	0.52	0.74		0.28			
Uniform Delay, d1	38.2	34.5	37.0	7.0	23.7		18.2			
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00			
Incremental Delay, d2	2.5	0.3	2.9	0.2	2.2		0.2			
Delay (s)	40.7	34.8	39.9	7.2	25.9		18.5			
Level of Service	D	C	D	A	C		B			
Approach Delay (s)	38.4			16.7	24.2			0.0		
Approach LOS	D			B	C			A		
Intersection Summary										
HCM 2000 Control Delay			23.4			HCM 2000 Level of Service			C	
HCM 2000 Volume to Capacity ratio			0.71							
Actuated Cycle Length (s)			103.1			Sum of lost time (s)			14.5	
Intersection Capacity Utilization			67.4%			ICU Level of Service			C	
Analysis Period (min)			15							
c Critical Lane Group										

c Critical Lane Group

Queues
20: US97 & Glacier Highland Ave

2017 Peak Hour
04/03/2018

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR2
Lane Group Flow (vph)	401	256	478	1167	1032	304
v/c Ratio	0.66	0.52	0.69	0.52	0.75	0.40
Control Delay	46.8	9.5	45.5	8.3	29.0	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.8	9.5	45.5	8.3	29.0	8.0
Queue Length 50th (ft)	124	0	147	161	284	33
Queue Length 95th (ft)	234	77	271	266	475	112
Internal Link Dist (ft)	383			2738	1074	
Turn Bay Length (ft)		200	325			200
Base Capacity (vph)	1168	710	1050	2917	2132	1060
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.36	0.46	0.40	0.48	0.29
Intersection Summary						

Intersection												
Int Delay, s/veh	50.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↕			↕	
Traffic Vol, veh/h	57	473	27	84	463	44	23	123	95	21	34	45
Future Vol, veh/h	57	473	27	84	463	44	23	123	95	21	34	45
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	525	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	5	5	3	3	0	0	0	1	0	8	0
Mvmt Flow	61	503	29	89	493	47	24	131	101	22	36	48

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	539	0	0	532	0	0	1376	1357	518	1450	1348	516
Stage 1	-	-	-	-	-	-	639	639	-	695	695	-
Stage 2	-	-	-	-	-	-	737	718	-	755	653	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.1	6.5	6.21	7.1	6.58	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.58	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.5	4	3.309	3.5	4.072	3.3
Pot Cap-1 Maneuver	1040	-	-	1030	-	-	124	150	560	110	147	563
Stage 1	-	-	-	-	-	-	468	474	-	436	435	-
Stage 2	-	-	-	-	-	-	413	436	-	404	454	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1040	-	-	1030	-	-	79 ~ 129	560	-	126	563	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	79 ~ 129	-	-	126	-	-
Stage 1	-	-	-	-	-	-	441	446	-	410	397	-
Stage 2	-	-	-	-	-	-	314	398	-	220	427	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	1.3	\$ 306.2	
HCM LOS			F	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	170	1040	-	-	1030	-	-	-
HCM Lane V/C Ratio	1.508	0.058	-	-	0.087	-	-	-
HCM Control Delay (s)	\$ 306.2	8.7	-	-	8.8	-	-	-
HCM Lane LOS	F	A	-	-	A	-	-	-
HCM 95th %tile Q(veh)	16.6	0.2	-	-	0.3	-	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM Signalized Intersection Capacity Analysis

22: SW 27th St & OR-126

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	531	39	228	587	139	52	215	125	147	218	37
Future Volume (vph)	81	531	39	228	587	139	52	215	125	147	218	37
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.7	5.0		4.7	5.0		4.7	5.0		4.7	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.97		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1662	1670		1662	1652		1582	1613		1630	1733	1410
Flt Permitted	0.10	1.00		0.13	1.00		0.50	1.00		0.21	1.00	1.00
Satd. Flow (perm)	182	1670		236	1652		828	1613		356	1733	1410
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	85	559	41	240	618	146	55	226	132	155	229	39
RTOR Reduction (vph)	0	2	0	0	8	0	0	21	0	0	0	29
Lane Group Flow (vph)	85	598	0	240	756	0	55	337	0	155	229	10
Confl. Peds. (#/hr)	1						1	1		1	1	1
Confl. Bikes (#/hr)							1					1
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	5%	2%	1%	2%	1%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	43.4	38.5		54.8	45.2		28.0	23.1		30.8	24.5	24.5
Effective Green, g (s)	43.4	38.5		54.8	45.2		28.0	23.1		30.8	24.5	24.5
Actuated g/C Ratio	0.44	0.39		0.55	0.46		0.28	0.23		0.31	0.25	0.25
Clearance Time (s)	4.7	5.0		4.7	5.0		4.7	5.0		4.7	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	153	650		298	755		271	376		192	429	349
v/s Ratio Prot	0.03	0.36		c0.09	c0.46		0.01	c0.21		c0.05	0.13	
v/s Ratio Perm	0.22			0.35			0.05			0.20		0.01
v/c Ratio	0.56	0.92		0.81	1.00		0.20	0.90		0.81	0.53	0.03
Uniform Delay, d1	20.9	28.7		18.5	26.9		26.4	36.7		28.8	32.2	28.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.3	18.0		14.6	33.0		0.4	23.0		21.4	1.3	0.0
Delay (s)	25.2	46.8		33.0	59.9		26.8	59.7		50.3	33.5	28.2
Level of Service	C	D		C	E		C	E		D	C	C
Approach Delay (s)		44.1			53.5			55.3			39.2	
Approach LOS		D			D			E			D	
Intersection Summary												
HCM 2000 Control Delay			48.8			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			98.9			Sum of lost time (s)			19.4			
Intersection Capacity Utilization			93.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
22: SW 27th St & OR-126

2017 Peak Hour
04/03/2018

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	85	600	240	764	55	358	155	229	39
v/c Ratio	0.48	0.93	0.79	0.98	0.19	0.92	0.81	0.52	0.08
Control Delay	22.0	51.4	35.9	55.6	24.3	65.7	58.3	38.2	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	51.4	35.9	55.6	24.3	65.7	58.3	38.2	0.3
Queue Length 50th (ft)	23	355	75	~490	24	208	71	130	0
Queue Length 95th (ft)	51	#576	#196	#743	51	#382	#152	209	0
Internal Link Dist (ft)		5185		2015		2675		2548	
Turn Bay Length (ft)	225		275		125		150		150
Base Capacity (vph)	179	678	313	779	294	406	192	438	488
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.88	0.77	0.98	0.19	0.88	0.81	0.52	0.08

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

23: SW Rimrock Dr & OR-126

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	664	9	283	845	293	18	190	177	212	179	83
Future Volume (vph)	110	664	9	283	845	293	18	190	177	212	179	83
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1583	3222		1662	1733	1409	1661	1733	1468	1662	1733	1453
Flt Permitted	0.13	1.00		0.22	1.00	1.00	0.64	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	219	3222		384	1733	1409	1116	1733	1468	693	1733	1453
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	117	706	10	301	899	312	19	202	188	226	190	88
RTOR Reduction (vph)	0	1	0	0	0	124	0	0	149	0	0	66
Lane Group Flow (vph)	117	715	0	301	899	188	19	202	39	226	190	22
Confl. Peds. (#/hr)	3		2	2		3	1		1	1		1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	5%	3%	0%	0%	1%	3%	0%	1%	0%	0%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	36.9	30.4		48.1	37.1	37.1	20.3	17.8	17.8	28.3	21.8	21.8
Effective Green, g (s)	36.9	30.4		48.1	37.1	37.1	20.3	17.8	17.8	28.3	21.8	21.8
Actuated g/C Ratio	0.43	0.35		0.56	0.43	0.43	0.24	0.21	0.21	0.33	0.25	0.25
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	197	1140		411	748	608	279	359	304	301	439	368
v/s Ratio Prot	0.04	0.22		c0.11	c0.52		0.00	0.12		c0.06	0.11	
v/s Ratio Perm	0.21			0.30		0.13	0.01		0.03	c0.19		0.02
v/c Ratio	0.59	0.63		0.73	1.20	0.31	0.07	0.56	0.13	0.75	0.43	0.06
Uniform Delay, d1	19.5	23.0		12.5	24.4	16.0	25.3	30.6	27.7	24.9	26.9	24.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.7	1.1		6.6	103.4	0.3	0.1	2.0	0.2	10.1	0.7	0.1
Delay (s)	24.2	24.1		19.1	127.8	16.3	25.4	32.6	27.9	35.0	27.6	24.4
Level of Service	C	C		B	F	B	C	C	C	D	C	C
Approach Delay (s)		24.1			83.2			30.1			30.3	
Approach LOS		C			F			C			C	
Intersection Summary												
HCM 2000 Control Delay			53.2									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.05									
Actuated Cycle Length (s)			85.9									Sum of lost time (s) 18.0
Intersection Capacity Utilization			94.0%									ICU Level of Service F
Analysis Period (min)			15									
c Critical Lane Group												

Queues
23: SW Rimrock Dr & OR-126

2017 Peak Hour
04/03/2018

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	117	716	301	899	312	19	202	188	226	190	88
v/c Ratio	0.57	0.61	0.71	1.16	0.42	0.06	0.65	0.45	0.81	0.42	0.18
Control Delay	25.4	25.0	21.1	112.7	7.3	19.6	41.5	8.2	49.1	30.1	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.4	25.0	21.1	112.7	7.3	19.6	41.5	8.2	49.1	30.1	0.8
Queue Length 50th (ft)	25	157	73	~561	28	7	98	0	93	76	0
Queue Length 95th (ft)	#88	244	#190	#875	95	21	166	51	#193	156	1
Internal Link Dist (ft)	2015		1820		1014		2700				
Turn Bay Length (ft)	225		200			200		175	250		250
Base Capacity (vph)	204	1177	430	773	748	330	668	681	278	668	661
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.61	0.70	1.16	0.42	0.06	0.30	0.28	0.81	0.28	0.13

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

24: SW 15th St & OR-126

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	854	54	48	1090	49	206	84	68	36	35	77
Future Volume (vph)	45	854	54	48	1090	49	206	84	68	36	35	77
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.97			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1662	3201		1658	3239			1627			1569	
Flt Permitted	0.12	1.00		0.20	1.00			0.73			0.87	
Satd. Flow (perm)	211	3201		353	3239			1229			1379	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	928	59	52	1185	53	224	91	74	39	38	84
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	25	0
Lane Group Flow (vph)	49	987	0	52	1235	0	0	389	0	0	136	0
Confl. Peds. (#/hr)	1		8	8		1	6		1	1		6
Heavy Vehicles (%)	0%	3%	0%	0%	2%	0%	1%	3%	0%	0%	0%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	39.7	39.7		39.7	39.7			31.6			31.6	
Effective Green, g (s)	39.7	39.7		39.7	39.7			31.6			31.6	
Actuated g/C Ratio	0.50	0.50		0.50	0.50			0.40			0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	105	1602		176	1621			489			549	
v/s Ratio Prot		0.31			c0.38							
v/s Ratio Perm	0.23			0.15				c0.32			0.10	
v/c Ratio	0.47	0.62		0.30	0.76			0.80			0.25	
Uniform Delay, d1	12.9	14.3		11.6	16.0			21.0			15.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	3.3	0.7		0.9	2.2			8.7			0.2	
Delay (s)	16.2	15.0		12.5	18.2			29.7			16.2	
Level of Service	B	B		B	B			C			B	
Approach Delay (s)		15.1			17.9			29.7			16.2	
Approach LOS		B			B			C			B	
Intersection Summary												
HCM 2000 Control Delay			18.4			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			79.3			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			78.3%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

Queues

2017 Peak Hour

24: SW 15th St & OR-126

04/03/2018

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	49	987	52	1238	389	161
v/c Ratio	0.47	0.62	0.30	0.77	0.80	0.28
Control Delay	34.0	17.7	20.1	21.3	36.6	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.0	17.7	20.1	21.3	36.6	14.7
Queue Length 50th (ft)	16	187	15	261	178	41
Queue Length 95th (ft)	#69	302	51	417	326	92
Internal Link Dist (ft)		1820		1191	423	675
Turn Bay Length (ft)	125		125			
Base Capacity (vph)	139	2105	231	2133	712	817
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.47	0.23	0.58	0.55	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

25: SW 11th St & SW Highland Way

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 									 	
Traffic Volume (vph)	0	659	341	0	0	0	0	0	0	12	85	0
Future Volume (vph)	0	659	341	0	0	0	0	0	0	12	85	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5									4.0	
Lane Util. Factor		0.95									0.95	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.95									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		3080									3305	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		3080									3305	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	716	371	0	0	0	0	0	0	13	92	0
RTOR Reduction (vph)	0	71	0	0	0	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	1016	0	0	0	0	0	0	0	0	91	0
Confl. Peds. (#/hr)							3					3
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA								Perm	NA	
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		28.6									5.3	
Effective Green, g (s)		28.6									5.3	
Actuated g/C Ratio		0.67									0.12	
Clearance Time (s)		4.5									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2077									413	
v/s Ratio Prot		0.33										
v/s Ratio Perm											0.03	
v/c Ratio		0.49									0.22	
Uniform Delay, d1		3.4									16.7	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.2									0.3	
Delay (s)		3.5									17.0	
Level of Service		A									B	
Approach Delay (s)		3.5			0.0			0.0			17.0	
Approach LOS		A			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			4.7									
HCM 2000 Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			42.4								8.5	
Intersection Capacity Utilization			44.6%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues
25: SW 11th St & SW Highland Way

2017 Peak Hour
04/03/2018

	→	↓
Lane Group	EBT	SBT
Lane Group Flow (vph)	1087	105
v/c Ratio	0.48	0.19
Control Delay	3.9	14.8
Queue Delay	0.0	0.0
Total Delay	3.9	14.8
Queue Length 50th (ft)	41	10
Queue Length 95th (ft)	76	26
Internal Link Dist (ft)	1097	269
Turn Bay Length (ft)		
Base Capacity (vph)	3080	1798
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.35	0.06
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

26: SW 9th St & SW Highland Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 				
Traffic Volume (vph)	34	663	0	0	0	0	0	501	126	0	0	0
Future Volume (vph)	34	663	0	0	0	0	0	501	126	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5						4.5	4.5			
Lane Util. Factor		0.95						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		3249						3260	1488			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		3249						3260	1488			
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	37	713	0	0	0	0	0	539	135	0	0	0
RTOR Reduction (vph)	0	9	0	0	0	0	0	0	88	0	0	0
Lane Group Flow (vph)	0	741	0	0	0	0	0	539	47	0	0	0
Confl. Peds. (#/hr)							2					2
Heavy Vehicles (%)	4%	2%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
Turn Type	Perm	NA						NA	Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		17.8						14.2	14.2			
Effective Green, g (s)		17.8						14.2	14.2			
Actuated g/C Ratio		0.43						0.35	0.35			
Clearance Time (s)		4.5						4.5	4.5			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		1410						1129	515			
v/s Ratio Prot								c0.17				
v/s Ratio Perm		0.23							0.03			
v/c Ratio		0.53						0.48	0.09			
Uniform Delay, d1		8.5						10.5	9.0			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.4						0.3	0.1			
Delay (s)		8.9						10.8	9.1			
Level of Service		A						B	A			
Approach Delay (s)		8.9			0.0			10.5			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		9.6						HCM 2000 Level of Service	A			
HCM 2000 Volume to Capacity ratio		0.50										
Actuated Cycle Length (s)		41.0						Sum of lost time (s)	9.0			
Intersection Capacity Utilization		44.1%						ICU Level of Service	A			
Analysis Period (min)		15										

c Critical Lane Group

Queues
26: SW 9th St & SW Highland Ave

2017 Peak Hour
04/03/2018

	→	↑	↗
Lane Group	EBT	NBT	NBR
Lane Group Flow (vph)	750	539	135
v/c Ratio	0.53	0.48	0.23
Control Delay	10.3	13.0	3.9
Queue Delay	0.0	0.0	0.0
Total Delay	10.3	13.0	3.9
Queue Length 50th (ft)	56	48	0
Queue Length 95th (ft)	122	105	28
Internal Link Dist (ft)	460	568	
Turn Bay Length (ft)			175
Base Capacity (vph)	3214	2932	1352
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.23	0.18	0.10
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

27: SW 6th St & SW Highland Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗							↖	↑↑	
Traffic Volume (vph)	0	779	55	0	0	0	0	0	0	179	577	0
Future Volume (vph)	0	779	55	0	0	0	0	0	0	179	577	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0	4.0							4.0	4.0	
Lane Util. Factor		0.95	1.00							1.00	0.95	
Frpb, ped/bikes		1.00	0.99							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	1.00	
Satd. Flow (prot)		3260	1469							1658	3292	
Flt Permitted		1.00	1.00							0.95	1.00	
Satd. Flow (perm)		3260	1469							1658	3292	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	820	58	0	0	0	0	0	0	188	607	0
RTOR Reduction (vph)	0	0	28	0	0	0	0	0	0	88	0	0
Lane Group Flow (vph)	0	820	30	0	0	0	0	0	0	100	607	0
Confl. Peds. (#/hr)									4	4		
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type		NA	Perm							Perm	NA	
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		22.1	22.1							18.6	18.6	
Effective Green, g (s)		22.1	22.1							18.6	18.6	
Actuated g/C Ratio		0.45	0.45							0.38	0.38	
Clearance Time (s)		4.0	4.0							4.0	4.0	
Vehicle Extension (s)		3.0	3.0							3.0	3.0	
Lane Grp Cap (vph)		1479	666							633	1257	
v/s Ratio Prot		c0.25									c0.18	
v/s Ratio Perm			0.02							0.06		
v/c Ratio		0.55	0.05							0.16	0.48	
Uniform Delay, d1		9.7	7.4							9.9	11.4	
Progression Factor		1.00	1.00							1.00	1.00	
Incremental Delay, d2		0.5	0.0							0.1	0.3	
Delay (s)		10.2	7.4							10.0	11.7	
Level of Service		B	A							B	B	
Approach Delay (s)		10.0			0.0			0.0			11.3	
Approach LOS		A			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			10.6		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			48.7		Sum of lost time (s)					8.0		
Intersection Capacity Utilization			54.6%		ICU Level of Service					A		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
27: SW 6th St & SW Highland Ave

2017 Peak Hour
04/03/2018

	→	↘	↙	↓
Lane Group	EBT	EBR	SBL	SBT
Lane Group Flow (vph)	820	58	188	607
v/c Ratio	0.56	0.08	0.26	0.49
Control Delay	12.3	4.2	5.4	13.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.3	4.2	5.4	13.9
Queue Length 50th (ft)	78	1	8	62
Queue Length 95th (ft)	175	19	48	142
Internal Link Dist (ft)	782			261
Turn Bay Length (ft)		100	150	
Base Capacity (vph)	3059	1381	1365	2666
Starvation Cap Reductn	0	0	0	86
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.27	0.04	0.14	0.24
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

28: SW 5th St & SW Highland Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	386	575	0	0	0	0	0	323	48	0	0	0
Future Volume (vph)	386	575	0	0	0	0	0	323	48	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5						4.5				
Lane Util. Factor	0.91	0.91						0.95				
Frt	1.00	1.00						0.98				
Flt Protected	0.95	0.99						1.00				
Satd. Flow (prot)	1513	3112						3260				
Flt Permitted	0.95	0.99						1.00				
Satd. Flow (perm)	1513	3112						3260				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	415	618	0	0	0	0	0	347	52	0	0	0
RTOR Reduction (vph)	171	10	0	0	0	0	0	14	0	0	0	0
Lane Group Flow (vph)	165	687	0	0	0	0	0	385	0	0	0	0
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA						NA				
Protected Phases		8						6				
Permitted Phases	8											
Actuated Green, G (s)	19.0	19.0						10.9				
Effective Green, g (s)	19.0	19.0						10.9				
Actuated g/C Ratio	0.49	0.49						0.28				
Clearance Time (s)	4.5	4.5						4.5				
Vehicle Extension (s)	3.0	3.0						3.0				
Lane Grp Cap (vph)	738	1520						913				
v/s Ratio Prot								c0.12				
v/s Ratio Perm	0.11	0.22										
v/c Ratio	0.22	0.45						0.42				
Uniform Delay, d1	5.7	6.5						11.4				
Progression Factor	1.00	1.00						1.00				
Incremental Delay, d2	0.2	0.2						0.3				
Delay (s)	5.9	6.7						11.7				
Level of Service	A	A						B				
Approach Delay (s)		6.5			0.0			11.7			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		7.9			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		38.9			Sum of lost time (s)			9.0				
Intersection Capacity Utilization		38.5%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
28: SW 5th St & SW Highland Ave

2017 Peak Hour
04/03/2018

			
Lane Group	EBL	EBT	NBT
Lane Group Flow (vph)	336	697	399
v/c Ratio	0.37	0.46	0.43
Control Delay	2.3	7.7	13.8
Queue Delay	0.0	0.0	0.0
Total Delay	2.3	7.7	13.8
Queue Length 50th (ft)	0	44	34
Queue Length 95th (ft)	31	96	84
Internal Link Dist (ft)		156	664
Turn Bay Length (ft)	75		
Base Capacity (vph)	1503	3086	2994
Starvation Cap Reductn	180	403	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.25	0.26	0.13
Intersection Summary			

Intersection

Int Delay, s/veh 4.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	57	281	240	102	108	100
Future Vol, veh/h	57	281	240	102	108	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	3	4	6	6	4
Mvmt Flow	63	309	264	112	119	110

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	264	0	0 698 264
Stage 1	-	-	- 264 -
Stage 2	-	-	- 434 -
Critical Hdwy	4.12	-	- 6.46 6.24
Critical Hdwy Stg 1	-	-	- 5.46 -
Critical Hdwy Stg 2	-	-	- 5.46 -
Follow-up Hdwy	2.218	-	- 3.554 3.336
Pot Cap-1 Maneuver	1300	-	- 401 770
Stage 1	-	-	- 771 -
Stage 2	-	-	- 645 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1300	-	- 378 770
Mov Cap-2 Maneuver	-	-	- 378 -
Stage 1	-	-	- 771 -
Stage 2	-	-	- 608 -

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	18.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1300	-	-	-	500
HCM Lane V/C Ratio	0.048	-	-	-	0.457
HCM Control Delay (s)	7.9	0	-	-	18.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	2.4

Intersection	
Intersection Delay, s/veh	11.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↵	↵		↵	↵	
Traffic Vol, veh/h	37	46	25	21	50	3	60	285	18	6	182	69
Future Vol, veh/h	37	46	25	21	50	3	60	285	18	6	182	69
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	3	0	4	0	0	0	3	1	0	0	1	0
Mvmt Flow	41	51	28	23	56	3	67	317	20	7	202	77
Number of Lanes	0	1	0	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	1
HCM Control Delay	10.2	9.9	12.9	11.9
HCM LOS	B	A	B	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	34%	28%	100%	0%
Vol Thru, %	0%	94%	43%	68%	0%	73%
Vol Right, %	0%	6%	23%	4%	0%	27%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	60	303	108	74	6	251
LT Vol	60	0	37	21	6	0
Through Vol	0	285	46	50	0	182
RT Vol	0	18	25	3	0	69
Lane Flow Rate	67	337	120	82	7	279
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.111	0.507	0.193	0.135	0.011	0.42
Departure Headway (Hd)	6.002	5.421	5.79	5.928	6.099	5.416
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	599	667	619	604	588	667
Service Time	3.724	3.143	3.827	3.968	3.825	3.141
HCM Lane V/C Ratio	0.112	0.505	0.194	0.136	0.012	0.418
HCM Control Delay	9.5	13.6	10.2	9.9	8.9	12
HCM Lane LOS	A	B	B	A	A	B
HCM 95th-tile Q	0.4	2.9	0.7	0.5	0	2.1

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	49	3	24	0	3	8	21	256	10	8	205	58
Future Vol, veh/h	49	3	24	0	3	8	21	256	10	8	205	58
Conflicting Peds, #/hr	4	0	0	0	0	4	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	0	0
Mvmt Flow	52	3	26	0	3	9	22	272	11	9	218	62

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	600	596	251	602	621	282	282	0	0	283	0	0
Stage 1	268	268	-	322	322	-	-	-	-	-	-	-
Stage 2	332	328	-	280	299	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	416	420	793	414	406	762	1292	-	-	1291	-	-
Stage 1	742	691	-	694	655	-	-	-	-	-	-	-
Stage 2	686	651	-	731	670	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	398	408	791	390	394	759	1292	-	-	1286	-	-
Mov Cap-2 Maneuver	398	408	-	390	394	-	-	-	-	-	-	-
Stage 1	726	684	-	680	642	-	-	-	-	-	-	-
Stage 2	659	638	-	698	663	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	14.2		11.1		0.6		0.2	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1292	-	-	473	606	1286	-
HCM Lane V/C Ratio	0.017	-	-	0.171	0.019	0.007	-
HCM Control Delay (s)	7.8	0	-	14.2	11.1	7.8	0
HCM Lane LOS	A	A	-	B	B	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.1	0	-

HCM Signalized Intersection Capacity Analysis

32: SW Canal Blvd & SW Veterans Way

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	185	116	117	321	189	127	278	82	168	344	10
Future Volume (vph)	9	185	116	117	321	189	127	278	82	168	344	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1660	1699	1473	1646	3228	1438	1646	1733	1444	3193	1725	1725
Flt Permitted	0.55	1.00	1.00	0.45	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	962	1699	1473	772	3228	1438	1646	1733	1444	3193	1725	1725
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	193	121	122	334	197	132	290	85	175	358	10
RTOR Reduction (vph)	0	0	73	0	0	132	0	0	50	0	1	0
Lane Group Flow (vph)	9	193	48	122	334	65	132	290	35	175	367	0
Confl. Peds. (#/hr)	3					3	3		1	1		3
Heavy Vehicles (%)	0%	3%	1%	1%	3%	1%	1%	1%	2%	1%	1%	0%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	NA
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)	18.7	17.7	28.5	28.8	23.8	23.8	10.8	22.5	29.6	8.5	20.2	
Effective Green, g (s)	18.7	17.7	28.5	28.8	23.8	23.8	10.8	22.5	29.6	8.5	20.2	
Actuated g/C Ratio	0.26	0.25	0.40	0.40	0.33	0.33	0.15	0.31	0.41	0.12	0.28	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	260	418	666	396	1070	476	247	543	675	378	485	
v/s Ratio Prot	0.00	c0.11	0.01	c0.03	0.10		c0.08	0.17	0.01	0.05	c0.21	
v/s Ratio Perm	0.01		0.02	0.09		0.05			0.02			
v/c Ratio	0.03	0.46	0.07	0.31	0.31	0.14	0.53	0.53	0.05	0.46	0.76	
Uniform Delay, d1	19.7	23.0	13.4	14.2	17.9	16.8	28.2	20.3	12.7	29.5	23.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.8	0.0	0.4	0.2	0.1	2.2	1.0	0.0	0.9	6.7	
Delay (s)	19.8	23.8	13.5	14.7	18.1	16.9	30.4	21.3	12.7	30.4	30.2	
Level of Service	B	C	B	B	B	B	C	C	B	C	C	
Approach Delay (s)		19.8			17.1			22.3			30.3	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			71.8				Sum of lost time (s)		16.0			
Intersection Capacity Utilization			59.5%				ICU Level of Service		B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2017 Peak Hour

32: SW Canal Blvd & SW Veterans Way

04/03/2018

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	9	193	121	122	334	197	132	290	85	175	368
v/c Ratio	0.03	0.55	0.17	0.33	0.30	0.32	0.51	0.51	0.13	0.44	0.73
Control Delay	17.7	33.3	3.8	20.4	20.4	5.7	37.3	22.2	3.0	35.4	31.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	33.3	3.8	20.4	20.4	5.7	37.3	22.2	3.0	35.4	31.6
Queue Length 50th (ft)	2	73	0	34	50	0	50	96	0	35	135
Queue Length 95th (ft)	13	162	30	88	126	53	128	180	21	82	261
Internal Link Dist (ft)		693			446			553			1860
Turn Bay Length (ft)	125		200	175		150	225		125	250	
Base Capacity (vph)	372	795	766	371	1511	777	348	968	672	434	834
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.24	0.16	0.33	0.22	0.25	0.38	0.30	0.13	0.40	0.44
Intersection Summary											

HCM Signalized Intersection Capacity Analysis

33: US-97 & SW Veterans Way

2017 Peak Hour

04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	131	228	195	301	163	265	1324	110	83	1080	61
Future Volume (vph)	76	131	228	195	301	163	265	1324	110	83	1080	61
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	1683	1463	1583	3056		1646	3057		1599	3063	
Flt Permitted	0.22	1.00	1.00	0.48	1.00		0.09	1.00		0.07	1.00	
Satd. Flow (perm)	377	1683	1463	797	3056		164	3057		124	3063	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	82	141	245	210	324	175	285	1424	118	89	1161	66
RTOR Reduction (vph)	0	0	31	0	52	0	0	4	0	0	3	0
Lane Group Flow (vph)	82	141	214	210	447	0	285	1538	0	89	1224	0
Confl. Peds. (#/hr)	7					7			2	2		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	4%	1%	5%	2%	3%	1%	7%	12%	4%	8%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	29.8	23.3	45.8	33.8	25.3		91.2	74.6		76.3	64.2	
Effective Green, g (s)	29.8	23.3	45.8	33.8	25.3		91.2	74.6		76.3	64.2	
Actuated g/C Ratio	0.22	0.17	0.33	0.25	0.18		0.67	0.54		0.56	0.47	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	142	286	537	245	564		352	1664		199	1435	
v/s Ratio Prot	0.03	0.08	0.07	c0.05	0.15		c0.13	c0.50		0.04	0.40	
v/s Ratio Perm	0.10		0.08	c0.16			0.41			0.21		
v/c Ratio	0.58	0.49	0.40	0.86	0.79		0.81	0.92		0.45	0.85	
Uniform Delay, d1	44.8	51.5	35.0	48.8	53.3		34.8	28.6		21.1	32.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.6	1.3	0.5	24.3	7.5		12.9	9.1		1.6	5.1	
Delay (s)	50.3	52.8	35.5	73.1	60.8		47.7	37.7		22.7	37.4	
Level of Service	D	D	D	E	E		D	D		C	D	
Approach Delay (s)		43.3			64.5			39.3			36.4	
Approach LOS		D			E			D			D	
Intersection Summary												
HCM 2000 Control Delay			43.0			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			137.0			Sum of lost time (s)				18.5		
Intersection Capacity Utilization			92.1%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
33: US-97 & SW Veterans Way

2017 Peak Hour
04/03/2018

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	82	141	245	210	499	285	1542	89	1227
v/c Ratio	0.57	0.49	0.47	0.86	0.81	0.81	0.92	0.45	0.85
Control Delay	55.9	57.3	28.4	76.3	57.4	47.2	39.7	27.6	40.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.9	57.3	28.4	76.3	57.4	47.2	39.7	27.6	40.4
Queue Length 50th (ft)	57	115	127	159	199	161	632	26	509
Queue Length 95th (ft)	101	183	202	#262	264	#324	#924	86	#728
Internal Link Dist (ft)		446			2921		4483		2738
Turn Bay Length (ft)	175			150		150		175	
Base Capacity (vph)	143	446	541	245	901	375	1668	204	1437
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.32	0.45	0.86	0.55	0.76	0.92	0.44	0.85

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection

Intersection Delay, s/veh 11.9

Intersection LOS B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↘	
Traffic Vol, veh/h	111	56	172	125	111	183
Future Vol, veh/h	111	56	172	125	111	183
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	3	9	5	9	4	4
Mvmt Flow	121	61	187	136	121	199
Number of Lanes	1	1	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.4	13.2	11.9
HCM LOS	A	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1
Vol Left, %	38%	0%	0%	58%
Vol Thru, %	0%	100%	0%	42%
Vol Right, %	62%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	294	111	56	297
LT Vol	111	0	0	172
Through Vol	0	111	0	125
RT Vol	183	0	56	0
Lane Flow Rate	320	121	61	323
Geometry Grp	2	7	7	5
Degree of Util (X)	0.437	0.195	0.088	0.479
Departure Headway (Hd)	5.024	5.821	5.215	5.342
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	722	619	690	678
Service Time	3.024	3.529	2.923	3.342
HCM Lane V/C Ratio	0.443	0.195	0.088	0.476
HCM Control Delay	11.9	9.9	8.4	13.2
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	2.2	0.7	0.3	2.6

Intersection						
Int Delay, s/veh	5.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰↱↰↱↰↱					
Traffic Vol, veh/h	330	6	219	285	4	275
Future Vol, veh/h	330	6	219	285	4	275
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	3	40	2	5	0	3
Mvmt Flow	355	6	235	306	4	296
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	361	0	1135	358
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	777	-
Critical Hdwy	-	-	4.12	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.327
Pot Cap-1 Maneuver	-	-	1198	-	226	684
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	457	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1198	-	182	684
Mov Cap-2 Maneuver	-	-	-	-	182	-
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	367	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		3.8		15	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	658	-	-	1198	-	
HCM Lane V/C Ratio	0.456	-	-	0.197	-	
HCM Control Delay (s)	15	-	-	8.7	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	2.4	-	-	0.7	-	

Intersection	
Intersection Delay, s/veh	16.6
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	66	24	89	141	72	56	271	84	34	165	4
Future Vol, veh/h	10	66	24	89	141	72	56	271	84	34	165	4
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles, %	0	0	0	1	1	3	0	1	0	0	2	0
Mvmt Flow	11	76	28	102	162	83	64	311	97	39	190	5
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	11.8	14.1	21.3	13.2
HCM LOS	B	B	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	76%	0%	73%	0%	66%	0%	98%
Vol Right, %	0%	24%	0%	27%	0%	34%	0%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	56	355	10	90	89	213	34	169
LT Vol	56	0	10	0	89	0	34	0
Through Vol	0	271	0	66	0	141	0	165
RT Vol	0	84	0	24	0	72	0	4
Lane Flow Rate	64	408	11	103	102	245	39	194
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.123	0.708	0.025	0.208	0.212	0.456	0.08	0.372
Departure Headway (Hd)	7.019	6.36	7.951	7.245	7.464	6.712	7.388	6.895
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	514	571	452	497	484	541	486	523
Service Time	4.719	4.06	5.672	4.967	5.164	4.412	5.112	4.619
HCM Lane V/C Ratio	0.125	0.715	0.024	0.207	0.211	0.453	0.08	0.371
HCM Control Delay	10.7	23	10.9	11.9	12.2	14.9	10.8	13.7
HCM Lane LOS	B	C	B	B	B	B	B	B
HCM 95th-tile Q	0.4	5.7	0.1	0.8	0.8	2.4	0.3	1.7

HCM Signalized Intersection Capacity Analysis

37: SW Canal Blvd & SW Odem Medo Way

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	171	0	366	0	291	154	221	258	0
Future Volume (vph)	0	0	0	171	0	366	0	291	154	221	258	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					5.0	5.0		5.0	5.0	5.0	5.0	
Lane Util. Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes					1.00	0.98		1.00	1.00	1.00	1.00	
Flpb, ped/bikes					0.99	1.00		1.00	1.00	1.00	1.00	
Frt					1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected					0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)					1643	1437		1733	1473	1662	1733	
Flt Permitted					0.76	1.00		1.00	1.00	0.37	1.00	
Satd. Flow (perm)					1310	1437		1733	1473	652	1733	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	178	0	381	0	303	160	230	269	0
RTOR Reduction (vph)	0	0	0	0	0	288	0	0	112	0	0	0
Lane Group Flow (vph)	0	0	0	0	178	93	0	303	48	230	269	0
Confl. Peds. (#/hr)	4		10	10		4	3					3
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	1%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)					12.3	12.3		15.2	15.2	28.1	28.1	
Effective Green, g (s)					12.3	12.3		15.2	15.2	28.1	28.1	
Actuated g/C Ratio					0.24	0.24		0.30	0.30	0.56	0.56	
Clearance Time (s)					5.0	5.0		5.0	5.0	5.0	5.0	
Vehicle Extension (s)					2.0	2.0		3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)					319	350		522	444	521	966	
v/s Ratio Prot								c0.17		c0.07	0.16	
v/s Ratio Perm					c0.14	0.06			0.03	0.18		
v/c Ratio					0.56	0.27		0.58	0.11	0.44	0.28	
Uniform Delay, d1					16.7	15.4		14.9	12.7	6.4	5.8	
Progression Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2					1.2	0.1		1.6	0.1	0.2	0.2	
Delay (s)					17.9	15.5		16.5	12.8	6.6	6.0	
Level of Service					B	B		B	B	A	A	
Approach Delay (s)		0.0			16.3			15.3			6.3	
Approach LOS		A			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			12.7		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.55									
Actuated Cycle Length (s)			50.4		Sum of lost time (s)					15.0		
Intersection Capacity Utilization			59.5%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2017 Peak Hour

37: SW Canal Blvd & SW Odem Medo Way

04/03/2018



Lane Group	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	178	381	303	160	230	269
v/c Ratio	0.56	0.60	0.59	0.29	0.45	0.28
Control Delay	25.7	6.9	21.5	4.8	9.5	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	6.9	21.5	4.8	9.5	7.6
Queue Length 50th (ft)	44	0	72	0	28	33
Queue Length 95th (ft)	115	57	168	35	81	94
Internal Link Dist (ft)	931		2881			465
Turn Bay Length (ft)				100	100	
Base Capacity (vph)	589	856	854	807	546	1046
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.45	0.35	0.20	0.42	0.26

Intersection Summary

HCM Signalized Intersection Capacity Analysis

38: US-97 & SW Odem Medo Way

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	252	14	157	9	22	15	266	1406	9	9	1111	260
Future Volume (vph)	252	14	157	9	22	15	266	1406	9	9	1111	260
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	5.0
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1563	1577	1435	1662	1585		1646	3194		1662	3107	1428
Flt Permitted	0.50	0.50	1.00	0.66	1.00		0.11	1.00		0.14	1.00	1.00
Satd. Flow (perm)	830	818	1435	1159	1585		198	3194		247	3107	1428
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	268	15	167	10	23	16	283	1496	10	10	1182	277
RTOR Reduction (vph)	0	0	73	0	14	0	0	0	0	0	0	111
Lane Group Flow (vph)	142	141	94	10	25	0	283	1506	0	10	1182	166
Confl. Peds. (#/hr)	1		1	1		1	2		1	1		2
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	1%	0%	3%	0%	0%	7%	1%	4%	0%	0%	7%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	3	8	1	7	4		1	6		5	2	3
Permitted Phases	8		8	4			6			2		2
Actuated Green, G (s)	25.5	25.5	38.7	12.0	11.1		78.5	72.2		55.7	54.4	63.8
Effective Green, g (s)	25.5	25.5	38.7	12.0	11.1		78.5	72.2		55.7	54.4	63.8
Actuated g/C Ratio	0.22	0.22	0.34	0.10	0.10		0.68	0.63		0.48	0.47	0.55
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	243	243	545	124	152		375	2005		135	1469	792
v/s Ratio Prot	c0.05	0.05	0.03	0.00	0.02		c0.13	0.47		0.00	c0.38	0.02
v/s Ratio Perm	c0.08	0.08	0.04	0.01			0.39			0.03		0.10
v/c Ratio	0.58	0.58	0.17	0.08	0.16		0.75	0.75		0.07	0.80	0.21
Uniform Delay, d1	38.4	40.0	26.9	46.4	47.7		24.3	15.1		15.8	25.8	12.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.6	3.5	0.2	0.3	0.5		8.4	1.6		0.2	3.3	0.1
Delay (s)	42.0	43.5	27.0	46.7	48.2		32.7	16.7		16.1	29.1	13.0
Level of Service	D	D	C	D	D		C	B		B	C	B
Approach Delay (s)		36.9			47.9			19.2			26.0	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			24.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			115.0				Sum of lost time (s)			21.0		
Intersection Capacity Utilization			77.7%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2017 Peak Hour

38: US-97 & SW Odem Medo Way

04/03/2018

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	142	141	167	10	39	283	1506	10	1182	277
v/c Ratio	0.63	0.63	0.28	0.05	0.24	0.71	0.70	0.04	0.82	0.30
Control Delay	56.0	55.7	10.9	41.2	38.3	30.8	14.5	8.0	31.7	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.0	55.7	10.9	41.2	38.3	30.8	14.5	8.0	31.7	3.2
Queue Length 50th (ft)	94	93	24	6	16	101	271	2	359	7
Queue Length 95th (ft)	#191	#189	87	23	55	239	612	8	566	51
Internal Link Dist (ft)		931			261		4040		4483	
Turn Bay Length (ft)	150		125	150		100		150		275
Base Capacity (vph)	225	344	694	187	499	513	2509	249	1977	910
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.41	0.24	0.05	0.08	0.55	0.60	0.04	0.60	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔		↔	↔	
Traffic Vol, veh/h	4	13	1	18	10	33	6	202	48	35	77	8
Future Vol, veh/h	4	13	1	18	10	33	6	202	48	35	77	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	5	0
Mvmt Flow	4	13	1	19	10	34	6	208	49	36	79	8

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	424	426	84	408	405	233	88	0	0	258	0	0
Stage 1	156	156	-	245	245	-	-	-	-	-	-	-
Stage 2	268	270	-	163	160	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	544	524	981	557	538	811	1520	-	-	1318	-	-
Stage 1	851	772	-	763	707	-	-	-	-	-	-	-
Stage 2	742	690	-	844	769	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	501	507	981	532	521	811	1520	-	-	1318	-	-
Mov Cap-2 Maneuver	501	507	-	532	521	-	-	-	-	-	-	-
Stage 1	847	751	-	759	703	-	-	-	-	-	-	-
Stage 2	697	687	-	805	748	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.2		11.1		0.2		2.3	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1520	-	-	520 651	1318	-	-
HCM Lane V/C Ratio	0.004	-	-	0.036 0.097	0.027	-	-
HCM Control Delay (s)	7.4	0	-	12.2 11.1	7.8	-	-
HCM Lane LOS	A	A	-	B B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1 0.3	0.1	-	-

Intersection

Intersection Delay, s/veh	14.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	36	71	33	4	97	7	96	380	5	3	159	29
Future Vol, veh/h	36	71	33	4	97	7	96	380	5	3	159	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	3	1	0	0	0	0	2	1	0	0	1	3
Mvmt Flow	39	77	36	4	105	8	104	413	5	3	173	32
Number of Lanes	0	1	0	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	1
HCM Control Delay	11.1	10.6	16.8	11.7
HCM LOS	B	B	C	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	26%	4%	100%	0%
Vol Thru, %	0%	99%	51%	90%	0%	85%
Vol Right, %	0%	1%	24%	6%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	96	385	140	108	3	188
LT Vol	96	0	36	4	3	0
Through Vol	0	380	71	97	0	159
RT Vol	0	5	33	7	0	29
Lane Flow Rate	104	418	152	117	3	204
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.179	0.655	0.253	0.198	0.006	0.337
Departure Headway (Hd)	6.164	5.632	5.985	6.076	6.538	5.938
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	582	640	598	589	547	605
Service Time	3.9	3.367	4.04	4.133	4.286	3.686
HCM Lane V/C Ratio	0.179	0.653	0.254	0.199	0.005	0.337
HCM Control Delay	10.2	18.5	11.1	10.6	9.3	11.7
HCM Lane LOS	B	C	B	B	A	B
HCM 95th-tile Q	0.6	4.8	1	0.7	0	1.5

HCM Signalized Intersection Capacity Analysis

42: US-97 SB Ramps & SW Yew Ave

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	180	174	274	552	0	0	0	0	88	0	151
Future Volume (vph)	0	180	174	274	552	0	0	0	0	88	0	151
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00	0.98	1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1667	1424	1567	1733						1662	1458
Flt Permitted		1.00	1.00	0.45	1.00						0.95	1.00
Satd. Flow (perm)		1667	1424	748	1733						1662	1458
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	202	196	308	620	0	0	0	0	99	0	170
RTOR Reduction (vph)	0	0	135	0	0	0	0	0	0	0	0	142
Lane Group Flow (vph)	0	202	61	308	620	0	0	0	0	0	99	28
Confl. Peds. (#/hr)			4	4								
Heavy Vehicles (%)	0%	5%	2%	6%	1%	0%	0%	0%	0%	0%	0%	2%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		2		1	6						4	
Permitted Phases			2	6						4		4
Actuated Green, G (s)		12.8	12.8	24.1	24.1						6.8	6.8
Effective Green, g (s)		12.8	12.8	24.1	24.1						6.8	6.8
Actuated g/C Ratio		0.31	0.31	0.59	0.59						0.17	0.17
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		521	445	566	1021						276	242
v/s Ratio Prot		0.12		0.08	c0.36							
v/s Ratio Perm			0.04	0.24							0.06	0.02
v/c Ratio		0.39	0.14	0.54	0.61						0.36	0.12
Uniform Delay, d1		11.0	10.1	4.7	5.4						15.1	14.5
Progression Factor		1.00	1.00	1.00	1.00						1.00	1.00
Incremental Delay, d2		0.5	0.1	1.1	1.0						0.8	0.2
Delay (s)		11.5	10.2	5.8	6.4						15.9	14.7
Level of Service		B	B	A	A						B	B
Approach Delay (s)		10.9			6.2			0.0			15.2	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			8.9		HCM 2000 Level of Service					A		
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			40.9		Sum of lost time (s)					15.0		
Intersection Capacity Utilization			66.0%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

c Critical Lane Group

Queues
42: US-97 SB Ramps & SW Yew Ave

2017 Peak Hour
04/03/2018

	→	↘	↙	←	↓	↘
Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	202	196	308	620	99	170
v/c Ratio	0.39	0.34	0.53	0.56	0.28	0.38
Control Delay	14.7	4.2	9.4	8.9	17.3	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	4.2	9.4	8.9	17.3	6.4
Queue Length 50th (ft)	37	0	33	82	18	0
Queue Length 95th (ft)	85	31	81	192	58	37
Internal Link Dist (ft)	1380			488	462	
Turn Bay Length (ft)		75	150			200
Base Capacity (vph)	1057	973	581	1484	1267	1152
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.20	0.53	0.42	0.08	0.15
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

43: US-97 NB Ramps & SE Airport Way

2017 Peak Hour
04/03/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	180	0	0	479	124	348	1	175	0	0	0
Future Volume (vph)	87	180	0	0	479	124	348	1	175	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0			5.0	5.0	5.0	5.0				
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00				
Frpb, ped/bikes	1.00	1.00			1.00	0.98	1.00	1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	0.85				
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00				
Satd. Flow (prot)	1598	1667			1683	1396	1630	1432				
Flt Permitted	0.19	1.00			1.00	1.00	0.95	1.00				
Satd. Flow (perm)	317	1667			1683	1396	1630	1432				
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	102	212	0	0	564	146	409	1	206	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	57	0	137	0	0	0	0
Lane Group Flow (vph)	102	212	0	0	564	89	409	70	0	0	0	0
Confl. Peds. (#/hr)	3		1	1		3						
Heavy Vehicles (%)	4%	5%	0%	0%	4%	4%	2%	0%	4%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8					
Actuated Green, G (s)	35.3	35.3			27.0	27.0	22.6	22.6				
Effective Green, g (s)	35.3	35.3			27.0	27.0	22.6	22.6				
Actuated g/C Ratio	0.52	0.52			0.40	0.40	0.33	0.33				
Clearance Time (s)	5.0	5.0			5.0	5.0	5.0	5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	227	866			669	555	542	476				
v/s Ratio Prot	c0.02	0.13			c0.34			0.05				
v/s Ratio Perm	0.21					0.06	c0.25					
v/c Ratio	0.45	0.24			0.84	0.16	0.75	0.15				
Uniform Delay, d1	11.3	9.0			18.5	13.2	20.2	15.9				
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00				
Incremental Delay, d2	1.4	0.1			9.5	0.1	5.9	0.1				
Delay (s)	12.7	9.1			28.0	13.3	26.1	16.0				
Level of Service	B	A			C	B	C	B				
Approach Delay (s)		10.3			25.0			22.7			0.0	
Approach LOS		B			C			C			A	
Intersection Summary												
HCM 2000 Control Delay			21.3		HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			67.9		Sum of lost time (s)			15.0				
Intersection Capacity Utilization			66.0%		ICU Level of Service			C				
Analysis Period (min)			15									
c Critical Lane Group												

Queues
43: US-97 NB Ramps & SE Airport Way

2017 Peak Hour
04/03/2018

						
Lane Group	EBL	EBT	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	102	212	564	146	409	207
v/c Ratio	0.41	0.25	0.83	0.24	0.74	0.33
Control Delay	15.7	11.7	34.8	8.6	29.2	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.7	11.7	34.8	8.6	29.2	4.2
Queue Length 50th (ft)	20	46	215	14	156	0
Queue Length 95th (ft)	52	101	#436	51	228	32
Internal Link Dist (ft)		488	979			520
Turn Bay Length (ft)	150			100		
Base Capacity (vph)	251	962	722	652	839	836
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.22	0.78	0.22	0.49	0.25

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection						
Int Delay, s/veh	1.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰		↱	↰	↱	↱
Traffic Vol, veh/h	249	25	5	395	48	12
Future Vol, veh/h	249	25	5	395	48	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	3	16	0	5	0	8
Mvmt Flow	286	29	6	454	55	14

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	315
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1257
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1257
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	15.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	371	725	-	-	1257	-
HCM Lane V/C Ratio	0.149	0.019	-	-	0.005	-
HCM Control Delay (s)	16.4	10.1	-	-	7.9	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	4.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	6	76	251	249	141	4
Future Vol, veh/h	6	76	251	249	141	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	4	1	0	1	0
Mvmt Flow	7	88	292	290	164	5
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1039	166	169	0	-	0
Stage 1	166	-	-	-	-	-
Stage 2	873	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.209	-	-	-
Pot Cap-1 Maneuver	258	873	1415	-	-	-
Stage 1	868	-	-	-	-	-
Stage 2	412	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	195	873	1415	-	-	-
Mov Cap-2 Maneuver	195	-	-	-	-	-
Stage 1	868	-	-	-	-	-
Stage 2	311	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	11	4.1		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1415	-	696	-	-	
HCM Lane V/C Ratio	0.206	-	0.137	-	-	
HCM Control Delay (s)	8.2	0	11	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.8	-	0.5	-	-	

Appendix G – Crash Data

Project Name:	Redmond Transportation System Plan
Project Number:	17720
Query Information:	ODOT
Date Queried:	ODOT
Data Provider:	ODOT Crash Analysis Reporting Unit
Analyst:	JXG
Current Date:	10/20/2017

General Crash Information

Crash ID	Record Type	# Vehicles Involved	# Participants Involved	Serial #	Crash Month	Crash Year	Week Day	Crash Hour (Hour Starting)	County	City	Latitude Degrees	Longitude Degrees	Impact Location	Collision Type	Crash Severity	Weather Condition	Road Surface Condition	Light Condition	
1402355	1	2	3	90105	January	21	2011	Friday	5:00 PM	Deschutes	Redmond	44.2550608	-121.1645797	Outbound within 50 feet	Sideswipe-meeting	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1402357	1	2	3	117	January	25	2011	Tuesday	4:00 PM	Deschutes	Redmond	44.25661252	-121.1840729	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1402383	1	2	2	133	January	28	2011	Friday	10:00 AM	Deschutes	Redmond	44.25178189	-121.184415	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1402544	1	2	2	120	January	25	2011	Tuesday	11:00 AM	Deschutes	Redmond	44.27551943	-121.1774854	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1402718	1	2	2	25	January	6	2011	Thursday	2:00 PM	Deschutes	Redmond	44.29098996	-121.1777389	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1404278	1	2	2	192	February	13	2011	Sunday	1:00 PM	Deschutes	Redmond	44.2620657	-121.1840302	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1404372	1	1	1	210	February	16	2011	Wednesday	7:00 AM	Deschutes	Redmond	44.26804243	-121.1921673	NW Intersection Quadrant	Fixed-Object or Other-Object	Property damage only crash (PDO)	Snow	Ice	Daylight
1405426	1	2	2	262	February	23	2011	Wednesday	9:00 AM	Deschutes	Redmond	44.27156419	-121.1732073	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1405477	1	1	1	271	February	24	2011	Thursday	2:00 PM	Deschutes	Redmond	44.24889698	-121.2058398	NW Intersection Quadrant	Non-collision	Property damage only crash (PDO)	Clear	Dry	Daylight
1406506	1	2	2	288	February	28	2011	Monday	7:00 AM	Deschutes	Redmond	44.26585001	-121.2044111	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1406509	1	2	1	286	February	27	2011	Sunday	3:00 AM	Deschutes	Redmond	44.2965979	-121.1634111	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1408836	1	2	2	51	January	12	2011	Wednesday	6:00 AM	Deschutes	Redmond	44.23986658	-121.1956407	Inbound within 50 feet	Sideswipe-meeting	Non-fatal injury crash	Cloudy	Dry	Darkness – no street lights
1409766	1	2	2	14	January	4	2011	Tuesday	3:00 PM	Deschutes	Redmond	44.27831906	-121.1732161	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1409770	1	2	3	17	January	5	2011	Wednesday	11:00 AM	Deschutes	Redmond	44.26099062	-121.1739116	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1410234	1	2	2	47	January	11	2011	Tuesday	5:00 PM	Deschutes	Redmond	44.28374233	-121.1742142	NW Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Darkness – no street lights
1410248	1	2	2	132	January	28	2011	Friday	11:00 AM	Deschutes	Redmond	44.27228596	-121.1628902	Southwest Intersection Quadrant	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1410273	1	2	2	28	January	7	2011	Friday	5:00 PM	Deschutes	Redmond	44.26928222	-121.1912836	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1410277	1	2	5	130	January	28	2011	Friday	3:00 PM	Deschutes	Redmond	44.26959572	-121.1753555	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1410283	1	2	2	205	February	15	2011	Tuesday	12:00 PM	Deschutes	Redmond	44.26383447	-121.1830576	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Snow	Snow	Daylight
1410294	1	2	4	215	February	16	2011	Wednesday	8:00 AM	Deschutes	Redmond	44.27058731	-121.1742634	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Snow	Snow	Daylight
1410343	1	2	2	234	February	19	2011	Saturday	8:00 AM	Deschutes	Redmond	44.27336869	-121.1976202	Southwest Intersection Quadrant	Sideswipe-overtaking	Non-fatal injury crash	Snow	Snow	Daylight
1410351	1	2	2	243	February	19	2011	Saturday	8:00 PM	Deschutes	Redmond	44.27059895	-121.1753571	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Snow	Ice	Darkness – no street lights
1410460	1	2	2	270	February	24	2011	Thursday	8:00 AM	Deschutes	Redmond	44.25177244	-121.1844213	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Snow	Daylight
1410528	1	2	5	163	February	8	2011	Tuesday	4:00 PM	Deschutes	Redmond	44.27255507	-121.1732051	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1410575	1	2	2	164	February	5	2011	Saturday	5:00 PM	Deschutes	Redmond	44.27058731	-121.1742634	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1410606	1	2	3	170	February	7	2011	Monday	1:00 PM	Deschutes	Redmond	44.29099062	-121.1739116	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1410942	1	2	3	195	February	13	2011	Sunday	4:00 PM	Deschutes	Redmond	44.29099062	-121.1739116	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Cloudy	Dry	Daylight
1410956	1	2	2	196	February	14	2011	Monday	6:00 PM	Deschutes	Redmond	44.27058731	-121.1742634	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1411002	1	2	2	201	February	15	2011	Tuesday	6:00 AM	Deschutes	Redmond	44.27285507	-121.1732051	Outbound within 50 feet	Angle	Non-fatal injury crash	Snow	Snow	Dawn (Twilight)
1411889	1	1	1	314	March	8	2011	Tuesday	6:00 PM	Deschutes	Redmond	44.28918627	-121.1682816	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1411893	1	2	3	316	March	6	2011	Tuesday	4:00 PM	Deschutes	Redmond	44.28778886	-121.1723052	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1411728	1	2	3	347	March	16	2011	Wednesday	6:00 PM	Deschutes	Redmond	44.25819154	-121.1827953	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1411745	1	2	1	362	March	18	2011	Friday	7:00 PM	Deschutes	Redmond	44.25470462	-121.2029694	Midblock location	Sideswipe-meeting	Non-fatal injury crash	Cloudy	Snow	Darkness – no street lights
1411824	1	2	1	387	March	24	2011	Thursday	9:00 AM	Deschutes	Redmond	44.25476691	-121.1917305	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1411830	1	2	4	388	March	25	2011	Friday	1:00 PM	Deschutes	Redmond	44.26343183	-121.182603	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1411841	1	1	1	394	March	26	2011	Saturday	11:00 PM	Deschutes	Redmond	44.25112028	-121.19795	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1411878	1	2	3	413	March	26	2011	Saturday	2:00 PM	Deschutes	Redmond	44.29100875	-121.1638389	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1411905	1	3	3	184	February	11	2011	Friday	2:00 PM	Deschutes	Redmond	44.27257627	-121.1694391	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1411917	1	2	1	381	March	23	2011	Wednesday	6:00 AM	Deschutes	Redmond	44.29936127	-121.1592165	Outbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Dawn (Twilight)
1412059	1	2	2	330	March	12	2011	Saturday	7:00 PM	Deschutes	Redmond	44.27256119	-121.1732051	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1412248	1	2	3	403	March	31	2011	Thursday	7:00 PM	Deschutes	Redmond	44.27255667	-121.1769805	Outbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1412551	1	2	2	379	March	23	2011	Wednesday	3:00 PM	Deschutes	Redmond	44.2679015	-121.174682	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1412620	1	3	3	395	March	27	2011	Sunday	8:00 AM	Deschutes	Redmond	44.26306834	-121.1769782	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Dawn (Twilight)
1412716	1	2	2	363	March	16	2011	Wednesday	8:00 AM	Deschutes	Redmond	44.265425	-121.1732556	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1412760	1	2	2	352	March	17	2011	Thursday	1:00 PM	Deschutes	Redmond	44.2593823	-121.1794061	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1414431	1	6	6	810	June	8	2011	Wednesday	5:00 PM	Deschutes	Redmond	44.24117854	-121.1943734	Southeast Intersection Quadrant	Sideswipe-overtaking	Fatal crash	Clear	Dry	Daylight
1415410	1	2	4	494	April	16	2011	Saturday	9:00 AM	Deschutes	Redmond	44.26920447	-121.1953511	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1415468	1	3	3	512	April	22	2011	Friday	4:00 PM	Deschutes	Redmond	44.28914401	-121.1891194	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1415694	1	2	1	495	April	16	2011	Saturday	12:00 PM	Deschutes	Redmond	44.27921975	-121.1784194	Outbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1415731	1	2	1	515	April	23	2011	Saturday	3:00 AM	Deschutes	Redmond	44.30313066	-121.1758785	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1415733	1	2	1	90515	April	23	2011	Saturday	3:00 AM	Deschutes	Redmond	44.30313066	-121.1758785	Midblock location	Backing	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1415804	1	2	3	453	April	7	2011	Thursday	3:00 PM	Deschutes	Redmond	44.27552781	-121.1732154	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Cloudy	Dry	Daylight
1415840	1	2	2	465	April	8	2011	Friday	1:00 PM	Deschutes	Redmond	44.27741646	-121.1732175	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1416013	1	2	2	489	April	17	2011	Sunday	2:00 PM	Deschutes	Redmond	44.28918627	-121.1682816	NE Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1416247	1	3	3	429	April	2	2011	Saturday	11:00 AM	Deschutes	Redmond	44.26948132	-121.1866937	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1416254	1	2	3	479	April	13	2011	Wednesday	7:00 AM	Deschutes	Redmond	44.26958287	-121.1840678	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1416309	1	1	1	502	April	19	2011	Tuesday	8:00 AM	Deschutes	Redmond	44.26631909	-121.1565569	Midblock location	Non-collision	Non-fatal injury crash	Clear	Dry	Daylight
1416313	1	2	2	544	April	30	2011	Saturday	10:00 AM	Deschutes	Redmond	44.26963023	-121.1732032	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1416384	1	2	2	435	April	3	2011	Sunday	12:00 PM	Deschutes	Redmond	44.2890004	-121.1672745	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1416388	1	2	2	504	April	18	2011	Monday	5:00 PM	Deschutes	Redmond	44.25476003	-121.1928889	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1416572	1	2	2	507	April	20	2011	Wednesday	10:00 AM	Deschutes	Redmond	44.27255507	-121.1732051	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1416696	1	1	1	522	April	25	2011	Monday	6:00 AM	Deschutes	Redmond	44.23783689	-121.1976202	Southwest Intersection Quadrant	Miscellaneous	Property damage only crash (PDO)	Clear	Dry	Daylight
1416758	1	2	2	536	April	28	2011	Thursday	2:00 PM	Deschutes	Redmond	44.25177244	-121.1844213	Outbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1416771	1	2	2	542	April	18	2011	Monday	5:00 PM	Deschutes	Redmond	44.2562857	-121.1814444	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1420333	1	2	2	688	May	29	2011	Sunday	9:00 AM	Deschutes	Redmond	44.27833463	-121.19925	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1420811	1	2	2	638	May	16	2011	Monday	3:00 PM	Deschutes	Redmond	44.28137944	-121.1892	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1421005	1	2	2	648	May	20	2011	Friday	9:00 AM	Deschutes	Redmond	44.26959201	-121.1795959	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Unknown	Dry	Daylight
1421010	1	2	2	654	May	21	2011	Saturday	2:00 PM	Deschutes	Redmond	44.24760034	-121.1991389	Outbound within 50 feet	Turning Movement	Non-fatal injury crash	Cloudy	Dry	Daylight
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1421231	1	2	2	604	May	12	2011	Thursday	6:00 PM	Deschutes	Redmond	44.26961205	-121.1742622	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1421271	1	2	2	627	May	17	2011	Tuesday	7:00 PM	Deschutes	Redmond	44.2695899	-121.1807742	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1421291	1	2	2	658	May	22	2011	Sunday	2:00 PM	Deschutes	Redmond	44.26920439	-121.2093365	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1421415	1	2	2	636	May	16	2011	Monday	12:00 PM	Deschutes	Redmond	44.26938765	-121.1742713	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1422280	1	3	1	653	May	21	2011	Saturday	7:00 PM	Deschutes	Redmond	44.26543453	-121.1740062	NE Intersection Quadrant	Sideswipe-meeting	Property damage only crash (PDO)	Clear	Dry	Daylight
1422326	1	2	2	672	May	25	2011	Wednesday	5:00 PM	Deschutes	Redmond	44.26973674	-121.1732044	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1422358	1	2	2	551	May	2	2011	Monday	12:00 PM	Deschutes	Redmond	44.26909062	-121.1739116	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1422574	1	2	3	602	May	12	2011	Thursday	9:00 PM	Deschutes	Redmond	44.24517129	-121.1904594	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1422683	1	2	2	618	May	14	2011	Saturday	4:00 PM	Deschutes	Redmond	44.26835007	-121.1800856	Southwest Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1423841	1	2	1	592	May	9	2011	Monday	11:00 AM	Deschutes	Redmond	44.27832815	-121.1967	Inbound within 50 feet	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1423853	1	1	1	588	May	7	2011	Saturday	7:00 PM	Deschutes	Redmond	44.23785575	-121.2116578	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1426846	1	1	1	728	June	7	2011	Tuesday	7:00 AM	Deschutes	Redmond	44.26928222	-121.1912836	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1426879	1	2	3	741	June	7	2011	Tuesday	4:00 PM	Deschutes	Redmond	44.26934103	-121.1892356	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1426969	1	2	2	788	June	18	2011	Saturday	1:00 PM	Deschutes	Redmond	44.265425	-121.1732556	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1427296	1	1	2	1127	August	4	2011	Thursday	12:00 AM	Deschutes	Redmond	44.24343695	-121.192169	Southwest Intersection Quadrant	Pedestrian	Fatal crash	Clear	Dry	Darkness – no street lights
1427555	1	1	2	708	June	3	2011	Friday	10:00 AM	Deschutes	Redmond	44.26909062	-121.1739116	Outbound within 50 feet	Pedestrian	Non-fatal injury crash	Clear	Dry	Daylight
1428158	1	4	5	778	June	17	2011	Friday	10:00 AM	Deschutes	Redmond	44.26977834	-121.1791497	Southeast Intersection Quadrant	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1428233	1	2	2	791	June	20	2011	Monday	3:00 PM	Deschutes	Redmond	44.26241416	-121.1774237	Southeast Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1428431	1	2	2	815	June	25	2011	Saturday	12:00 AM	Deschutes	Redmond	44.27058883	-121.1732138	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1428548	1	3	4	833	June	28	2011	Tuesday	5:00 PM	Deschutes	Redmond	44.28394284	-121.1734034	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1428777	1	2	2	697	May	31	2011	Tuesday	3:00 PM	Deschutes	Redmond	44.27741638	-121.1774889	NE Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1428787	1	2	2	702	June	2	2011	Thursday	4:00 PM	Deschutes	Redmond	44.25475245	-121.1941611	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1428831	1	2	2	717	June	7	2011	Tuesday	5:00 PM	Deschutes	Redmond	44.25998198	-121.1810852	Midblock location	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1428853	1	2	2	720	June	7	2011	Tuesday	4:00 PM	Deschutes	Redmond	44.26454259	-121.1773518	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1428861	1	2	2	731	June	8	2011	Wednesday	11:00 AM	Deschutes	Redmond	44.2792234	-121.1721388	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1428872	1	2	2	770	June	14	2011	Tuesday	11:00 AM	Deschutes	Redmond	44.26373177	-121.1787643	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1428881	1	2	2	767	June	12	2011	Sunday	5:00 PM	Deschutes	Redmond	44.27255507	-121.1732051	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1428891	1	2	2	772	June	15	2011	Wednesday	5:00 PM	Deschutes	Redmond	44.26963023	-121.1732032	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1428956	1	2	3	779	June	17	2011	Friday	2:00 PM	Deschutes	Redmond	44.26939896	-121.1777389	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1429001	1	2	2	800	June	22	2011	Wednesday	10:00 PM	Deschutes	Redmond	44.27380471	-121.1892367	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1429010	1	3	3	827	June	27	2011	Monday	7:00 PM	Deschutes	Redmond	44.26349881	-121.1873626	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1429416	1	2	3	758	June	13	2011	Monday	9:00 AM	Deschutes	Redmond	44.24750034	-121.1991389	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1431685	1	2	3	859	July	4	2011	Monday	5:00 PM	Deschutes	Redmond	44.30092516	-121.1721588	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1431894	1	1	1	877	July	4	2011	Saturday	2:00 AM	Deschutes	Redmond	44.247961	-121.1945693	NW Intersection Quadrant	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1431934	1	2	2	881	July	7	2011	Thursday	8:00 PM	Deschutes	Redmond	44.26928222	-121.1912836	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1432303	1	2	2	861	July	5	2011	Tuesday	5:00 PM	Deschutes	Redmond	44.25618051	-121.2043898	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1433311	1	2	2	893	July	8	2011	Friday	6:00 PM	Deschutes	Redmond	44.2593823	-121.1794061	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1433481	1	2	2	924	July	15	2011	Friday	3:00 PM	Deschutes	Redmond	44.24594862	-121.1869692	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1433488	1	2	2	927	July	15	2011	Friday	3:00 PM	Deschutes	Redmond	44.24594862	-121.1869692	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1433568	1	2	2	936	July	18	2011	Monday	10:00 AM	Deschutes	Redmond	44.25177244	-121.1844213	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1433577	1	2	2	939	June	30	2011	Thursday	3:00 PM	Deschutes	Redmond	44.26909062	-121.1739116	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1433856	1	2	2	898	July	9	2011	Saturday	9:00 PM	Deschutes	Redmond	44.26928222	-121.1912836	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1433866	1	2	2	888	July	8	2011	Friday	9:00 PM	Deschutes	Redmond	44.27057002	-121.1785923	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1433868	1	2	2	879	July	7	2011	Thursday	8:00 AM	Deschutes	Redmond	44.26920439	-121.2093365	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1433882	1	2	2	869	July	6	2011	Wednesday	11:00 AM	Deschutes	Redmond	44.26928222	-121.1912836	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1434139	1	2	2	962	July	23	2011	Saturday	7:00 PM	Deschutes	Redmond	44.26918735	-121.204389	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1434226	1	2	2	999	July	29	2011	Friday	2:00 PM	Deschutes	Redmond	44.26920439	-121.2093365	Inbound within 50 feet	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1434234	1	2	2	1002	July	30	2011	Saturday	11:00 AM	Deschutes	Redmond	44.26920439	-121.2093365	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1434462	1	2	2	917	July	14	2011	Thursday	6:00 PM	Deschutes	Redmond	44.27155795	-121.1742876	Inbound within 50 feet	Parking Maneuver	Property damage only crash (PDO)	Clear	Dry	Daylight
1434473	1	2	2	922	July	15	2011	Friday	11:00 AM	Deschutes	Redmond	44.26306834	-121.1769782	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1434506	1	2	2	938	July	18	2011	Monday	5:00 PM	Deschutes	Redmond	44.27255649	-121.1742768	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Rain	Wet	Daylight
1434621	1	3	4	1006	July	30	2011	Saturday	2:00 PM	Deschutes	Redmond	44.26959215	-121.1774611	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1434848	1	2	1	1008	July	30	2011	Saturday	7:00 PM	Deschutes	Redmond	44.2494099	-121.1966527	Midblock location	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1436810	1	2	2	941	July	19	2011	Tuesday	7:00 PM	Deschutes	Redmond	44.26805708	-121.1993499	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1440338	1	2	2	1019	August	2	2011	Tuesday	7:00 AM	Deschutes	Redmond	44.26961205	-121.1742622	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1440348	1	2	4	1072	August	10	2011	Wednesday	6:00 PM	Deschutes	Redmond	44.27058731	-121.1742634	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1440356	1	1	1	1111	August	18	2011	Thursday	12:00 AM	Deschutes	Redmond	44.26921218	-121.2012702	Outbound within 50 feet	Miscellaneous	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1440403	1	2	2	1139	August	22	2011	Monday	11:00 AM	Deschutes	Redmond	44.26920447	-121.1993511	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1440475	1	2	3	1020	August	2	2011	Tuesday	2:00 PM	Deschutes	Redmond	44.25163492	-121.184527	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1440525	1	2	2	1024	August	3	2011	Wednesday	3:00 PM	Deschutes	Redmond	44.25202934	-121.1842497	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1440555	1	2	2	1045	August	5	2011	Friday	7:00 AM	Deschutes	Redmond	44.26306834	-121.1769782	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1440571	1	2	2	1055	August	8	2011	Monday	2:00 PM	Deschutes	Redmond	44.26962985	-121.1716312	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1440647	1	2	2	1076	August	11	2011	Thursday	1:00 AM	Deschutes	Redmond	44.26975131	-121.1715393	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1440661	1	2	2	1078	August	11	2011	Thursday	7:00 AM	Deschutes	Redmond	44.2698441	-121.1717056	Outbound within 50 feet	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1440700	1	2	2	1815	August	4	2011	Thursday	3:00 PM	Deschutes	Redmond	44.24296237	-121.1939709	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Unknown	Unknown	Daylight
1441727	1	2	2	1270	September	20	2011	Tuesday	9:00 PM	Deschutes	Redmond	44.26928222	-121.1912836	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1441840	1	2	2	1294	September	27	2011	Tuesday	5:00 PM	Deschutes	Redmond	44.26920447	-121.1993511	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1441935	1	2	2	1223	September	9	2011	Friday	6:00 PM	Deschutes	Redmond	44.28202684	-121.1732328	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1442022	1	3	3	1250	September	15	2011	Thursday	4:00 PM	Deschutes	Redmond	44.26306834	-121.1769782	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1442047	1	3	3	1253	September	15	2011	Thursday	5:00 PM	Deschutes	Redmond	44.26924028	-121.1947013	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1442167	1	3	3	1323	October</														

1443066	1	2	2	1540	November	17	2011	Thursday	12:00 PM	Deschutes	Redmond	44.27058985	-121.1753571	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1443068	1	2	5	1541	November	17	2011	Thursday	4:00 PM	Deschutes	Redmond	44.26934103	-121.1892356	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1443060	1	2	2	1546	November	16	2011	Wednesday	1:00 PM	Deschutes	Redmond	44.28736914	-121.1740028	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1443348	1	2	3	1580	November	18	2011	Friday	2:00 PM	Deschutes	Redmond	44.2723668	-121.1632624	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1443465	1	2	2	1608	November	28	2011	Monday	5:00 PM	Deschutes	Redmond	44.25177244	-121.1844213	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1443498	1	2	2	1620	November	21	2011	Monday	2:00 PM	Deschutes	Redmond	44.26920447	-121.193511	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1443838	1	1	1	1785	December	30	2011	Friday	1:00 PM	Deschutes	Redmond	44.28452247	-121.1738387	Inbound within 50 feet	Rear-End	Miscellaneous	Clear	Wet	Daylight
1443924	1	2	2	1634	December	2	2011	Friday	2:00 PM	Deschutes	Redmond	44.26962985	-121.1716312		Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1443948	1	1	2	1649	December	5	2011	Monday	12:00 PM	Deschutes	Redmond	44.27255649	-121.1742768	Outbound within 50 feet	Pedestrian	Non-fatal injury crash	Clear	Dry	Daylight
1443952	1	1	1	1650	December	5	2011	Monday	9:00 PM	Deschutes	Redmond	44.23783689	-121.1976202	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1444032	1	2	3	1668	December	9	2011	Friday	2:00 PM	Deschutes	Redmond	44.24507421	-121.1905561	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1444064	1	1	1	1677	December	11	2011	Sunday	1:00 AM	Deschutes	Redmond	44.27246859	-121.1632057	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1444078	1	2	2	1683	December	13	2011	Tuesday	3:00 PM	Deschutes	Redmond	44.26959208	-121.1774715	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1444171	1	2	2	1721	December	20	2011	Tuesday	7:00 PM	Deschutes	Redmond	44.2658589	-121.1807742	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1444174	1	2	2	1723	December	20	2011	Tuesday	4:00 AM	Deschutes	Redmond	44.2427621	-121.1928699	Southwest Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1444182	1	2	3	1728	December	21	2011	Wednesday	4:00 PM	Deschutes	Redmond	44.26267583	-121.1772455	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1444762	1	2	2	1332	October	4	2011	Tuesday	2:00 PM	Deschutes	Redmond	44.25785736	-121.1830627	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1444777	1	1	1	1335	October	5	2011	Wednesday	12:00 AM	Deschutes	Redmond	44.25553273	-121.184939	Midblock location	Non-collision	Non-fatal injury crash	Cloudy	Wet	Darkness – no street lights
1445062	1	2	3	1309	September	29	2011	Thursday	2:00 PM	Deschutes	Redmond	44.26903897	-121.1753566	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1445618	1	2	1	1066	August	9	2011	Tuesday	10:00 AM	Deschutes	Redmond	44.27057135	-121.1785425	Outbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1445680	1	1	1	1014	August	1	2011	Monday	6:00 PM	Deschutes	Redmond	44.27200121	-121.1893026	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Rain	Wet	Daylight
1445692	1	2	2	1030	August	3	2011	Wednesday	12:00 PM	Deschutes	Redmond	44.24313685	-121.1861004	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1445754	1	2	4	1047	August	5	2011	Friday	11:00 PM	Deschutes	Redmond	44.27652284	-121.1721388	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1445767	1	2	2	1048	August	5	2011	Friday	6:00 PM	Deschutes	Redmond	44.26296312	-121.1766213	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1445856	1	3	4	1071	August	10	2011	Wednesday	12:00 PM	Deschutes	Redmond	44.25117098	-121.1904512	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1445943	1	2	2	10870	August	12	2011	Friday	5:00 PM	Deschutes	Redmond	44.26661333	-121.1840723	Southeast Intersection Quadrant	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1445966	1	3	3	1094	August	15	2011	Monday	4:00 PM	Deschutes	Redmond	44.26928244	-121.1912836	Outbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1445995	1	3	3	1104	August	18	2011	Thursday	9:00 PM	Deschutes	Redmond	44.25177244	-121.1844213	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1446014	1	2	2	1114	August	19	2011	Friday	6:00 PM	Deschutes	Redmond	44.27642255	-121.2093806	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1446033	1	2	2	1124	August	20	2011	Saturday	1:00 PM	Deschutes	Redmond	44.27552791	-121.1732154	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1446047	1	2	2	1151	August	25	2011	Thursday	6:00 PM	Deschutes	Redmond	44.27551291	-121.178055	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1446099	1	2	2	1157	August	26	2011	Friday	3:00 PM	Deschutes	Redmond	44.2792148	-121.1753611	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1446113	1	2	2	1158	August	26	2011	Friday	2:00 PM	Deschutes	Redmond	44.26788581	-121.1747806	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Unknown	Unknown	Daylight
1446467	1	2	3	1061	August	8	2011	Monday	3:00 PM	Deschutes	Redmond	44.27358037	-121.1666353	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1446484	1	2	3	1073	August	10	2011	Wednesday	8:00 AM	Deschutes	Redmond	44.28202684	-121.1732328	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1446733	1	2	1	1013	August	1	2011	Monday	5:00 AM	Deschutes	Redmond	44.2800679	-121.1974889	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Dawn (Twilight)
1446739	1	2	4	1069	May	10	2011	Tuesday	5:00 PM	Deschutes	Redmond	44.2640868	-121.1967303	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1447176	1	2	2	1167	August	27	2011	Saturday	3:00 PM	Deschutes	Redmond	44.28375617	-121.1753695	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1447884	1	2	2	1184	September	1	2011	Thursday	3:00 PM	Deschutes	Redmond	44.27831288	-121.1742851	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1448168	1	2	2	1204	September	7	2011	Wednesday	3:00 PM	Deschutes	Redmond	44.27258966	-121.1643392	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1448382	1	1	2	1213	September	8	2011	Thursday	4:00 PM	Deschutes	Redmond	44.27551943	-121.1774854	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1448495	1	1	2	1656	December	4	2011	Sunday	4:00 PM	Deschutes	Redmond	44.29450072	-121.1738889	Outbound within 50 feet	Pedestrian	Non-fatal injury crash	Clear	Dry	Daylight
1448498	1	1	1	1517	November	10	2011	Thursday	12:00 AM	Deschutes	Redmond	44.25286379	-121.2045183	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1448565	1	2	2	1529	November	14	2011	Monday	11:00 AM	Deschutes	Redmond	44.27921721	-121.1732111	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1448577	1	2	2	1542	November	17	2011	Thursday	9:00 PM	Deschutes	Redmond	44.27553402	-121.1721389	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1448583	1	2	3	1316	September	30	2011	Friday	5:00 PM	Deschutes	Redmond	44.25476107	-121.1941738	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1448713	1	2	1	1604	November	27	2011	Sunday	11:00 AM	Deschutes	Redmond	44.2941146	-121.1828651	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1448883	1	2	2	1638	December	2	2011	Friday	4:00 PM	Deschutes	Redmond	44.25476107	-121.1941738	Southwest Intersection Quadrant	Rear-End	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1448992	1	2	1	1641	November	12	2011	Saturday	4:00 PM	Deschutes	Redmond	44.28048894	-121.1942439	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1449007	1	2	2	1651	December	6	2011	Tuesday	3:00 PM	Deschutes	Redmond	44.27354199	-121.1721388	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1449496	1	2	2	1662	December	7	2011	Wednesday	5:00 PM	Deschutes	Redmond	44.28914401	-121.1891194	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1449593	1	5	2	1666	December	9	2011	Friday	10:00 PM	Deschutes	Redmond	44.25799996	-121.1875687	Midblock location	Sideswipe-meeting	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1449598	1	2	2	1262	September	19	2011	Monday	10:00 AM	Deschutes	Redmond	44.27255649	-121.1742768	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1449112	1	2	4	1486	November	5	2011	Saturday	2:00 AM	Deschutes	Redmond	44.27763067	-121.2093867	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1449113	1	2	2	1667	December	9	2011	Friday	9:00 AM	Deschutes	Redmond	44.26890725	-121.1913228	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1449125	1	1	1	1675	December	10	2011	Saturday	9:00 PM	Deschutes	Redmond	44.26161908	-121.1999917	Unknown	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1449186	1	1	1	1692	December	15	2011	Thursday	12:00 AM	Deschutes	Redmond	44.265425	-121.1732556	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1449200	1	2	2	1697	December	15	2011	Thursday	6:00 PM	Deschutes	Redmond	44.29089996	-121.1777389	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1449209	1	2	2	1702	December	16	2011	Friday	6:00 PM	Deschutes	Redmond	44.26942958	-121.1876343	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1449235	1	2	2	1709	December	17	2011	Saturday	12:00 PM	Deschutes	Redmond	44.28752984	-121.2238064	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1449309	1	2	3	1724	December	20	2011	Tuesday	3:00 PM	Deschutes	Redmond	44.27551921	-121.175355	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1449325	1	2	2	1247	September	14	2011	Wednesday	1:00 PM	Deschutes	Redmond	44.25107976	-121.2139194	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1449350	1	1	1	1740	December	22	2011	Thursday	6:00 PM	Deschutes	Redmond	44.26394112	-121.1789889	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1449393	1	2	4	1766	December	29	2011	Thursday	5:00 PM	Deschutes	Redmond	44.27842255	-121.2093806	NW Intersection Quadrant	Angle	Non-fatal injury crash	Rain	Wet	Darkness – no street lights
1449420	1	2	2	1715	December	19	2011	Monday	9:00 AM	Deschutes	Redmond	44.27643064	-121.1992874	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1449431	1	2	3	1433	October	26	2011	Wednesday	7:00 AM	Deschutes	Redmond	44.27647106	-121.1878695	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1449436	1	2	2	1379	October	14	2011	Friday	11:00 AM	Deschutes	Redmond	44.27258618	-121.1666297	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1449439	1	2	2	1381	October	14	2011	Friday	6:00 PM	Deschutes	Redmond	44.265425	-121.1732556	Unknown	Angle	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1449452	1	3	3	1394	October	17	2011	Monday	4:00 PM	Deschutes	Redmond	44.26477868	-121.1892806	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1449454	1	3	5	1441	October	27	2011	Thursday	5:00 PM	Deschutes	Redmond	44.2384333	-121.209912	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry</	

1451494	1	2	2	31	January	10	2012	Tuesday	9:00 AM	Deschutes	Redmond	44.271742876	-121.1742876	Outbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1451518	1	2	2	36	January	12	2012	Thursday	3:00 PM	Deschutes	Redmond	44.260110567	-121.181429	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1451635	1	2	2	78	January	17	2012	Tuesday	3:00 PM	Deschutes	Redmond	44.260909025	-121.1741389	Midblock location	Turning Movement	Property damage only crash (PDO)	Cloudy	Wet	Daylight
1451680	1	2	2	114	January	23	2012	Monday	4:00 PM	Deschutes	Redmond	44.254752338	-121.1841737	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1451702	1	2	3	125	January	25	2012	Wednesday	9:00 PM	Deschutes	Redmond	44.26028223	-121.1912836	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1451758	1	2	2	160	January	30	2012	Monday	8:00 AM	Deschutes	Redmond	44.26193592	-121.2093531	NE Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Wet	Daylight
1452680	1	1	1	69	January	18	2012	Wednesday	9:00 AM	Deschutes	Redmond	44.252272722	-121.2127761	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Rain	Wet	Daylight
1452682	1	1	1	135	January	25	2012	Wednesday	10:00 AM	Deschutes	Redmond	44.276423033	-121.1977561	Inbound within 50 feet	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Daylight
1453092	1	2	2	143	January	26	2012	Thursday	5:00 PM	Deschutes	Redmond	44.25293678	-121.1865075	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1456809	1	3	6	99	February	6	2012	Monday	7:00 AM	Deschutes	Redmond	44.29705735	-121.1665449	Southeast Intersection Quadrant	Head-On	Fatal crash	Fog	Ice	Dawn (Twilight)
1456929	1	1	1	196	February	8	2012	Wednesday	3:00 AM	Deschutes	Redmond	44.26956065	-121.1848889	NW Intersection Quadrant	Fixed-Object or Other-Object	Property damage only crash (PDO)	Snow	Ice	Darkness – no street lights
1456950	1	2	3	206	February	10	2012	Friday	2:00 PM	Deschutes	Redmond	44.26958279	-121.1840684	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1456957	1	2	2	285	February	20	2012	Monday	9:00 AM	Deschutes	Redmond	44.26958313	-121.1819346	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1456967	1	2	4	173	February	3	2012	Friday	12:00 PM	Deschutes	Redmond	44.26963023	-121.1732033	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1457026	1	2	2	202	February	9	2012	Thursday	5:00 AM	Deschutes	Redmond	44.27058884	-121.1732138	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Rain	Wet	Darkness – no street lights
1457030	1	2	1	177	February	3	2012	Friday	1:00 AM	Deschutes	Redmond	44.25957548	-121.1799145	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Ice	Darkness – no street lights
1458638	1	2	2	208	February	10	2012	Friday	4:00 PM	Deschutes	Redmond	44.260909062	-121.1739116	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1458648	1	2	2	253	February	21	2012	Tuesday	4:00 PM	Deschutes	Redmond	44.24752987	-121.2293879	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1458663	1	2	4	280	February	25	2012	Saturday	Unknown Time	Deschutes	Redmond	44.2547787	-121.1872167	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1458711	1	2	2	296	February	27	2012	Monday	2:00 PM	Deschutes	Redmond	44.26204552	-121.1865592	NE Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Snow	Daylight
1459704	1	1	2	193	February	8	2012	Wednesday	3:00 AM	Deschutes	Redmond	44.26504049	-121.1711043	Inbound within 50 feet	Fixed-Object or Other-Object	Non-fatal injury crash	Snow	Ice	Darkness – no street lights
1459706	1	2	2	280	February	23	2012	Thursday	7:00 AM	Deschutes	Redmond	44.29819684	-121.1789649	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1465547	1	2	2	342	March	2	2012	Friday	6:00 PM	Deschutes	Redmond	44.26920365	-121.2093365	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1465562	1	2	3	329	March	1	2012	Thursday	3:00 PM	Deschutes	Redmond	44.27057753	-121.1774794	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1465715	1	2	2	349	March	5	2012	Monday	11:00 AM	Deschutes	Redmond	44.27058757	-121.1740861	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1465719	1	2	2	367	March	9	2012	Friday	1:00 PM	Deschutes	Redmond	44.26959572	-121.1753555	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1465752	1	2	2	419	March	20	2012	Tuesday	2:00 PM	Deschutes	Redmond	44.26306827	-121.1769789	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1465760	1	2	2	426	March	21	2012	Wednesday	10:00 AM	Deschutes	Redmond	44.26306835	-121.1769782	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Snow	Wet	Daylight
1465945	1	2	2	371	March	11	2012	Sunday	4:00 PM	Deschutes	Redmond	44.25177244	-121.1844213	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1465986	1	1	1	382	March	13	2012	Tuesday	1:00 PM	Deschutes	Redmond	44.26589374	-121.2060748	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1466133	1	2	2	348	March	5	2012	Monday	3:00 PM	Deschutes	Redmond	44.29450072	-121.1738589	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1466239	1	2	2	90393	March	15	2012	Thursday	11:00 AM	Deschutes	Redmond	44.26959201	-121.1795959	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1466278	1	2	3	365	March	8	2012	Thursday	7:00 PM	Deschutes	Redmond	44.27642256	-121.2089313	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1467691	1	2	2	569	April	28	2012	Saturday	1:00 PM	Deschutes	Redmond	44.260909062	-121.1739116	Inbound within 50 feet	Turning Movement	Non-fatal injury crash	Cloudy	Dry	Daylight
1467713	1	1	1	543	April	20	2012	Friday	10:00 PM	Deschutes	Redmond	44.2497221	-121.1860386	Southwest Intersection Quadrant	Miscellaneous	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1467717	1	2	2	487	April	6	2012	Friday	5:00 PM	Deschutes	Redmond	44.260909062	-121.1739116	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1467725	1	2	2	503	April	9	2012	Monday	12:00 PM	Deschutes	Redmond	44.26958287	-121.1840678	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1467728	1	2	2	508	April	10	2012	Tuesday	10:00 AM	Deschutes	Redmond	44.27058884	-121.1732138	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1467732	1	2	2	552	April	21	2012	Saturday	12:00 PM	Deschutes	Redmond	44.27058731	-121.1742633	Inbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1467901	1	2	2	553	April	21	2012	Saturday	12:00 PM	Deschutes	Redmond	44.27651528	-121.1764086	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1467907	1	2	2	551	April	21	2012	Saturday	1:00 PM	Deschutes	Redmond	44.28102804	-121.1753731	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1467919	1	2	2	550	April	23	2012	Monday	1:00 PM	Deschutes	Redmond	44.24751033	-121.1951154	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1467927	1	2	2	514	April	12	2012	Thursday	2:00 PM	Deschutes	Redmond	44.27258717	-121.1796198	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1467935	1	2	2	494	February	9	2012	Thursday	4:00 PM	Deschutes	Redmond	44.28379839	-121.1588211	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1468074	1	3	3	538	April	19	2012	Thursday	2:00 PM	Deschutes	Redmond	44.27258618	-121.1666297	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Rain	Wet	Daylight
1469461	1	2	2	598	May	5	2012	Saturday	1:00 PM	Deschutes	Redmond	44.27074989	-121.1742674	Inbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1469465	1	2	2	619	May	11	2012	Friday	4:00 PM	Deschutes	Redmond	44.26934103	-121.1892335	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1469476	1	2	2	650	May	17	2012	Thursday	4:00 PM	Deschutes	Redmond	44.26934103	-121.1892356	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1469480	1	2	2	656	May	20	2012	Sunday	9:00 PM	Deschutes	Redmond	44.27058731	-121.1742633	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1469481	1	2	2	589	May	3	2012	Thursday	7:00 AM	Deschutes	Redmond	44.25177244	-121.1844213	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1469520	1	2	2	633	May	14	2012	Monday	10:00 AM	Deschutes	Redmond	44.2593823	-121.1794061	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1469536	1	2	2	635	May	15	2012	Tuesday	6:00 PM	Deschutes	Redmond	44.25383561	-121.1830569	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1469545	1	2	2	645	May	16	2012	Wednesday	5:00 AM	Deschutes	Redmond	44.25798069	-121.180592	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Dawn (Twilight)
1470234	1	2	2	657	May	20	2012	Sunday	2:00 PM	Deschutes	Redmond	44.25842636	-121.1826058	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1470239	1	2	2	666	May	23	2012	Wednesday	1:00 PM	Deschutes	Redmond	44.26195902	-121.1942435	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1470282	1	2	2	582	May	1	2012	Tuesday	3:00 PM	Deschutes	Redmond	44.27551173	-121.1785001	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1470290	1	2	2	587	May	2	2012	Wednesday	7:00 AM	Deschutes	Redmond	44.26880844	-121.1840673	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1470309	1	2	2	588	May	2	2012	Wednesday	6:00 PM	Deschutes	Redmond	44.265425	-121.1732556	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1470311	1	2	2	602	May	6	2012	Sunday	3:00 PM	Deschutes	Redmond	44.27380457	-121.1892505	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1470313	1	2	2	632	May	14	2012	Monday	8:00 AM	Deschutes	Redmond	44.260909062	-121.1739116	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1470341	1	2	2	641	May	16	2012	Wednesday	4:00 PM	Deschutes	Redmond	44.271195	-121.2093303	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1470375	1	2	2	596	May	5	2012	Saturday	11:00 PM	Deschutes	Redmond	44.25469615	-121.2043724	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1470379	1	2	2	593	May	4	2012	Friday	10:00 AM	Deschutes	Redmond	44.28404335	-121.1942637	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1470387	1	1	1	6110	May	12	2012	Saturday	3:00 PM	Deschutes	Redmond	44.26920447	-121.1993511	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1472507	1	2	2	710	June	4	2012	Monday	11:00 AM	Deschutes	Redmond	44.27058884	-121.1732138	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1472643	1	2	3	728	June	10	2012	Sunday	1:00 PM	Deschutes	Redmond	44.25770598	-121.1805096	Outbound within 50 feet	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1472732	1	2	3	714	June	5	2012	Tuesday	8:00 AM	Deschutes	Redmond	44.29569389	-121.1787167	Inbound within 50 feet	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1472748	1	2	2	717	June	6	2012	Wednesday	10:00 AM	Deschutes	Redmond	44.26924339	-121.194297	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1472754	1	2	2	723	June	8	2012	Friday	9:00 PM	Deschutes	Redmond	44.24016568	-121.1882861	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Rain	Wet	Darkness – no street lights
1472759	1	2	2	729	June	10	2012	Sunday	4:00 PM	Deschutes	Redmond	44.26928222	-121.1912836	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1472887	1	2	2	73															

1476470	1	2	2	890	July	14	2012	Saturday	7:00 PM	Deschutes	Redmond	44.26959572	-121.1753555	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1476476	1	1	1	900	July	16	2012	Monday	8:00 PM	Deschutes	Redmond	44.26428407	-121.1524576	Midblock location	Non-collision	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1476492	1	3	5	928	July	21	2012	Saturday	6:00 PM	Deschutes	Redmond	44.26961205	-121.1742622	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1476500	1	2	2	953	July	27	2012	Friday	5:00 PM	Deschutes	Redmond	44.26920447	-121.1993211	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1476505	1	2	3	962	July	28	2012	Saturday	5:00 PM	Deschutes	Redmond	44.26982827	-121.1840678	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1476513	1	2	2	838	July	3	2012	Tuesday	5:00 PM	Deschutes	Redmond	44.26308835	-121.1769782	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1476570	1	2	3	974	July	30	2012	Monday	12:00 PM	Deschutes	Redmond	44.28917966	-121.173948	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1476734	1	2	4	886	July	13	2012	Friday	7:00 AM	Deschutes	Redmond	44.27255507	-121.1732051	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1476799	1	2	2	902	July	17	2012	Tuesday	6:00 PM	Deschutes	Redmond	44.26821917	-121.1735877	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1476848	1	2	2	915	July	20	2012	Friday	5:00 PM	Deschutes	Redmond	44.26402292	-121.1763469	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1477045	1	1	1	956	July	27	2012	Friday	3:00 PM	Deschutes	Redmond	44.2593823	-121.1794061	Inbound within 50 feet	Non-collision	Non-fatal injury crash	Clear	Dry	Daylight
1477280	1	2	4	831	July	2	2012	Monday	3:00 PM	Deschutes	Redmond	44.26597631	-121.1740004	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1477301	1	1	1	847	July	5	2012	Thursday	4:00 AM	Deschutes	Redmond	44.28536676	-121.1917796	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1477302	1	2	2	859	July	8	2012	Sunday	3:00 PM	Deschutes	Redmond	44.28393471	-121.1741926	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1477304	1	2	2	888	July	11	2012	Wednesday	11:00 AM	Deschutes	Redmond	44.27551919	-121.1753571	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1477306	1	2	2	939	July	25	2012	Wednesday	10:00 AM	Deschutes	Redmond	44.2890096	-121.1673682	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1477307	1	1	2	869	June	22	2012	Friday	8:00 PM	Deschutes	Redmond	44.24824167	-121.229414	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Rain	Wet	Dusk (Twilight)
1478826	1	1	2	979	July	30	2012	Monday	10:00 AM	Deschutes	Redmond	44.27355049	-121.1753491	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1482094	1	2	2	1049	August	11	2012	Saturday	8:00 PM	Deschutes	Redmond	44.26617867	-121.1749184	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1482107	1	2	2	992	August	2	2012	Thursday	6:00 PM	Deschutes	Redmond	44.26959209	-121.1774715	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1482118	1	3	4	1024	August	27	2012	Monday	5:00 PM	Deschutes	Redmond	44.26948132	-121.1866937	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1482569	1	2	2	982	August	1	2012	Wednesday	10:00 PM	Deschutes	Redmond	44.24131557	-121.1914855	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1482611	1	2	2	999	August	3	2012	Friday	5:00 PM	Deschutes	Redmond	44.27741166	-121.1753516	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1483812	1	2	2	964	July	24	2012	Tuesday	8:00 AM	Deschutes	Redmond	44.26437328	-121.1999642	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1483998	1	2	1	998	August	3	2012	Friday	10:00 PM	Deschutes	Redmond	44.27861839	-121.1732156	Midblock location	Sideswipe-overtaking	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1484075	1	2	3	993	August	3	2012	Friday	4:00 PM	Deschutes	Redmond	44.25478923	-121.1857208	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1484084	1	1	2	90933	August	3	2012	Friday	4:00 PM	Deschutes	Redmond	44.25474208	-121.1967325	Inbound within 50 feet	Non-collision	Property damage only crash (PDO)	Clear	Dry	Daylight
1484087	1	1	2	70993	August	3	2012	Friday	4:00 PM	Deschutes	Redmond	44.25474986	-121.1954293	Inbound within 50 feet	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Daylight
1484100	1	2	2	987	August	2	2012	Thursday	7:00 AM	Deschutes	Redmond	44.25111251	-121.1993202	Outbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1484278	1	2	2	1110	August	23	2012	Thursday	4:00 PM	Deschutes	Redmond	44.29099062	-121.1739116	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1484410	1	2	2	1091	August	19	2012	Sunday	6:00 PM	Deschutes	Redmond	44.2593823	-121.1794061	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1484439	1	2	2	1102	August	21	2012	Tuesday	3:00 PM	Deschutes	Redmond	44.26959201	-121.1795959	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1484451	1	2	2	1107	August	22	2012	Wednesday	1:00 PM	Deschutes	Redmond	44.26961205	-121.1742622	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1484587	1	3	3	1096	August	20	2012	Monday	3:00 PM	Deschutes	Redmond	44.25842836	-121.1826058	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1484605	1	2	2	1131	August	28	2012	Tuesday	10:00 PM	Deschutes	Redmond	44.25472675	-121.1992912	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1484985	1	2	2	1138	August	30	2012	Thursday	6:00 AM	Deschutes	Redmond	44.26015548	-121.1942265	Inbound within 50 feet	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1485060	1	1	1	99999	October	12	2012	Friday	10:00 PM	Deschutes	Redmond	44.26959798	-121.1960309	NW Intersection Quadrant	Miscellaneous	Fatal crash	Rain	Wet	Darkness – no street lights
1488442	1	2	2	1213	September	14	2012	Friday	4:00 PM	Deschutes	Redmond	44.2640569	-121.1520105	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1488445	1	2	2	1222	September	17	2012	Monday	1:00 PM	Deschutes	Redmond	44.26928222	-121.1912836	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1488463	1	2	3	1239	September	19	2012	Wednesday	7:00 AM	Deschutes	Redmond	44.27058731	-121.1742633	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1488468	1	2	2	1262	September	24	2012	Monday	1:00 PM	Deschutes	Redmond	44.26920447	-121.1993511	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1488472	1	2	2	1195	September	10	2012	Monday	4:00 PM	Deschutes	Redmond	44.26920447	-121.1993511	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1488498	1	2	3	1153	August	28	2012	Tuesday	4:00 PM	Deschutes	Redmond	44.27057003	-121.1795923	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1488704	1	2	2	1259	September	25	2012	Tuesday	2:00 PM	Deschutes	Redmond	44.26308835	-121.1769782	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1488712	1	2	2	1274	September	27	2012	Thursday	12:00 PM	Deschutes	Redmond	44.26909062	-121.1739116	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1488763	1	3	3	1279	September	28	2012	Friday	11:00 AM	Deschutes	Redmond	44.27257329	-121.1686777	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1488785	1	2	2	1187	September	8	2012	Saturday	10:00 AM	Deschutes	Redmond	44.2549983	-121.1822917	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1488788	1	2	2	1183	August	31	2012	Friday	4:00 PM	Deschutes	Redmond	44.28736914	-121.1740028	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1488802	1	2	2	1173	September	5	2012	Wednesday	7:00 AM	Deschutes	Redmond	44.27552157	-121.1742958	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1488969	1	2	1	1209	September	13	2012	Thursday	2:00 PM	Deschutes	Redmond	44.27143333	-121.1753583	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1488998	1	2	2	1211	September	14	2012	Friday	10:00 AM	Deschutes	Redmond	44.28536662	-121.1891697	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1489016	1	2	2	1242	September	20	2012	Thursday	8:00 AM	Deschutes	Redmond	44.27652765	-121.1742746	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1489025	1	2	2	1232	August	31	2012	Friday	12:00 PM	Deschutes	Redmond	44.25350115	-121.1873662	Southwest Intersection Quadrant	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1489027	1	2	2	1185	September	7	2012	Friday	7:00 AM	Deschutes	Redmond	44.27255507	-121.1732051	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1489034	1	2	2	1189	September	8	2012	Saturday	9:00 AM	Deschutes	Redmond	44.24427384	-121.1989275	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1489096	1	2	3	1158	September	3	2012	Monday	7:00 PM	Deschutes	Redmond	44.26805698	-121.1993568	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1489782	1	2	1	1152	August	25	2012	Saturday	11:00 PM	Deschutes	Redmond	44.27356123	-121.2078784	Midblock location	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1490542	1	2	2	1366	October	17	2012	Wednesday	7:00 AM	Deschutes	Redmond	44.27058731	-121.1742633	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Dawn (Twilight)
1490548	1	2	2	1324	October	6	2012	Saturday	7:00 PM	Deschutes	Redmond	44.27056699	-121.1817687	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1490569	1	3	3	1394	September	10	2012	Monday	5:00 PM	Deschutes	Redmond	44.26934103	-121.1892356	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1490720	1	1	2	1326	October	8	2012	Monday	6:00 AM	Deschutes	Redmond	44.26308835	-121.1769782	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1490742	1	2	2	1348	October	12	2012	Friday	4:00 PM	Deschutes	Redmond	44.26909062	-121.1739116	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Rain	Wet	Daylight
1490746	1	2	2	1356	October	14	2012	Sunday	2:00 PM	Deschutes	Redmond	44.2564728	-121.1812722	Southwest Intersection Quadrant	Rear-End	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1490751	1	2	3	1384	October	19	2012	Friday	5:00 AM	Deschutes	Redmond	44.27651661	-121.1732188	NE Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Darkness – no street lights
1490756	1	2	2	1385	October	19	2012	Friday	7:00 PM	Deschutes	Redmond	44.26425	-121.1732556	Outbound within 50 feet	Head-On	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1490765	1	2	2	1390	October	20	2012	Saturday	3:00 PM	Deschutes	Redmond	44.2593823	-121.1794061	Inbound within 50 feet	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1490796	1	2	2	1418	October	25	2012	Thursday	8:00 PM	Deschutes	Redmond	44.26308835	-121.1769782	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1491013	1	2	2	1297	October	2	2012	Tuesday	3:00 PM	Deschutes	Redmond	44.27741166	-121.1753516	NE Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1491082	1	2	2	1315	October	5	2012	Friday	4:00 PM	Deschutes	Redmond	44.25475238	-121.1941737	Outbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1491108	1	2	3	1344	October	12	2012	Friday	7:00 AM	Deschutes	Redmond	44.27650901	-121.177489	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1491146	1	1																	

1494009	1	2	2	1686	December	14	2012	Friday	2:00 PM	Deschutes	Redmond	44.27058731	-121.1742633	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1494912	1	2	2	1691	December	15	2012	Saturday	12:00 PM	Deschutes	Redmond	44.27058984	-121.1753571	Outbound within 50 feet	Sideswipe-overtaking	Non-fatal injury crash	Cloudy	Dry	Daylight
1494916	1	2	2	1747	December	19	2012	Wednesday	6:00 PM	Deschutes	Redmond	44.26909062	-121.1739116	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Cloudy	Dry	Darkness – no street lights
1494922	1	3	3	1772	December	22	2012	Saturday	11:00 AM	Deschutes	Redmond	44.26982827	-121.1748678	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1495010	1	2	4	1824	December	27	2012	Thursday	3:00 PM	Deschutes	Redmond	44.27087134	-121.1785425	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Ice	Daylight
1495014	1	2	2	1830	December	27	2012	Thursday	8:00 AM	Deschutes	Redmond	44.27055761	-121.1774788	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Ice	Daylight
1495035	1	2	2	1833	December	28	2012	Friday	10:00 AM	Deschutes	Redmond	44.29450072	-121.1738889	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Ice	Daylight
1495039	1	2	2	1845	December	30	2012	Sunday	2:00 PM	Deschutes	Redmond	44.27411407	-121.1742822	Midblock location	Rear-End	Property damage only crash (PDO)	Cloudy	Ice	Daylight
1495088	1	2	4	1861	December	31	2012	Monday	4:00 PM	Deschutes	Redmond	44.27255649	-121.1742768	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Ice	Daylight
1495323	1	2	2	1651	December	6	2012	Thursday	4:00 PM	Deschutes	Redmond	44.24752423	-121.1881584	Outbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1495713	1	2	2	1797	December	23	2012	Sunday	1:00 PM	Deschutes	Redmond	44.25177244	-121.1844213	Outbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Snow	Snow	Daylight
1495727	1	1	1	1817	December	26	2012	Wednesday	7:00 AM	Deschutes	Redmond	44.23556218	-121.1998129	NW Intersection Quadrant	Fixed-Object or Other-Object	Property damage only crash (PDO)	Snow	Ice	Dawn (Twilight)
1495828	1	2	2	1826	December	27	2012	Thursday	11:00 AM	Deschutes	Redmond	44.25396557	-121.1829713	Midblock location	Turning Movement	Non-fatal injury crash	Cloudy	Wet	Daylight
1495854	1	2	2	1846	December	30	2012	Sunday	4:00 PM	Deschutes	Redmond	44.30403335	-121.1732888	Outbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Cloudy	Ice	Dusk (Twilight)
1496890	1	1	1	1458	November	2	2012	Friday	11:00 PM	Deschutes	Redmond	44.24427384	-121.1989275	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Rain	Wet	Darkness – no street lights
1496953	1	2	1	1460	November	2	2012	Friday	8:00 PM	Deschutes	Redmond	44.29705	-121.1814594	Midblock location	Rear-End	Non-fatal injury crash	Rain	Wet	Darkness – no street lights
1496984	1	2	2	1523	November	13	2012	Tuesday	2:00 AM	Deschutes	Redmond	44.26660201	-121.1840812	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Darkness – no street lights
1496987	1	3	5	1525	November	4	2012	Sunday	1:00 PM	Deschutes	Redmond	44.26010309	-121.181434	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1496993	1	2	3	1558	November	17	2012	Saturday	5:00 PM	Deschutes	Redmond	44.25475238	-121.1941737	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Snow	Darkness – no street lights
1497052	1	2	2	1579	November	24	2012	Saturday	4:00 PM	Deschutes	Redmond	44.25347996	-121.1846912	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Rain	Wet	Dusk (Twilight)
1497064	1	2	1	1586	November	25	2012	Sunday	3:00 PM	Deschutes	Redmond	44.27352894	-121.1825357	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1497138	1	2	4	1605	November	29	2012	Thursday	2:00 PM	Deschutes	Redmond	44.25471722	-121.2125811	NW Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1497176	1	2	5	1610	November	30	2012	Friday	2:00 PM	Deschutes	Redmond	44.27256127	-121.1721324	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1497798	1	2	2	1545	November	15	2012	Thursday	1:00 PM	Deschutes	Redmond	44.27551421	-121.1774854	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1498720	1	1	2	1650	November	27	2012	Tuesday	5:00 PM	Deschutes	Redmond	44.26928222	-121.1912836	Outbound within 50 feet	Pedestrian	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1498819	1	2	2	1657	December	9	2012	Sunday	12:00 PM	Deschutes	Redmond	44.27553805	-121.1635362	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1498847	1	2	1	1661	December	10	2012	Monday	1:00 AM	Deschutes	Redmond	44.27768612	-121.1753545	Midblock location	Sideswipe-overtaking	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1498861	1	2	2	1664	December	12	2012	Wednesday	8:00 AM	Deschutes	Redmond	44.2583557	-121.1942095	NW Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Ice	Daylight
1498968	1	3	3	1673	December	13	2012	Thursday	7:00 AM	Deschutes	Redmond	44.27821484	-121.1753599	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1498900	1	1	1	1702	December	15	2012	Saturday	9:00 PM	Deschutes	Redmond	44.25841306	-121.1875711	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Snow	Ice	Darkness – no street lights
1498966	1	2	2	1737	December	18	2012	Tuesday	5:00 PM	Deschutes	Redmond	44.29445631	-121.172699	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1499118	1	2	2	1780	December	23	2012	Sunday	12:00 PM	Deschutes	Redmond	44.28012734	-121.1775316	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Snow	Snow	Daylight
1499122	1	1	1	1802	December	18	2012	Tuesday	11:00 AM	Deschutes	Redmond	44.265425	-121.1732556	Southwest Intersection Quadrant	Non-collision	Property damage only crash (PDO)	Snow	Snow	Daylight
1499128	1	2	2	1805	December	24	2012	Monday	10:00 AM	Deschutes	Redmond	44.27645257	-121.1892509	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Snow	Daylight
1499240	1	2	3	1832	December	28	2012	Friday	9:00 PM	Deschutes	Redmond	44.25901582	-121.2044192	Outbound within 50 feet	Turning Movement	Non-fatal injury crash	Snow	Ice	Darkness – no street lights
1502990	1	1	1	53	January	10	2013	Thursday	12:00 PM	Deschutes	Redmond	44.26961205	-121.1742622	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Snow	Ice	Daylight
1502999	1	2	2	63	January	11	2013	Friday	3:00 PM	Deschutes	Redmond	44.26959571	-121.1753555	Outbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Ice	Daylight
1503012	1	2	2	93	January	17	2013	Thursday	3:00 PM	Deschutes	Redmond	44.26928223	-121.191283	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1503025	1	2	2	139	January	26	2013	Saturday	11:00 AM	Deschutes	Redmond	44.26959571	-121.1753555	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1503335	1	2	2	19	January	4	2013	Friday	12:00 PM	Deschutes	Redmond	44.29090961	-121.1739116	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1503348	1	2	2	49	January	10	2013	Thursday	12:00 PM	Deschutes	Redmond	44.27058736	-121.1742881	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Snow	Ice	Daylight
1503392	1	2	2	54	January	10	2013	Thursday	1:00 PM	Deschutes	Redmond	44.30190382	-121.1701868	Outbound within 50 feet	Turning Movement	Non-fatal injury crash	Snow	Ice	Daylight
1503421	1	2	2	64	January	11	2013	Friday	10:00 AM	Deschutes	Redmond	44.28104064	-121.1732236	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Ice	Daylight
1503542	1	2	2	137	January	26	2013	Saturday	5:00 AM	Deschutes	Redmond	44.28883052	-121.1673002	Outbound within 50 feet	Sideswipe-meeting	Non-fatal injury crash	Cloudy	Ice	Darkness – no street lights
1504070	1	2	2	18	January	4	2013	Friday	6:00 PM	Deschutes	Redmond	44.29450071	-121.1738889	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Cloudy	Dry	Darkness – no street lights
1504087	1	1	1	48	January	9	2013	Wednesday	11:00 PM	Deschutes	Redmond	44.25452916	-121.1863905	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Cloudy	Dry	Darkness – no street lights
1504112	1	2	2	52	January	10	2013	Thursday	3:00 PM	Deschutes	Redmond	44.24427384	-121.1989275	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Ice	Daylight
1504194	1	2	2	66	January	11	2013	Friday	3:00 PM	Deschutes	Redmond	44.2792268	-121.1715472	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Ice	Daylight
1504199	1	1	1	68	January	12	2013	Saturday	11:00 PM	Deschutes	Redmond	44.26209321	-121.1791798	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1504214	1	2	1	70	January	13	2013	Sunday	6:00 AM	Deschutes	Redmond	44.2774164	-121.1775004	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Ice	Darkness – no street lights
1504350	1	2	2	107	January	19	2013	Saturday	5:00 PM	Deschutes	Redmond	44.25841305	-121.1875711	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1504355	1	1	1	109	January	20	2013	Sunday	3:00 PM	Deschutes	Redmond	44.25056632	-121.228174	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1504363	1	1	1	116	January	22	2013	Tuesday	7:00 AM	Deschutes	Redmond	44.29095761	-121.1872361	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1504415	1	3	3	120	January	22	2013	Tuesday	11:00 AM	Deschutes	Redmond	44.27645257	-121.1892509	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1504420	1	2	2	131	January	25	2013	Friday	8:00 AM	Deschutes	Redmond	44.26663679	-121.1785573	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Rain	Wet	Daylight
1504587	1	2	2	183	February	4	2013	Monday	10:00 PM	Deschutes	Redmond	44.26309803	-121.1769784	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1505036	1	1	1	38	January	5	2013	Saturday	3:00 PM	Deschutes	Redmond	44.255272	-121.2211386	NW Intersection Quadrant	Fixed-Object or Other-Object	Non-fatal injury crash	Snow	Ice	Daylight
1505917	1	1	1	186	February	6	2013	Wednesday	5:00 PM	Deschutes	Redmond	44.26958312	-121.1819345	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Cloudy	Dry	Dusk (Twilight)
1505934	1	2	2	209	February	2	2013	Saturday	8:00 PM	Deschutes	Redmond	44.24427384	-121.1989275	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1505944	1	2	2	212	February	12	2013	Tuesday	12:00 PM	Deschutes	Redmond	44.27582156	-121.1742957	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1505946	1	1	1	234	February	20	2013	Wednesday	7:00 AM	Deschutes	Redmond	44.25110572	-121.1905364	Inbound within 50 feet	Non-collision	Non-fatal injury crash	Clear	Dry	Daylight
1505958	1	1	1	253	February	23	2013	Saturday	9:00 PM	Deschutes	Redmond	44.26808773	-121.1785081	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1506031	1	2	1	4	January	1	2013	Tuesday	12:00 AM	Deschutes	Redmond	44.26048958	-121.2035528	NW Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Fog	Ice	Darkness – no street lights
1506149	1	2	2	200	February	9	2013	Saturday	10:00 PM	Deschutes	Redmond	44.26962985	-121.1716311	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1506179	1	2	2	172	February	2	2013	Saturday	2:00 PM	Deschutes	Redmond	44.26372435	-121.1787697	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1506180	1	2	2	184	February	4	2013	Monday	1:00 PM	Deschutes	Redmond	44.27652277	-121.1721499	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1506181	1	2	2	193	February	8	2013	Friday	1:00 PM	Deschutes	Redmond	44.26961205	-121.1742622	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1506182	1	2	3	214	February	13	2013	Wednesday	7:00 PM	Deschutes	Redmond	44.27255507	-121.1732051	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1506195	1	1	2	219	February	14	2013	Thursday	2:00 PM	Deschutes	Redmond	44.29098998	-121.1774775	Inbound within 50 feet	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1506197	1	2	3	236	February	20	2013	Wednesday	5:00 PM	Deschutes	Redmond								

1512593	1	2	2	294	March	7	2013	Thursday	3:00 PM	Deschutes	Redmond	44.26959571	-121.1753555	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1512602	1	2	2	305	March	9	2013	Saturday	4:00 PM	Deschutes	Redmond	44.27058731	-121.1742629	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1512605	1	2	3	320	March	13	2013	Wednesday	4:00 PM	Deschutes	Redmond	44.27058731	-121.1742629	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1512607	1	2	3	324	March	14	2013	Thursday	11:00 AM	Deschutes	Redmond	44.26959571	-121.1853809	Midblock location	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1512683	1	2	3	328	March	14	2013	Thursday	12:00 PM	Deschutes	Redmond	44.26959571	-121.1742629	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1512735	1	2	3	380	March	28	2013	Thursday	11:00 AM	Deschutes	Redmond	44.27058689	-121.1805652	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1513794	1	2	2	293	March	7	2013	Thursday	3:00 PM	Deschutes	Redmond	44.29951109	-121.1789323	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1514751	1	2	2	407	April	2	2013	Tuesday	4:00 PM	Deschutes	Redmond	44.27454443	-121.1710818	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1515065	1	2	3	413	April	3	2013	Wednesday	7:00 AM	Deschutes	Redmond	44.2909061	-121.1739116	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1515068	1	2	3	414	April	3	2013	Wednesday	12:00 PM	Deschutes	Redmond	44.26306835	-121.1769782	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1515071	1	2	2	416	April	3	2013	Wednesday	9:00 AM	Deschutes	Redmond	44.27058984	-121.1753571	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1515084	1	2	2	439	March	18	2013	Monday	9:00 AM	Deschutes	Redmond	44.27642256	-121.2035913	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1515168	1	2	2	446	April	11	2013	Thursday	3:00 PM	Deschutes	Redmond	44.27355049	-121.1753491	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1515198	1	1	2	454	April	14	2013	Sunday	9:00 PM	Deschutes	Redmond	44.26188611	-121.1942409	Midblock location	Pedestrian	Non-fatal injury crash	Cloudy	Dry	Darkness – no street lights
1515210	1	2	1	460	April	16	2013	Tuesday	4:00 PM	Deschutes	Redmond	44.25841536	-121.1871805	NW Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1515216	1	2	2	463	April	16	2013	Tuesday	4:00 PM	Deschutes	Redmond	44.256602	-121.1840812	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1515293	1	2	2	482	April	19	2013	Friday	3:00 PM	Deschutes	Redmond	44.26928221	-121.1912836	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1515327	1	2	2	495	April	22	2013	Monday	12:00 PM	Deschutes	Redmond	44.280148	-121.1706667	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1515330	1	2	2	501	April	23	2013	Tuesday	1:00 PM	Deschutes	Redmond	44.27551421	-121.1774854	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1515341	1	2	2	507	April	25	2013	Thursday	11:00 AM	Deschutes	Redmond	44.26928221	-121.1912836	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1515372	1	3	3	534	April	30	2013	Tuesday	8:00 PM	Deschutes	Redmond	44.27970977	-121.1882214	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1515377	1	1	1	521	April	28	2013	Sunday	4:00 AM	Deschutes	Redmond	44.28306113	-121.1782446	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1515729	1	2	1	405	April	2	2013	Tuesday	7:00 AM	Deschutes	Redmond	44.26582584	-121.1999541	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1516438	1	2	2	529	April	17	2013	Wednesday	5:00 PM	Deschutes	Redmond	44.26963035	-121.1732028	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1516444	1	2	3	491	April	22	2013	Monday	5:00 PM	Deschutes	Redmond	44.2909061	-121.1739116	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1516641	1	2	2	412	April	3	2013	Wednesday	7:00 AM	Deschutes	Redmond	44.26920439	-121.2093361	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1516675	1	3	3	444	April	10	2013	Wednesday	7:00 PM	Deschutes	Redmond	44.26958286	-121.1840678	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1516993	1	4	5	502	April	24	2013	Wednesday	3:00 PM	Deschutes	Redmond	44.27257293	-121.1688778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1517007	1	2	2	473	April	18	2013	Thursday	4:00 PM	Deschutes	Redmond	44.27257293	-121.1688778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1517013	1	2	5	421	April	4	2013	Thursday	2:00 PM	Deschutes	Redmond	44.26203137	-121.1842484	Southwest Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1517035	1	2	2	536	April	30	2013	Tuesday	7:00 AM	Deschutes	Redmond	44.26794696	-121.2044187	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1517040	1	2	2	468	April	17	2013	Wednesday	2:00 AM	Deschutes	Redmond	44.26567121	-121.1916204	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Cloudy	Ice	Darkness – no street lights
1519265	1	2	1	459	April	16	2013	Tuesday	10:00 AM	Deschutes	Redmond	44.29608055	-121.1637995	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1520508	1	2	2	575	May	8	2013	Wednesday	1:00 PM	Deschutes	Redmond	44.27645257	-121.1892509	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1520532	1	2	2	546	May	4	2013	Saturday	1:00 PM	Deschutes	Redmond	44.2909865	-121.1764281	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1520570	1	2	1	655	May	28	2013	Tuesday	11:00 AM	Deschutes	Redmond	44.27255566	-121.1774805	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1520629	1	2	3	663	May	29	2013	Wednesday	10:00 AM	Deschutes	Redmond	44.27642256	-121.2035913	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1520681	1	2	2	557	May	5	2013	Monday	6:00 AM	Deschutes	Redmond	44.27255607	-121.1732051	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1520704	1	2	1	607	May	18	2013	Saturday	7:00 AM	Deschutes	Redmond	44.25841192	-121.1865293	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1520793	1	1	1	676	May	31	2013	Friday	12:00 PM	Deschutes	Redmond	44.26205493	-121.1400551	NW Intersection Quadrant	Non-collision	Property damage only crash (PDO)	Clear	Dry	Daylight
1520804	1	2	2	90588	May	11	2013	Saturday	Unknown Time	Deschutes	Redmond	44.24886635	-121.190956	Midblock location	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1520808	1	2	3	573	May	10	2013	Friday	10:00 AM	Deschutes	Redmond	44.27954443	-121.2093375	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1520822	1	2	3	629	May	22	2013	Wednesday	12:00 PM	Deschutes	Redmond	44.26566151	-121.1929065	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Rain	Wet	Daylight
1521105	1	2	3	540	May	2	2013	Thursday	2:00 PM	Deschutes	Redmond	44.27255507	-121.1732051	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1521113	1	2	2	562	May	7	2013	Tuesday	6:00 AM	Deschutes	Redmond	44.25177243	-121.1844213	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1521128	1	2	2	570	May	9	2013	Thursday	9:00 PM	Deschutes	Redmond	44.26961205	-121.1742622	Inbound within 50 feet	Backing	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1521140	1	2	2	579	May	10	2013	Friday	10:00 AM	Deschutes	Redmond	44.27058731	-121.1742629	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1521141	1	2	2	592	May	14	2013	Tuesday	12:00 PM	Deschutes	Redmond	44.26961205	-121.1742622	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1521144	1	1	2	596	May	15	2013	Wednesday	8:00 PM	Deschutes	Redmond	44.28319402	-121.1681487	Midblock location	Miscellaneous	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1521147	1	2	2	603	May	17	2013	Friday	4:00 PM	Deschutes	Redmond	44.25177243	-121.1844213	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1521185	1	5	7	605	May	18	2013	Saturday	10:00 AM	Deschutes	Redmond	44.27284877	-121.1697537	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1521210	1	2	2	622	May	21	2013	Tuesday	9:00 AM	Deschutes	Redmond	44.25306165	-121.1835662	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Rain	Wet	Daylight
1521212	1	2	2	627	May	22	2013	Wednesday	4:00 PM	Deschutes	Redmond	44.27226914	-121.1700403	Midblock location	Rear-End	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1521214	1	2	2	637	May	23	2013	Thursday	6:00 AM	Deschutes	Redmond	44.26962885	-121.1716311	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1521216	1	2	3	638	May	24	2013	Friday	11:00 AM	Deschutes	Redmond	44.26920447	-121.1993511	Outbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1523009	1	1	1	686	June	3	2013	Monday	12:00 PM	Deschutes	Redmond	44.26241641	-121.1774221	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Daylight
1523038	1	1	1	750	June	16	2013	Sunday	4:00 PM	Deschutes	Redmond	44.28348516	-121.1681157	Midblock location	Non-collision	Non-fatal injury crash	Clear	Dry	Daylight
1523058	1	2	2	802	June	25	2013	Tuesday	2:00 PM	Deschutes	Redmond	44.25163711	-121.1845253	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1523089	1	2	2	709	April	17	2013	Wednesday	2:00 PM	Deschutes	Redmond	44.26334077	-121.176798	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1523135	1	2	2	757	June	17	2013	Monday	1:00 PM	Deschutes	Redmond	44.2593823	-121.1794061	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1523136	1	2	2	818	June	28	2013	Friday	6:00 PM	Deschutes	Redmond	44.26975102	-121.1715395	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1523201	1	2	2	824	June	29	2013	Saturday	9:00 PM	Deschutes	Redmond	44.26975102	-121.1715395	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1523230	1	2	2	755	June	16	2013	Sunday	10:00 AM	Deschutes	Redmond	44.25370709	-121.1831414	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1523568	1	2	2	696	June	4	2013	Tuesday	1:00 PM	Deschutes	Redmond	44.26959571	-121.1753555	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1523587	1	2	4	698	June	4	2013	Tuesday	5:00 PM	Deschutes	Redmond	44.26928223	-121.191283	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1523589	1	2	2	797	June	24	2013	Monday	1:00 PM	Deschutes	Redmond	44.26924338	-121.1942969	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1523755	1	2	2	787	June	21	2013	Friday	4:00 PM	Deschutes	Redmond	44.27258964	-121.1643387	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1523854	1	1	1	724	June	10	2013	Monday	6:00 PM	Deschutes	Redmond	44.2640599	-121.1520105	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1523876	1	2	2	681	June	1	2013	Saturday	3:00 PM	Deschutes	Redmond	44.25177243	-121.1844213	Outbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1523891	1	2	2	718	June	10	2013	Monday	8:00 AM	Deschutes	Redmond	44.2620006	-121.1731638	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1523895	1	2	2	746	June	14	2013	Friday	5:00 PM	Deschutes									

1529334	1	1	1	916	July	16	2013	Tuesday	6:00 AM	Deschutes	Redmond	44.2774164	-121.1775004	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1529979	1	2	2	820	July	3	2013	Wednesday	3:00 PM	Deschutes	Redmond	44.26542499	-121.1732555	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1529986	1	2	2	872	July	8	2013	Tuesday	11:00 AM	Deschutes	Redmond	44.27508333	-121.1892507	Midblock location	Sideswipe-meeting	Property damage only crash (PDO)	Clear	Dry	Daylight
1529986	1	2	3	877	July	9	2013	Tuesday	3:00 PM	Deschutes	Redmond	44.25835569	-121.1943295	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1530024	1	2	2	891	July	11	2013	Thursday	11:00 AM	Deschutes	Redmond	44.2735419	-121.1721529	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1530026	1	2	2	898	July	12	2013	Friday	4:00 PM	Deschutes	Redmond	44.2855585	-121.1739997	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1530062	1	2	2	935	July	19	2013	Friday	7:00 AM	Deschutes	Redmond	44.27257293	-121.1698778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1530098	1	2	2	946	July	21	2013	Sunday	10:00 AM	Deschutes	Redmond	44.27801666	-121.1732166	Midblock location	Sideswipe-overtaking	Non-fatal injury crash	Clear	Dry	Daylight
1530147	1	2	2	947	July	21	2013	Sunday	8:00 PM	Deschutes	Redmond	44.26542499	-121.1732555	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1530152	1	2	2	956	July	23	2013	Tuesday	12:00 PM	Deschutes	Redmond	44.30181269	-121.1788749	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1530162	1	1	2	1000	July	29	2013	Monday	9:00 PM	Deschutes	Redmond	44.26189063	-121.2000004	Southwest Intersection Quadrant	Pedestrian	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1531247	1	2	2	1063	August	9	2013	Friday	3:00 PM	Deschutes	Redmond	44.26975102	-121.1715395	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1531253	1	2	2	1169	August	30	2013	Friday	1:00 PM	Deschutes	Redmond	44.26962985	-121.1716311	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Unknown	Unknown	Daylight
1531259	1	2	3	1138	July	18	2013	Thursday	5:00 PM	Deschutes	Redmond	44.27257293	-121.1698778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1531492	1	2	2	1069	August	10	2013	Saturday	11:00 AM	Deschutes	Redmond	44.27257293	-121.1698778	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1531517	1	2	4	1045	August	6	2013	Tuesday	4:00 PM	Deschutes	Redmond	44.25177243	-121.1844213	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1531618	1	2	2	1015	August	1	2013	Thursday	1:00 PM	Deschutes	Redmond	44.26928223	-121.191283	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Snow	Daylight
1531745	1	2	3	1090	August	14	2013	Wednesday	3:00 PM	Deschutes	Redmond	44.26942093	-121.1878229	Outbound within 50 feet	Sideswipe-overtaking	Non-fatal injury crash	Clear	Dry	Daylight
1531759	1	2	2	1078	August	11	2013	Sunday	2:00 PM	Deschutes	Redmond	44.26963035	-121.1732028	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1531789	1	2	2	1035	August	4	2013	Sunday	7:00 PM	Deschutes	Redmond	44.26992028	-121.177471	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1531796	1	2	2	1334	September	27	2013	Friday	5:00 PM	Deschutes	Redmond	44.2821916	-121.1738577	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1531933	1	1	1	1139	August	26	2013	Monday	7:00 AM	Deschutes	Redmond	44.27255507	-121.1732061	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1532345	1	2	2	1025	August	2	2013	Friday	7:00 PM	Deschutes	Redmond	44.29450071	-121.1738888	Inbound within 50 feet	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1532391	1	2	2	1065	August	9	2013	Friday	3:00 PM	Deschutes	Redmond	44.2705776	-121.1774788	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1532396	1	2	4	1079	August	12	2013	Monday	2:00 PM	Deschutes	Redmond	44.2547787	-121.1872167	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1532699	1	2	2	1123	August	22	2013	Thursday	8:00 PM	Deschutes	Redmond	44.27642256	-121.2093913	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1532719	1	3	3	1153	August	29	2013	Thursday	12:00 PM	Deschutes	Redmond	44.27256126	-121.1721324	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1532722	1	2	3	1023	August	2	2013	Friday	7:00 AM	Deschutes	Redmond	44.27257293	-121.1698778	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1535680	1	1	1	1258	September	11	2013	Wednesday	7:00 PM	Deschutes	Redmond	44.28920235	-121.1670876	Outbound within 50 feet	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Daylight
1535687	1	1	1	1176	September	2	2013	Monday	2:00 PM	Deschutes	Redmond	44.26963035	-121.1732028	Inbound within 50 feet	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Daylight
1535869	1	2	2	1318	September	25	2013	Wednesday	5:00 PM	Deschutes	Redmond	44.28920439	-121.2093361	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Cloudy	Snow	Daylight
1535871	1	2	2	1213	September	6	2013	Friday	3:00 PM	Deschutes	Redmond	44.27058883	-121.1732138	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1535872	1	2	2	1177	September	3	2013	Tuesday	10:00 PM	Deschutes	Redmond	44.26992028	-121.177471	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1535933	1	4	4	1226	September	8	2013	Sunday	1:00 PM	Deschutes	Redmond	44.25177243	-121.1844213	Southwest Intersection Quadrant	Sideswipe-meeting	Property damage only crash (PDO)	Clear	Dry	Daylight
1535947	1	2	2	1230	September	8	2013	Sunday	7:00 PM	Deschutes	Redmond	44.26920447	-121.1993511	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1535949	1	1	2	1251	September	13	2013	Friday	6:00 PM	Deschutes	Redmond	44.25770733	-121.1805087	Midblock location	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1536145	1	2	2	1328	September	26	2013	Thursday	6:00 PM	Deschutes	Redmond	44.26963035	-121.1732028	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1536146	1	2	2	1328	September	26	2013	Thursday	3:00 PM	Deschutes	Redmond	44.26193196	-121.2074648	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1536250	1	2	1	1268	September	17	2013	Thursday	4:00 PM	Deschutes	Redmond	44.26191486	-121.204373	Inbound within 50 feet	Angle	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1536305	1	4	1	1337	September	28	2013	Saturday	10:00 AM	Deschutes	Redmond	44.2583404	-121.1967722	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1536314	1	2	2	1270	September	18	2013	Wednesday	2:00 PM	Deschutes	Redmond	44.27277499	-121.1892497	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1536318	1	2	2	1267	September	10	2013	Tuesday	7:00 PM	Deschutes	Redmond	44.26805697	-121.1993568	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1536320	1	2	2	1253	September	13	2013	Friday	11:00 AM	Deschutes	Redmond	44.27158794	-121.1742876	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1536324	1	2	2	1243	September	11	2013	Wednesday	11:00 AM	Deschutes	Redmond	44.27551919	-121.1753571	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1536328	1	2	2	1244	September	11	2013	Wednesday	3:00 PM	Deschutes	Redmond	44.27259818	-121.1666297	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1536370	1	1	1	1186	September	4	2013	Wednesday	7:00 AM	Deschutes	Redmond	44.28917606	-121.1780167	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1536375	1	2	2	1196	September	5	2013	Thursday	1:00 PM	Deschutes	Redmond	44.28588886	-121.1819271	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1537837	1	1	1	1498	October	28	2013	Monday	5:00 AM	Deschutes	Redmond	44.25306165	-121.1835662	Southwest Intersection Quadrant	Non-collision	Property damage only crash (PDO)	Clear	Wet	Darkness – no street lights
1537937	1	2	2	1494	October	29	2013	Tuesday	3:00 PM	Deschutes	Redmond	44.25177243	-121.1844213	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1537940	1	2	2	1491	October	29	2013	Tuesday	7:00 PM	Deschutes	Redmond	44.26920439	-121.2093361	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1537961	1	2	2	1433	October	16	2013	Wednesday	1:00 PM	Deschutes	Redmond	44.26955225	-121.1850848	Midblock location	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1537962	1	2	3	1409	October	11	2013	Friday	1:00 PM	Deschutes	Redmond	44.26920439	-121.2093361	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1537965	1	2	2	1398	October	9	2013	Wednesday	4:00 PM	Deschutes	Redmond	44.26920439	-121.2093361	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1537971	1	2	2	1393	October	8	2013	Tuesday	1:00 PM	Deschutes	Redmond	44.26963035	-121.1732028	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1537974	1	2	3	1380	October	6	2013	Sunday	6:00 PM	Deschutes	Redmond	44.26961205	-121.1742822	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1537976	1	2	2	1375	September	22	2013	Sunday	Unknown Time	Deschutes	Redmond	44.26924338	-121.1942969	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Rain	Wet	Daylight
1538093	1	2	2	1411	October	11	2013	Friday	7:00 PM	Deschutes	Redmond	44.28899912	-121.1672747	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1538597	1	2	3	1506	October	28	2013	Monday	3:00 PM	Deschutes	Redmond	44.256602	-121.1840812	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1538601	1	2	2	1502	October	28	2013	Monday	1:00 PM	Deschutes	Redmond	44.27921718	-121.1752147	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1538606	1	2	2	1499	October	23	2013	Wednesday	9:00 AM	Deschutes	Redmond	44.27155349	-121.177479	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1538608	1	2	4	1496	June	9	2013	Sunday	2:00 PM	Deschutes	Redmond	44.26959571	-121.1753555	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1538624	1	2	2	1476	October	24	2013	Thursday	2:00 PM	Deschutes	Redmond	44.26286959	-121.1789432	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1538630	1	2	3	1468	October	23	2013	Wednesday	4:00 PM	Deschutes	Redmond	44.25452916	-121.1860905	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1538677	1	1	2	1457	October	18	2013	Friday	5:00 PM	Deschutes	Redmond	44.26881388	-121.1942971	Midblock location	Pedestrian	Non-fatal injury crash	Clear	Dry	Daylight
1538685	1	2	2	1453	October	21	2013	Monday	5:00 PM	Deschutes	Redmond	44.27645257	-121.1892509	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1538689	1	2	2	1437	October	17	2013	Thursday	8:00 AM	Deschutes	Redmond	44.2774164	-121.1775004	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1538697	1	2	2	1405	October	10	2013	Thursday	5:00 PM	Deschutes	Redmond	44.28918832	-121.1682915	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1538709	1	1	1	1376	October	5	2013	Saturday	9:00 AM	Deschutes	Redmond	44.24855302	-121.2293818	Midblock location	Non-collision	Non-fatal injury crash	Clear	Dry	Daylight
1538985	1	2	2	1432	October	15	2013	Tuesday	4:00 PM	Deschutes	Redmond	44.27553804	-121.1633562	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1539273	1	1	1	1531	November	3	2013	Sunday	2:00 AM	Deschutes	Redmond	44.25203137	-121.1842484	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
153928																			

1540568	1	3	4	1575	November	12	2013	Tuesday	5:00 PM	Deschutes	Redmond	44.26894105	-121.1882351	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1540585	1	2	3	1569	November	11	2013	Monday	11:00 AM	Deschutes	Redmond	44.25177243	-121.1844213	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1540596	1	3	4	1513	November	1	2013	Friday	3:00 PM	Deschutes	Redmond	44.27257293	-121.1698778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1540612	1	2	3	1616	November	18	2013	Monday	5:00 PM	Deschutes	Redmond	44.27083894	-121.1753566	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1540891	1	2	4	1561	November	9	2013	Saturday	3:00 PM	Deschutes	Redmond	44.26995771	-121.1753565	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1540912	1	2	2	1606	November	15	2013	Friday	6:00 PM	Deschutes	Redmond	44.26928223	-121.191283	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1541405	1	2	4	1751	December	8	2013	Sunday	1:00 PM	Deschutes	Redmond	44.26962985	-121.1716311	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Ice	Daylight
1541422	1	2	3	1778	December	10	2013	Tuesday	9:00 AM	Deschutes	Redmond	44.27058883	-121.1732138	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Ice	Daylight
1541424	1	2	2	1832	December	19	2013	Thursday	3:00 PM	Deschutes	Redmond	44.26956939	-121.1846848	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1541494	1	6	7	1839	December	19	2013	Thursday	5:00 PM	Deschutes	Redmond	44.26924338	-121.1942969	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Darkness – no street lights
1541502	1	2	2	1891	December	28	2013	Saturday	4:00 PM	Deschutes	Redmond	44.27037328	-121.1724418	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1541508	1	2	2	1900	December	31	2013	Tuesday	8:00 PM	Deschutes	Redmond	44.26958245	-121.1842675	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1541636	1	2	2	1890	December	29	2013	Friday	6:00 PM	Deschutes	Redmond	44.27383823	-121.1976188	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1541638	1	2	2	1756	December	8	2013	Sunday	1:00 PM	Deschutes	Redmond	44.27257329	-121.1698771	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Ice	Daylight
1541644	1	2	2	1759	December	9	2013	Monday	7:00 PM	Deschutes	Redmond	44.26909061	-121.1739116	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Ice	Darkness – no street lights
1541645	1	2	2	1834	December	19	2013	Thursday	12:00 PM	Deschutes	Redmond	44.25693428	-121.1810175	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1541975	1	1	1	1775	December	6	2013	Friday	6:00 PM	Deschutes	Redmond	44.26958286	-121.1840678	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Snow	Darkness – no street lights
1542172	1	1	1	1848	December	20	2013	Friday	12:00 PM	Deschutes	Redmond	44.27254939	-121.1785574	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Snow	Snow	Daylight
1542261	1	2	2	1874	December	24	2013	Tuesday	8:00 AM	Deschutes	Redmond	44.24750031	-121.1991462	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Ice	Daylight
1542276	1	2	1	1889	December	27	2013	Friday	9:00 PM	Deschutes	Redmond	44.28201666	-121.1753689	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Cloudy	Dry	Darkness – no street lights
1542279	1	2	2	1890	December	27	2013	Friday	5:00 PM	Deschutes	Redmond	44.25842836	-121.1826058	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1542280	1	2	2	1892	December	28	2013	Saturday	2:00 PM	Deschutes	Redmond	44.26372435	-121.1787897	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1542656	1	2	2	1902	December	31	2013	Tuesday	4:00 PM	Deschutes	Redmond	44.27645257	-121.1892509	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1542660	1	2	2	1904	December	31	2013	Tuesday	12:00 PM	Deschutes	Redmond	44.25244465	-121.1857587	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1542665	1	2	2	1768	December	9	2013	Monday	6:00 AM	Deschutes	Redmond	44.26404335	-121.1942637	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Snow	Ice	Darkness – no street lights
1542676	1	2	4	1772	December	10	2013	Tuesday	3:00 PM	Deschutes	Redmond	44.25830692	-121.2002965	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Ice	Daylight
1542680	1	2	2	1692	December	3	2013	Tuesday	5:00 PM	Deschutes	Redmond	44.24837152	-121.1941001	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1542858	1	3	1	1863	December	22	2013	Sunday	6:00 PM	Deschutes	Redmond	44.26633337	-121.1776291	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1542891	1	3	3	1838	December	19	2013	Thursday	3:00 PM	Deschutes	Redmond	44.24752986	-121.2233878	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1543127	1	2	2	1708	December	5	2013	Thursday	2:00 PM	Deschutes	Redmond	44.26104054	-121.1732226	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1543131	1	2	2	1706	December	5	2013	Thursday	7:00 AM	Deschutes	Redmond	44.25469614	-121.2043724	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1543139	1	2	2	1683	December	2	2013	Monday	9:00 AM	Deschutes	Redmond	44.25111126	-121.1992302	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1543161	1	2	2	1762	December	9	2013	Monday	12:00 PM	Deschutes	Redmond	44.27642256	-121.2093913	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Ice	Daylight
1543700	1	2	3	1777	December	10	2013	Tuesday	2:00 PM	Deschutes	Redmond	44.27353655	-121.1806861	NW Intersection Quadrant	Angle	Non-fatal injury crash	Rain	Ice	Daylight
1543834	1	2	2	1368	October	4	2013	Friday	11:00 AM	Deschutes	Redmond	44.2986991	-121.1695828	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1543875	1	1	1	1206	September	6	2013	Friday	9:00 PM	Deschutes	Redmond	44.24034739	-121.1930091	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1543880	1	1	1	1198	September	5	2013	Thursday	11:00 PM	Deschutes	Redmond	44.24562643	-121.1846973	Inbound within 50 feet	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1543966	1	2	1	1423	October	14	2013	Monday	1:00 PM	Deschutes	Redmond	44.28136526	-121.1848919	Inbound within 50 feet	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1543990	1	2	2	1603	November	15	2013	Friday	7:00 AM	Deschutes	Redmond	44.23934581	-121.2070449	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1544044	1	2	2	1613	November	16	2013	Saturday	1:00 PM	Deschutes	Redmond	44.28536676	-121.1917796	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1544682	1	1	1	873	July	9	2013	Tuesday	12:00 PM	Deschutes	Redmond	44.26537499	-121.1795531	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Daylight
1544893	1	2	3	227	February	16	2013	Saturday	3:00 PM	Deschutes	Redmond	44.29098233	-121.1790663	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1550467	1	2	2	35	January	10	2014	Friday	10:00 AM	Deschutes	Redmond	44.26924339	-121.194297	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1550489	1	2	2	92	January	21	2014	Tuesday	3:00 PM	Deschutes	Redmond	44.26934103	-121.1892356	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1550483	1	2	2	162	January	31	2014	Friday	4:00 PM	Deschutes	Redmond	44.26963023	-121.1732032	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1550524	1	2	5	10	January	4	2014	Saturday	4:00 PM	Deschutes	Redmond	44.27257329	-121.1698777	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1550525	1	1	31	31	January	9	2014	Thursday	12:00 AM	Deschutes	Redmond	44.26885239	-121.1870299	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Rain	Wet	Darkness – no street lights
1550540	1	2	2	9	January	4	2014	Saturday	11:00 PM	Deschutes	Redmond	44.26975131	-121.1715393	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1550547	1	2	3	78	January	18	2014	Saturday	11:00 AM	Deschutes	Redmond	44.28377665	-121.1680827	Outbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1551519	1	2	2	3	January	2	2014	Thursday	2:00 PM	Deschutes	Redmond	44.25471722	-121.2125811	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1551525	1	2	3	24	January	8	2014	Wednesday	7:00 AM	Deschutes	Redmond	44.25244465	-121.1857587	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Cloudy	Snow	Daylight
1551528	1	2	2	27	January	8	2014	Wednesday	2:00 PM	Deschutes	Redmond	44.27151667	-121.1968193	Midblock location	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1551539	1	2	2	34	January	9	2014	Thursday	4:00 PM	Deschutes	Redmond	44.25177244	-121.1844213	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1551573	1	2	2	122	January	25	2014	Saturday	8:00 AM	Deschutes	Redmond	44.29100873	-121.1638514	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Snow	Ice	Daylight
1551575	1	2	2	105	January	23	2014	Thursday	5:00 PM	Deschutes	Redmond	44.26788579	-121.1746687	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1551576	1	1	1	91	January	20	2014	Monday	2:00 PM	Deschutes	Redmond	44.23825784	-121.2131558	Midblock location	Non-collision	Property damage only crash (PDO)	Cloudy	Wet	Daylight
1551629	1	2	2	93	January	21	2014	Tuesday	1:00 PM	Deschutes	Redmond	44.26556633	-121.1853473	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1551638	1	2	2	63	January	14	2014	Tuesday	2:00 PM	Deschutes	Redmond	44.28137943	-121.1892062	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1551646	1	2	2	154	January	30	2014	Thursday	3:00 PM	Deschutes	Redmond	44.25841306	-121.1875711	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1551649	1	2	2	89	January	20	2014	Monday	9:00 AM	Deschutes	Redmond	44.26961205	-121.1742622	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Cloudy	Snow	Daylight
1551652	1	2	2	76	January	17	2014	Friday	8:00 AM	Deschutes	Redmond	44.26963023	-121.1732032	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1551666	1	2	2	39	January	10	2014	Friday	3:00 PM	Deschutes	Redmond	44.28550674	-121.1764568	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1553195	1	1	1	181	February	3	2014	Monday	10:00 AM	Deschutes	Redmond	44.30174736	-121.172408	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Cloudy	Ice	Daylight
1553220	1	2	2	354	February	28	2014	Friday	9:00 AM	Deschutes	Redmond	44.25873716	-121.1798308	Southwest Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1553227	1	2	3	285	February	17	2014	Monday	3:00 PM	Deschutes	Redmond	44.26962985	-121.1716311	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1553237	1	2	4	209	February	7	2014	Friday	3:00 PM	Deschutes	Redmond	44.27257329	-121.1698777	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Snow	Ice	Daylight
1553242	1	3	5	208	February	7	2014	Friday	3:00 PM	Deschutes	Redmond	44.25122005	-121.1848383	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Snow	Snow	Daylight
1553267	1	2	2	183	February	3	2014	Monday	4:00 PM	Deschutes	Redmond	44.25122005	-121.1848383	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1553594	1	2	3	353	February	28	2014	Friday	10:00 AM	Deschutes	Redmond	44.27058743	-121.1731892	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1553598	1	2	2	165	February	1	2014	Saturday	7:00 PM	Deschutes	Redmond	44.26959208	-121.1774715	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Darkness –

1554638	1	2	2	188	February	3	2014	Monday	7:00 AM	Deschutes	Redmond	44.23759552	-121.2123459	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Rain	Ice	Daylight
1558729	1	2	2	80061	March	18	2014	Tuesday	10:00 AM	Deschutes	Redmond	44.2909062	-121.1739116	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1559709	1	2	2	410	March	11	2014	Tuesday	4:00 PM	Deschutes	Redmond	44.26962985	-121.1716311	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1559734	1	2	2	467	March	24	2014	Monday	3:00 PM	Deschutes	Redmond	44.26927766	-121.1916381	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1559738	1	2	2	484	March	29	2014	Saturday	11:00 AM	Deschutes	Redmond	44.2699208	-121.1774715	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1559742	1	2	2	494	March	31	2014	Monday	3:00 PM	Deschutes	Redmond	44.26920439	-121.2093365	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1559749	1	1	2	451	March	20	2014	Thursday	5:00 PM	Deschutes	Redmond	44.26958287	-121.1840678	Inbound within 50 feet	Pedestrian	Non-fatal injury crash	Clear	Dry	Daylight
1559782	1	2	3	368	March	3	2014	Monday	4:00 PM	Deschutes	Redmond	44.25177244	-121.1844213	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Cloudy	Dry	Daylight
1559960	1	2	5	430	March	17	2014	Monday	2:00 PM	Deschutes	Redmond	44.26306834	-121.1769782	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1560014	1	2	2	475	March	26	2014	Wednesday	12:00 PM	Deschutes	Redmond	44.24180303	-121.1922861	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1560054	1	3	2	478	March	27	2014	Thursday	2:00 PM	Deschutes	Redmond	44.27299722	-121.174283	Midblock location	Parking Maneuver	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1560345	1	2	1	487	March	30	2014	Sunday	2:00 PM	Deschutes	Redmond	44.26535895	-121.1894528	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1560372	1	2	2	272	February	14	2014	Friday	6:00 PM	Deschutes	Redmond	44.29098233	-121.179063	Inbound within 50 feet	Angle	Non-fatal injury crash	Rain	Wet	Darkness – no street lights
1560387	1	1	1	90034	January	9	2014	Thursday	8:00 AM	Deschutes	Redmond	44.29097322	-121.1834878	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Cloudy	Ice	Daylight
1560506	1	2	2	374	February	10	2014	Monday	4:00 PM	Deschutes	Redmond	44.27257776	-121.1682198	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Ice	Daylight
1560517	1	3	3	382	March	5	2014	Wednesday	4:00 PM	Deschutes	Redmond	44.26306834	-121.1769782	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1560528	1	2	2	385	March	6	2014	Thursday	4:00 PM	Deschutes	Redmond	44.24077493	-121.1906668	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1560535	1	2	2	421	March	14	2014	Friday	10:00 AM	Deschutes	Redmond	44.26817899	-121.1866826	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1560538	1	2	2	437	March	18	2014	Tuesday	4:00 PM	Deschutes	Redmond	44.27258618	-121.1666297	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1560539	1	2	2	470	March	25	2014	Tuesday	12:00 PM	Deschutes	Redmond	44.27648678	-121.1866943	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1560584	1	2	2	400	March	8	2014	Saturday	7:00 PM	Deschutes	Redmond	44.2909865	-121.1764281	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1560570	1	2	2	376	March	4	2014	Tuesday	7:00 PM	Deschutes	Redmond	44.27256127	-121.1721324	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1560579	1	2	2	403	March	9	2014	Sunday	4:00 PM	Deschutes	Redmond	44.24296032	-121.1939744	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Rain	Wet	Daylight
1560622	1	2	2	446	March	19	2014	Wednesday	8:00 AM	Deschutes	Redmond	44.29099062	-121.1739116	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Dawn (Twilight)
1560627	1	2	2	447	March	20	2014	Thursday	6:00 PM	Deschutes	Redmond	44.25452917	-121.1860905	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1562025	1	2	2	555	April	13	2014	Sunday	10:00 AM	Deschutes	Redmond	44.26959201	-121.1795959	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1562345	1	1	1	536	April	9	2014	Wednesday	6:00 PM	Deschutes	Redmond	44.26095252	-121.1662684	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1562347	1	1	1	90536	April	9	2014	Wednesday	6:00 PM	Deschutes	Redmond	44.2666886	-121.174565	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1562351	1	2	2	537	April	9	2014	Wednesday	6:00 PM	Deschutes	Redmond	44.27733973	-121.1687484	Midblock location	Backing	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1562490	1	1	1	508	April	1	2014	Tuesday	11:00 PM	Deschutes	Redmond	44.24432013	-121.1988258	Southeast Intersection Quadrant	Fixed-Object or Other-Object	Property damage only crash (PDO)	Unknown	Unknown	Darkness – no street lights
1562751	1	2	3	519	April	6	2014	Sunday	9:00 AM	Deschutes	Redmond	44.25489615	-121.2043722	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1562815	1	2	2	550	April	12	2014	Saturday	10:00 AM	Deschutes	Redmond	44.27255649	-121.1742768	Inbound within 50 feet	Backing	Non-fatal injury crash	Clear	Dry	Daylight
1562904	1	2	2	534	April	9	2014	Wednesday	5:00 PM	Deschutes	Redmond	44.29098999	-121.1777475	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1562958	1	3	3	570	April	17	2014	Thursday	5:00 PM	Deschutes	Redmond	44.27258966	-121.1643392	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1563024	1	2	2	575	April	18	2014	Friday	2:00 PM	Deschutes	Redmond	44.24610658	-121.196709	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1563069	1	2	2	585	April	21	2014	Monday	4:00 PM	Deschutes	Redmond	44.26142331	-121.168888	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1563071	1	2	2	606	April	26	2014	Saturday	2:00 PM	Deschutes	Redmond	44.26010309	-121.181434	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Unknown	Unknown	Daylight
1563076	1	2	2	616	April	30	2014	Wednesday	5:00 PM	Deschutes	Redmond	44.26437328	-121.1996942	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1563082	1	2	2	600	April	24	2014	Thursday	1:00 PM	Deschutes	Redmond	44.265425	-121.1732556	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1563089	1	2	2	580	April	19	2014	Saturday	8:00 AM	Deschutes	Redmond	44.25831547	-121.2072646	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1563121	1	2	2	576	April	18	2014	Friday	12:00 PM	Deschutes	Redmond	44.26010309	-121.181434	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1563122	1	2	2	568	April	16	2014	Wednesday	9:00 AM	Deschutes	Redmond	44.27552157	-121.1742958	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1563156	1	1	2	601	April	24	2014	Thursday	2:00 PM	Deschutes	Redmond	44.27354325	-121.1770111	Midblock location	Pedestrian	Non-fatal injury crash	Clear	Dry	Daylight
1566276	1	1	1	663	May	9	2014	Friday	12:00 PM	Deschutes	Redmond	44.265425	-121.1732556	NW Intersection Quadrant	Fixed-Object or Other-Object	Property damage only crash (PDO)	Unknown	Unknown	Daylight
1566312	1	2	2	642	May	4	2014	Sunday	5:00 PM	Deschutes	Redmond	44.26961111	-121.1742611	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1566430	1	1	1	724	May	21	2014	Wednesday	8:00 PM	Deschutes	Redmond	44.27226811	-121.1626817	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1566454	1	2	2	714	May	19	2014	Monday	4:00 PM	Deschutes	Redmond	44.26961111	-121.1742611	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1566554	1	2	2	695	May	16	2014	Friday	12:00 PM	Deschutes	Redmond	44.25177222	-121.1844222	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1566623	1	3	3	743	May	23	2014	Friday	12:00 PM	Deschutes	Redmond	44.25177222	-121.1844222	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1566663	1	1	1	670	May	11	2014	Sunday	8:00 PM	Deschutes	Redmond	44.27257222	-121.1698778	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1567467	1	2	2	748	May	26	2014	Monday	11:00 PM	Deschutes	Redmond	44.265425	-121.1732556	Midblock location	Sideswipe-meeting	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1567476	1	2	5	764	May	29	2014	Thursday	1:00 PM	Deschutes	Redmond	44.263725	-121.1787694	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1567610	1	2	2	699	May	16	2014	Friday	9:00 AM	Deschutes	Redmond	44.25472778	-121.1992917	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1571444	1	1	1	585	April	16	2014	Thursday	4:00 AM	Deschutes	Redmond	44.27302778	-121.2093389	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1573477	1	2	3	803	June	5	2014	Thursday	9:00 PM	Deschutes	Redmond	44.27257222	-121.1698778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1573530	1	3	3	832	June	9	2014	Monday	4:00 PM	Deschutes	Redmond	44.26306944	-121.1769778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1573648	1	2	2	891	June	19	2014	Thursday	6:00 PM	Deschutes	Redmond	44.25990833	-121.1790667	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1573768	1	3	3	937	June	26	2014	Thursday	5:00 PM	Deschutes	Redmond	44.27257222	-121.1698778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1573796	1	4	4	967	June	30	2014	Monday	5:00 PM	Deschutes	Redmond	44.25938333	-121.1794056	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1573818	1	1	1	837	June	9	2014	Monday	4:00 PM	Deschutes	Redmond	44.26213056	-121.1747389	Inbound within 50 feet	Non-collision	Non-fatal injury crash	Clear	Dry	Daylight
1573850	1	2	2	896	June	19	2014	Thursday	10:00 AM	Deschutes	Redmond	44.26961111	-121.1742611	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1573926	1	2	2	950	June	27	2014	Friday	1:00 PM	Deschutes	Redmond	44.26963056	-121.1716306	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1573939	1	2	2	951	June	27	2014	Friday	11:00 AM	Deschutes	Redmond	44.26963056	-121.1716306	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1573996	1	2	2	939	June	26	2014	Thursday	11:00 PM	Deschutes	Redmond	44.272575	-121.1636361	Midblock location	Sideswipe-meeting	Non-fatal injury crash	Cloudy	Dry	Darkness – no street lights
1574130	1	2	3	939	April	16	2014	Wednesday	4:00 PM	Deschutes	Redmond	44.289675	-121.1649472	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1574139	1	1	1	452	March	20	2014	Thursday	12:00 PM	Deschutes	Redmond	44.29096944	-121.1843611	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1574706	1	2	2	797	June	4	2014	Wednesday	1:00 PM	Deschutes	Redmond	44.28104167	-121.1742972	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Unknown	Unknown	Daylight
1574709	1	2	2	820	June	8	2014	Sunday	3:00 PM	Deschutes	Redmond	44.25835556	-121.1942083	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1574737	1	2	3	835	June	9	2014	Monday	4:00 PM	Deschutes	Redmond	44.26760833	-121.1819167	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1574743	1	2	6	841	June	10	2014	Tuesday	9:00 PM	Deschutes	Redmond	44.26920556	-121.19935	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1574773	1	3	3	878	June	16	2014	Monday											

1580841	1	2	2	1115	July	29	2014	Tuesday	2:00 PM	Deschutes	Redmond	44.263725	-121.1787694	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1580851	1	2	3	984	July	3	2014	Thursday	5:00 PM	Deschutes	Redmond	44.26663611	-121.1795583	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1580853	1	2	2	985	July	3	2014	Thursday	10:00 AM	Deschutes	Redmond	44.2535	-121.1873667	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1580876	1	2	2	991	July	4	2014	Friday	3:00 PM	Deschutes	Redmond	44.26921687	-121.2093472	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1580884	1	2	1	1006	July	7	2014	Monday	5:00 PM	Deschutes	Redmond	44.27380833	-121.1942861	Inbound within 50 feet	Miscellaneous	Property damage only crash (PDO)	Clear	Dry	Daylight
1580894	1	2	2	1008	July	7	2014	Monday	6:00 PM	Deschutes	Redmond	44.24753056	-121.2293889	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1580896	1	2	2	1019	July	8	2014	Tuesday	5:00 PM	Deschutes	Redmond	44.26010278	-121.1814333	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1585203	1	1	6	1152	July	7	2014	Monday	6:00 PM	Deschutes	Redmond	44.29169167	-121.1668944	Midblock location	Non-collision	Non-fatal injury crash	Clear	Dry	Daylight
1585331	1	2	2	1257	July	11	2014	Friday	10:00 PM	Deschutes	Redmond	44.26919722	-121.2044	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1585342	1	2	4	1146	August	4	2014	Monday	4:00 PM	Deschutes	Redmond	44.26306944	-121.1769778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1585349	1	2	2	1181	July	25	2014	Friday	5:00 PM	Deschutes	Redmond	44.27257222	-121.1698778	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1585372	1	1	1	1211	August	15	2014	Friday	7:00 AM	Deschutes	Redmond	44.26306944	-121.1851333	Midblock location	Miscellaneous	Property damage only crash (PDO)	Clear	Dry	Daylight
1586472	1	3	3	1128	August	1	2014	Friday	7:00 AM	Deschutes	Redmond	44.25453056	-121.1860917	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1586475	1	2	2	1130	August	1	2014	Friday	11:00 AM	Deschutes	Redmond	44.263725	-121.1787694	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1586496	1	2	3	1132	August	1	2014	Friday	4:00 PM	Deschutes	Redmond	44.29075556	-121.173925	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1586524	1	2	2	1139	August	3	2014	Sunday	6:00 PM	Deschutes	Redmond	44.26961111	-121.1742611	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1586542	1	2	2	1176	August	8	2014	Friday	8:00 PM	Deschutes	Redmond	44.25243333	-121.1857583	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1586581	1	2	2	1202	August	14	2014	Thursday	12:00 AM	Deschutes	Redmond	44.27741667	-121.171775	Inbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Unknown	Unknown	Darkness – no street lights
1586604	1	2	2	1234	August	19	2014	Tuesday	10:00 AM	Deschutes	Redmond	44.276525	-121.1721361	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1587821	1	2	2	1131	August	1	2014	Friday	7:00 PM	Deschutes	Redmond	44.24016667	-121.1882861	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1587825	1	4	1	1179	August	9	2014	Saturday	1:00 AM	Deschutes	Redmond	44.27723056	-121.1985917	Midblock location	Sideways-meeting	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1587927	1	2	2	1204	August	14	2014	Thursday	3:00 PM	Deschutes	Redmond	44.27279722	-121.1993306	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Rain	Wet	Daylight
1592271	1	1	3	1382	September	15	2014	Monday	9:00 PM	Deschutes	Redmond	44.26134444	-121.1584222	Outbound within 50 feet	Non-collision	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1592366	1	1	1	1423	September	24	2014	Wednesday	4:00 PM	Deschutes	Redmond	44.26808889	-121.1785083	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Rain	Wet	Daylight
1592436	1	2	5	1412	September	22	2014	Monday	4:00 PM	Deschutes	Redmond	44.27643056	-121.1957806	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1592541	1	2	2	1417	September	24	2014	Wednesday	2:00 PM	Deschutes	Redmond	44.26928333	-121.1912833	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Unknown	Unknown	Daylight
1592655	1	2	2	1425	September	24	2014	Wednesday	12:00 PM	Deschutes	Redmond	44.27255556	-121.1732056	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Cloudy	Snow	Daylight
1592689	1	1	2	1454	September	29	2014	Monday	7:00 AM	Deschutes	Redmond	44.27643611	-121.1942778	Inbound within 50 feet	Pedestrian	Non-fatal injury crash	Clear	Dry	Daylight
1592699	1	2	2	1429	September	25	2014	Thursday	2:00 PM	Deschutes	Redmond	44.27228389	-121.1721278	Midblock location	Parking Maneuver	Property damage only crash (PDO)	Clear	Dry	Daylight
1592755	1	2	1	1393	September	18	2014	Thursday	7:00 PM	Deschutes	Redmond	44.27832778	-121.1968944	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1592835	1	2	2	1420	September	24	2014	Wednesday	10:00 PM	Deschutes	Redmond	44.27255833	-121.1732111	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Rain	Wet	Darkness – no street lights
1592838	1	2	2	1428	September	25	2014	Thursday	5:00 PM	Deschutes	Redmond	44.26959167	-121.1795972	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1592883	1	2	3	1378	September	15	2014	Monday	6:00 PM	Deschutes	Redmond	44.26565	-121.1795611	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1592999	1	2	1	1353	September	10	2014	Wednesday	7:00 AM	Deschutes	Redmond	44.26662222	-121.182275	NW Intersection Quadrant	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1593009	1	2	2	1356	September	11	2014	Thursday	11:00 AM	Deschutes	Redmond	44.26459444	-121.1771778	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1593284	1	2	2	1312	September	3	2014	Wednesday	9:00 AM	Deschutes	Redmond	44.27257222	-121.1702611	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1593768	1	2	2	1456	September	30	2014	Tuesday	5:00 PM	Deschutes	Redmond	44.24189167	-121.1936861	Southwest Intersection Quadrant	Miscellaneous	Property damage only crash (PDO)	Clear	Dry	Daylight
1593772	1	2	2	1383	September	16	2014	Tuesday	12:00 PM	Deschutes	Redmond	44.27241944	-121.1696983	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1593779	1	2	2	1407	September	21	2014	Sunday	11:00 AM	Deschutes	Redmond	44.25318056	-121.1834889	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1593789	1	2	2	1355	September	11	2014	Thursday	9:00 AM	Deschutes	Redmond	44.23783611	-121.1976194	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1593792	1	2	2	1335	September	7	2014	Sunday	4:00 PM	Deschutes	Redmond	44.26909167	-121.1739111	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1593846	1	3	4	1301	September	2	2014	Tuesday	4:00 PM	Deschutes	Redmond	44.26306944	-121.1769778	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1593897	1	2	2	1387	September	16	2014	Tuesday	12:00 PM	Deschutes	Redmond	44.26958333	-121.1840667	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1593910	1	3	3	1411	September	22	2014	Monday	5:00 PM	Deschutes	Redmond	44.26948056	-121.1866944	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1593918	1	2	2	1424	September	24	2014	Wednesday	12:00 PM	Deschutes	Redmond	44.26961111	-121.1742611	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Rain	Wet	Daylight
1596377	1	1	1	1651	October	17	2014	Friday	5:00 PM	Deschutes	Redmond	44.27003333	-121.1720333	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Rain	Wet	Daylight
1596528	1	2	2	1532	October	12	2014	Sunday	9:00 AM	Deschutes	Redmond	44.27058889	-121.1732139	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1596549	1	2	2	1523	September	5	2014	Friday	7:00 AM	Deschutes	Redmond	44.26958333	-121.1840667	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1596553	1	2	2	1506	October	8	2014	Wednesday	6:00 PM	Deschutes	Redmond	44.26961111	-121.1742611	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1596562	1	2	2	1605	October	24	2014	Friday	4:00 PM	Deschutes	Redmond	44.26959167	-121.1774722	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1596567	1	2	2	1655	October	30	2014	Thursday	7:00 AM	Deschutes	Redmond	44.26909167	-121.1739111	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Cloudy	Wet	Daylight
1596594	1	2	2	1631	October	26	2014	Sunday	1:00 PM	Deschutes	Redmond	44.26975	-121.1715389	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1596773	1	2	2	1568	October	18	2014	Saturday	11:00 AM	Deschutes	Redmond	44.26975	-121.1715389	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1596876	1	4	4	1652	October	30	2014	Thursday	3:00 PM	Deschutes	Redmond	44.26821944	-121.1801722	Southwest Intersection Quadrant	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1596883	1	3	3	1538	October	13	2014	Monday	5:00 PM	Deschutes	Redmond	44.26306944	-121.1769778	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1597037	1	2	2	1600	October	23	2014	Thursday	6:00 AM	Deschutes	Redmond	44.26958611	-121.1813611	Inbound within 50 feet	Angle	Non-fatal injury crash	Rain	Wet	Dawn (Twilight)
1597101	1	2	2	1603	October	23	2014	Thursday	2:00 PM	Deschutes	Redmond	44.26909167	-121.1739111	Inbound within 50 feet	Backing	Property damage only crash (PDO)	Clear	Dry	Daylight
1597356	1	2	2	1463	October	1	2014	Wednesday	2:00 PM	Deschutes	Redmond	44.27318056	-121.1732028	Midblock location	Sideways-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1597361	1	2	2	1464	October	1	2014	Wednesday	5:00 PM	Deschutes	Redmond	44.26268333	-121.177225	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Unknown	Unknown	Dusk (Twilight)
1597840	1	2	2	1517	October	10	2014	Friday	1:00 PM	Deschutes	Redmond	44.26458056	-121.1772222	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1597855	1	1	2	1520	October	10	2014	Friday	1:00 PM	Deschutes	Redmond	44.28202778	-121.1732333	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1597913	1	2	2	1541	October	13	2014	Monday	9:00 AM	Deschutes	Redmond	44.269625	-121.173325	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1597916	1	2	2	1543	October	14	2014	Tuesday	4:00 PM	Deschutes	Redmond	44.27653333	-121.17215	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1598048	1	2	2	1585	October	20	2014	Monday	7:00 AM	Deschutes	Redmond	44.27058889	-121.1732083	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Dawn (Twilight)
1598061	1	2	4	1589	October	22	2014	Wednesday	7:00 AM	Deschutes	Redmond	44.27845556	-121.1892333	Midblock location	Rear-End	Non-fatal injury crash	Cloudy	Wet	Dawn (Twilight)
1598200	1	2	2	1649	October	29	2014	Wednesday	10:00 AM	Deschutes	Redmond	44.28200833	-121.1769194	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1598262	1	1	1	1670	October	15	2014	Wednesday	12:00 PM	Deschutes	Redmond	44.27785556	-121.1992694	Midblock location	Miscellaneous	Property damage only crash (PDO)	Clear	Dry	Daylight
1598429	1	2	4	1701	November	6	2014	Thursday	5:00 PM	Deschutes	Redmond	44.26909167	-121.1722	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Cloudy	Dry	Darkness – with street lights
1598445	1	2	2	1707	November	7	2014	Friday	9:00 AM	Deschutes	Redmond	44.27653611	-121.1638611	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1598451	1	2	2	1709	November	7	2014	Friday	2:00 PM	Deschutes	Redmond	44.26909222	-121.1834667	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1598456	1	3	3	1711	November	7	20												

1599530	1	2	2	1939	December	11	2014	Thursday	1:00 PM	Deschutes	Redmond	44.27058333	-121.1774833	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1599601	1	1	2	1958	December	15	2014	Monday	1:00 PM	Deschutes	Redmond	44.25098889	-121.2278917	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Fog	Ice	Daylight
1599605	1	2	3	1960	December	15	2014	Monday	5:00 PM	Deschutes	Redmond	44.26307222	-121.1769861	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1599606	1	2	3	1961	December	15	2014	Monday	1:00 PM	Deschutes	Redmond	44.26306944	-121.1769778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Unknown	Wet	Daylight
1599618	1	2	2	1963	December	15	2014	Monday	8:00 AM	Deschutes	Redmond	44.26768611	-121.1738611	Midblock location	Sideswipe-meeting	Non-fatal injury crash	Cloudy	Ice	Daylight
1599627	1	2	2	1965	December	15	2014	Monday	8:00 AM	Deschutes	Redmond	44.26975833	-121.1715417	Midblock location	Rear-End	Non-fatal injury crash	Snow	Ice	Daylight
1599637	1	1	1	1969	December	15	2014	Monday	9:00 AM	Deschutes	Redmond	44.30075833	-121.1725	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Unknown	Ice	Daylight
1599638	1	2	2	1970	December	15	2014	Monday	7:00 AM	Deschutes	Redmond	44.25177222	-121.1844222	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Ice	Darkness – with street lights
1599653	1	3	4	1972	December	15	2014	Monday	6:00 AM	Deschutes	Redmond	44.24180278	-121.1922861	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Snow	Ice	Dawn (Twilight)
1599684	1	2	2	1978	December	16	2014	Tuesday	2:00 PM	Deschutes	Redmond	44.24233333	-121.2019833	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1599705	1	1	2	1982	December	16	2014	Tuesday	12:00 AM	Deschutes	Redmond	44.24180278	-121.1922861	Outbound within 50 feet	Fixed-Object or Other-Object	Non-fatal injury crash	Snow	Ice	Darkness – with street lights
1599755	1	2	2	1999	December	19	2014	Friday	11:00 AM	Deschutes	Redmond	44.27258056	-121.1695833	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1599789	1	2	2	2008	December	20	2014	Saturday	5:00 PM	Deschutes	Redmond	44.26613889	-121.1756111	Inbound within 50 feet	Pedestrian	Non-fatal injury crash	Rain	Wet	Darkness – no street lights
1599817	1	2	3	2011	December	21	2014	Sunday	5:00 PM	Deschutes	Redmond	44.26846389	-121.174	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1599835	1	2	3	2018	December	22	2014	Monday	8:00 AM	Deschutes	Redmond	44.26961389	-121.1742639	NW Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1599837	1	2	2	2019	December	22	2014	Monday	5:00 PM	Deschutes	Redmond	44.26373056	-121.1787667	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1599901	1	2	2	2043	December	25	2014	Thursday	7:00 PM	Deschutes	Redmond	44.26975556	-121.1715528	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1599925	1	2	3	2052	December	26	2014	Friday	10:00 PM	Deschutes	Redmond	44.28202778	-121.1743056	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1599930	1	3	1	2053	December	26	2014	Friday	9:00 PM	Deschutes	Redmond	44.27333889	-121.1753472	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1600030	1	2	2	2071	December	29	2014	Monday	1:00 PM	Deschutes	Redmond	44.26142222	-121.1688889	Inbound within 50 feet	Turning Movement	Non-fatal injury crash	Snow	Snow	Daylight
1600067	1	2	2	2085	December	29	2014	Monday	9:00 AM	Deschutes	Redmond	44.26924444	-121.1943056	Inbound within 50 feet	Turning Movement	Non-fatal injury crash	Snow	Ice	Daylight
1600087	1	2	2	2093	December	29	2014	Monday	12:00 PM	Deschutes	Redmond	44.27652222	-121.1753417	NW Intersection Quadrant	Angle	Non-fatal injury crash	Snow	Ice	Daylight
1600114	1	2	2	2105	December	29	2014	Monday	8:00 AM	Deschutes	Redmond	44.26142222	-121.1688889	Inbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Snow	Ice	Daylight
1600167	1	2	2	2109	December	29	2014	Monday	10:00 AM	Deschutes	Redmond	44.26142222	-121.1688889	Inbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Ice	Daylight
1600175	1	2	2	2115	December	29	2014	Monday	7:00 AM	Deschutes	Redmond	44.24411944	-121.1988056	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Snow	Ice	Dawn (Twilight)
1600185	1	2	2	2118	December	29	2014	Monday	1:00 PM	Deschutes	Redmond	44.27256111	-121.1721333	Inbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Snow	Ice	Daylight
1600200	1	2	3	2121	December	30	2014	Tuesday	1:00 PM	Deschutes	Redmond	44.26307222	-121.1769778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Ice	Daylight
1600262	1	2	2	2132	December	30	2014	Tuesday	3:00 PM	Deschutes	Redmond	44.27791389	-121.1742917	Midblock location	Turning Movement	Property damage only crash (PDO)	Unknown	Unknown	Dusk (Twilight)
1600277	1	2	2	2137	December	31	2014	Wednesday	3:00 PM	Deschutes	Redmond	44.26983333	-121.1716306	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Ice	Daylight
1600314	1	2	2	2149	December	22	2014	Monday	4:00 PM	Deschutes	Redmond	44.24504722	-121.1866917	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1600839	1	2	2	2126	December	30	2014	Tuesday	4:00 PM	Deschutes	Redmond	44.26186944	-121.1562026	Midblock location	Sideswipe-meeting	Non-fatal injury crash	Snow	Ice	Dusk (Twilight)
1600845	1	1	1	1505	August	16	2014	Saturday	8:00 PM	Deschutes	Redmond	44.27641667	-121.2043167	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1600849	1	2	6	1558	October	16	2014	Thursday	5:00 PM	Deschutes	Redmond	44.25841944	-121.1840167	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1600854	1	1	1	1608	October	24	2014	Friday	4:00 PM	Deschutes	Redmond	44.24978333	-121.1922806	NE Intersection Quadrant	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Daylight
1600867	1	2	1	1699	October	14	2014	Tuesday	2:00 PM	Deschutes	Redmond	44.25109167	-121.2043194	Outbound within 50 feet	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1600868	1	1	1	1777	November	15	2014	Saturday	4:00 PM	Deschutes	Redmond	44.28734722	-121.18915	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Snow	Ice	Daylight
1600878	1	1	1	1861	December	2	2014	Tuesday	7:00 PM	Deschutes	Redmond	44.2819	-121.1952472	Southeast Intersection Quadrant	Fixed-Object or Other-Object	Property damage only crash (PDO)	Fog	Unknown	Darkness – no street lights
1600883	1	2	1	1921	December	7	2014	Sunday	9:00 PM	Deschutes	Redmond	44.30339722	-121.1846861	Midblock location	Rear-End	Non-fatal injury crash	Rain	Wet	Darkness – no street lights
1600794	1	2	3	32	January	5	2015	Monday	9:00 AM	Deschutes	Redmond	44.26928333	-121.1912833	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1607118	1	2	2	34	January	6	2015	Tuesday	3:00 PM	Deschutes	Redmond	44.28430278	-121.1740972	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1607141	1	2	2	45	January	7	2015	Wednesday	8:00 AM	Deschutes	Redmond	44.27058611	-121.1742639	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Dawn (Twilight)
1607683	1	2	2	96	January	19	2015	Monday	3:00 PM	Deschutes	Redmond	44.27058889	-121.1732139	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1607738	1	2	2	106	January	21	2015	Wednesday	7:00 PM	Deschutes	Redmond	44.27058611	-121.1742639	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1607790	1	2	2	58	January	10	2015	Saturday	12:00 PM	Deschutes	Redmond	44.26963056	-121.1716306	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1607807	1	1	1	116	January	24	2015	Saturday	4:00 PM	Deschutes	Redmond	44.26920278	-121.2085472	Inbound within 50 feet	Non-collision	Non-fatal injury crash	Clear	Dry	Daylight
1608053	1	2	5	131	January	30	2015	Friday	9:00 AM	Deschutes	Redmond	44.26959167	-121.1736572	NW Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1608591	1	2	3	180	February	7	2015	Saturday	12:00 PM	Deschutes	Redmond	44.26959167	-121.177825	Southeast Intersection Quadrant	Sideswipe-overtaking	Non-fatal injury crash	Clear	Dry	Daylight
1608620	1	3	3	174	February	11	2015	Wednesday	1:00 PM	Deschutes	Redmond	44.25177222	-121.1844222	Inbound within 50 feet	Sideswipe-overtaking	Non-fatal injury crash	Clear	Dry	Daylight
1608641	1	2	2	172	February	9	2015	Monday	6:00 PM	Deschutes	Redmond	44.26934167	-121.1892361	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1608942	1	2	4	235	February	25	2015	Wednesday	5:00 PM	Deschutes	Redmond	44.26928333	-121.1912833	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1608992	1	2	2	197	February	15	2015	Sunday	3:00 AM	Deschutes	Redmond	44.30075833	-121.1706139	Outbound within 50 feet	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1611989	1	2	2	308	March	10	2015	Tuesday	7:00 PM	Deschutes	Redmond	44.27058611	-121.1742639	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1611998	1	2	5	325	March	15	2015	Sunday	6:00 PM	Deschutes	Redmond	44.27058611	-121.1742639	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1612066	1	2	6	323	March	14	2015	Saturday	11:00 AM	Deschutes	Redmond	44.27057778	-121.1774778	NE Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1612190	1	2	2	336	March	17	2015	Tuesday	5:00 PM	Deschutes	Redmond	44.26088056	-121.1739167	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1612459	1	2	3	350	March	21	2015	Saturday	9:00 AM	Deschutes	Redmond	44.27057778	-121.1774778	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1612514	1	2	3	363	March	20	2015	Friday	12:00 PM	Deschutes	Redmond	44.26963056	-121.1716306	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Unknown	Daylight
1612607	1	2	5	383	March	28	2015	Saturday	10:00 PM	Deschutes	Redmond	44.2819	-121.1843361	Midblock location	Rear-End	Non-fatal injury crash	Cloudy	Dry	Darkness – with street lights
1613044	1	2	3	407	April	1	2015	Wednesday	5:00 PM	Deschutes	Redmond	44.26928333	-121.1912833	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1613086	1	2	2	438	April	7	2015	Tuesday	5:00 PM	Deschutes	Redmond	44.28314167	-121.1732417	Midblock location	Sideswipe-overtaking	Non-fatal injury crash	Rain	Wet	Dusk (Twilight)
1613172	1	2	4	442	April	8	2015	Wednesday	7:00 PM	Deschutes	Redmond	44.25318889	-121.1834833	Inbound within 50 feet	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1613457	1	2	2	497	April	17	2015	Friday	10:00 AM	Deschutes	Redmond	44.26959167	-121.1795869	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1613560	1	2	2	496	February	6	2015	Friday	11:00 AM	Deschutes	Redmond	44.24816944	-121.1875306	Southwest Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1613634	1	3	3	528	April	24	2015	Friday	10:00 PM	Deschutes	Redmond	44.27271111	-121.1698139	Southwest Intersection Quadrant	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1616345	1	2	3	595	May	6	2015	Wednesday	6:00 AM	Deschutes	Redmond	44.26959167	-121.1795972	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Dawn (Twilight)
1616363	1	3	4	560	May	1	2015	Friday	4:00 PM	Deschutes	Redmond	44.25228611	-121.1840778	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1616410	1	1	2	589	May	5	2015	Tuesday	12:00 PM	Deschutes	Redmond	44.25318889	-121.1834833	Midblock location	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1616660	1	2	2	642	May	12	2015	Tuesday	7:00 AM	Deschutes	Redmond	44.26306944	-121.1769778	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Wet	Daylight
1616712	1	3	3	649	May	15	2015	Friday	4:00 PM	Deschutes	Redmond	44.26934444	-121.1718833	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1616723	1	2	2	653	May	15	2015	Friday	1:00 PM	Deschutes	Redmond	44.27652778	-121.174275	Southwest Intersection Quadrant	Pedestrian	Non-fatal injury crash	Clear	Dry	Daylight

1621274	1	3	7	1260	August	31	2015	Monday	3:00 PM	Deschutes	Redmond	44.25344722	-121.1833111	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1622780	1	3	3	1281	September	3	2015	Thursday	7:00 AM	Deschutes	Redmond	44.27257222	-121.1698778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1623027	1	2	2	1311	September	4	2015	Friday	11:00 AM	Deschutes	Redmond	44.26975	-121.1715389	NW Intersection Quadrant	Sideswipe-overtaking	Non-fatal injury crash	Clear	Dry	Daylight
1623660	1	2	3	1318	September	12	2015	Saturday	12:00 PM	Deschutes	Redmond	44.26959167	-121.1774722	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1623814	1	2	4	1354	September	16	2015	Wednesday	11:00 AM	Deschutes	Redmond	44.27741111	-121.1742806	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1623819	1	2	2	1356	September	16	2015	Wednesday	11:00 AM	Deschutes	Redmond	44.26920556	-121.2093361	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1623826	1	2	3	1358	September	16	2015	Wednesday	10:00 PM	Deschutes	Redmond	44.23724167	-121.1982083	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1624778	1	2	3	1406	September	26	2015	Saturday	7:00 PM	Deschutes	Redmond	44.26959167	-121.1774722	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1624789	1	2	2	1413	September	27	2015	Sunday	11:00 AM	Deschutes	Redmond	44.28104167	-121.1742972	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1624795	1	2	2	1420	September	28	2015	Monday	12:00 PM	Deschutes	Redmond	44.262675	-121.1772444	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1624802	1	2	2	1421	September	28	2015	Monday	3:00 PM	Deschutes	Redmond	44.26920556	-121.19935	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1624967	1	2	3	1386	September	22	2015	Tuesday	7:00 PM	Deschutes	Redmond	44.28918056	-121.1740056	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1625149	1	2	2	1438	October	1	2015	Thursday	4:00 PM	Deschutes	Redmond	44.26228333	-121.1775139	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1625167	1	2	3	1480	October	6	2015	Tuesday	10:00 AM	Deschutes	Redmond	44.27257222	-121.1698778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1625431	1	2	2	1505	October	12	2015	Monday	4:00 AM	Deschutes	Redmond	44.26306944	-121.1769778	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1625607	1	2	3	1557	October	14	2015	Wednesday	2:00 PM	Deschutes	Redmond	44.27011111	-121.1712944	Southeast Intersection Quadrant	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1625612	1	2	2	1558	October	20	2015	Tuesday	2:00 PM	Deschutes	Redmond	44.26958889	-121.1805778	Southwest Intersection Quadrant	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1625619	1	2	5	1591	October	24	2015	Saturday	3:00 PM	Deschutes	Redmond	44.2945	-121.1738889	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1625739	1	2	3	1612	October	28	2015	Wednesday	11:00 AM	Deschutes	Redmond	44.26920556	-121.19915	Southeast Intersection Quadrant	Rear-End	Non-fatal injury crash	Rain	Wet	Daylight
1625969	1	2	2	1633	November	1	2015	Sunday	6:00 PM	Deschutes	Redmond	44.24296111	-121.193975	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1625969	1	3	3	1635	November	2	2015	Monday	12:00 PM	Deschutes	Redmond	44.262675	-121.1772444	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1625984	1	2	2	1656	November	4	2015	Wednesday	3:00 PM	Deschutes	Redmond	44.26928333	-121.1912833	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1625996	1	2	2	1672	November	6	2015	Friday	8:00 AM	Deschutes	Redmond	44.26306944	-121.1769778	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1626004	1	2	15	1676	November	6	2015	Friday	8:00 PM	Deschutes	Redmond	44.25680278	-121.1811056	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1626017	1	2	3	1685	November	8	2015	Sunday	4:00 PM	Deschutes	Redmond	44.27058611	-121.1742639	NE Intersection Quadrant	Angle	Non-fatal injury crash	Rain	Wet	Dusk (Twilight)
1626021	1	2	4	1693	November	9	2015	Monday	12:00 PM	Deschutes	Redmond	44.26961111	-121.1742611	NE Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1626200	1	3	3	1714	November	11	2015	Wednesday	1:00 PM	Deschutes	Redmond	44.26975	-121.1715389	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Cloudy	Dry	Daylight
1626229	1	2	2	1723	November	13	2015	Friday	4:00 PM	Deschutes	Redmond	44.24985556	-121.1859222	Southeast Intersection Quadrant	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1626445	1	2	2	1780	November	18	2015	Wednesday	3:00 PM	Deschutes	Redmond	44.26924167	-121.1945	Outbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1626449	1	2	2	1771	November	19	2015	Thursday	3:00 PM	Deschutes	Redmond	44.26983333	-121.1840867	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
162698	1	2	2	90	January	18	2015	Sunday	8:00 AM	Deschutes	Redmond	44.27058611	-121.1742639	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1627004	1	2	2	95	January	19	2015	Monday	9:00 AM	Deschutes	Redmond	44.25770556	-121.1805111	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1627071	1	2	2	540	April	27	2015	Monday	2:00 PM	Deschutes	Redmond	44.26958333	-121.1840667	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Daylight
1627114	1	2	2	580	December	8	2015	Tuesday	10:00 AM	Deschutes	Redmond	44.26961111	-121.1742611	NE Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1627124	1	2	2	1991	December	10	2015	Thursday	9:00 PM	Deschutes	Redmond	44.25409167	-121.1828889	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1627185	1	2	3	1187	August	16	2015	Sunday	11:00 AM	Deschutes	Redmond	44.26920556	-121.2093361	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1627201	1	2	3	1752	November	20	2015	Friday	7:00 PM	Deschutes	Redmond	44.25099167	-121.1739111	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1627353	1	2	3	2058	December	18	2015	Friday	3:00 AM	Deschutes	Redmond	44.271525	-121.1819583	Southeast Intersection Quadrant	Head On	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1627464	1	2	2	2054	December	18	2015	Friday	12:00 PM	Deschutes	Redmond	44.28918056	-121.1740056	Inbound within 50 feet	Backing	Non-fatal injury crash	Clear	Dry	Daylight
1627737	1	2	3	2135	December	26	2015	Saturday	11:00 AM	Deschutes	Redmond	44.26306944	-121.1769778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1628006	1	3	2	2159	December	29	2015	Tuesday	6:00 PM	Deschutes	Redmond	44.28175833	-121.1732306	Midblock location	Sideswipe-overtaking	Non-fatal injury crash	Clear	Wet	Darkness – no street lights
1628017	1	2	2	2168	December	30	2015	Wednesday	8:00 PM	Deschutes	Redmond	44.26975	-121.1715389	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Fog	Dry	Darkness – no street lights
1629054	1	2	2	13	January	2	2015	Friday	8:00 AM	Deschutes	Redmond	44.27058611	-121.1742639	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Snow	Daylight
1629076	1	2	2	23	January	3	2015	Saturday	6:00 PM	Deschutes	Redmond	44.2945	-121.1738889	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1631394	1	2	2	107	January	21	2015	Wednesday	6:00 PM	Deschutes	Redmond	44.247525	-121.1881583	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Cloudy	Dry	Darkness – with street lights
1631607	1	1	1	145	February	5	2015	Thursday	10:00 PM	Deschutes	Redmond	44.30489167	-121.1731	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1631623	1	2	2	146	February	5	2015	Thursday	4:00 PM	Deschutes	Redmond	44.26927222	-121.174	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1631626	1	2	2	153	February	4	2015	Wednesday	12:00 PM	Deschutes	Redmond	44.25886667	-121.1797472	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1631634	1	2	2	161	February	7	2015	Saturday	11:00 AM	Deschutes	Redmond	44.26961111	-121.1742611	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1631640	1	2	2	168	February	10	2015	Tuesday	4:00 PM	Deschutes	Redmond	44.26929722	-121.1907722	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1631643	1	2	2	177	February	11	2015	Wednesday	5:00 PM	Deschutes	Redmond	44.24201389	-121.1935667	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1631994	1	2	2	216	February	19	2015	Thursday	2:00 PM	Deschutes	Redmond	44.28961389	-121.1671861	Southwest Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1632243	1	2	2	272	March	3	2015	Tuesday	6:00 PM	Deschutes	Redmond	44.2692	-121.2039806	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1632248	1	2	2	273	March	3	2015	Tuesday	4:00 PM	Deschutes	Redmond	44.259125	-121.173675	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1632264	1	2	2	286	March	2	2015	Monday	3:00 PM	Deschutes	Redmond	44.27041944	-121.1813056	Outbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1632268	1	2	2	298	March	9	2015	Monday	3:00 PM	Deschutes	Redmond	44.26961111	-121.1742611	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1632823	1	2	2	313	March	12	2015	Thursday	3:00 PM	Deschutes	Redmond	44.26959167	-121.1774722	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1632828	1	2	2	321	March	14	2015	Saturday	12:00 PM	Deschutes	Redmond	44.25228611	-121.1840778	Southwest Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1632767	1	2	2	346	March	20	2015	Friday	4:00 PM	Deschutes	Redmond	44.28883056	-121.1673	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1632792	1	2	2	377	March	26	2015	Thursday	1:00 PM	Deschutes	Redmond	44.27255556	-121.1742778	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1632797	1	2	2	386	March	29	2015	Sunday	12:00 PM	Deschutes	Redmond	44.27226944	-121.1700389	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1632802	1	2	2	397	March	30	2015	Monday	7:00 AM	Deschutes	Redmond	44.26958056	-121.1836472	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1632810	1	1	1	399	March	31	2015	Tuesday	5:00 PM	Deschutes	Redmond	44.27258611	-121.1641028	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1636955	1	2	2	481	April	14	2015	Tuesday	11:00 AM	Deschutes	Redmond	44.24972222	-121.1860389	Southeast Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1637298	1	1	1	531	April	25	2015	Saturday	4:00 AM	Deschutes	Redmond	44.26958889	-121.1805778	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1637414	1	1	1	554	April	30	2015	Thursday	3:00 PM	Deschutes	Redmond	44.272575	-121.1694389	NW Intersection Quadrant	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1637565	1	2	2	561	May	2	2015	Saturday	4:00 PM	Deschutes	Redmond	44.26958889	-121.180775	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1637573	1	2	2	571	May	3	2015	Sunday	3:00 PM	Deschutes	Redmond	44.26961111	-121.1742611	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1637941	1	2	2	676	May	21	2015	Thursday	4:00 PM	Deschutes	Redmond	44.24517222	-121.1904583	Midblock location	Rear-End	Property damage only crash (PDO)	Rain	Wet	Daylight
1638857	1	2	2	778	June	10	2015	Wednesday	5:00 PM	Deschutes	Redmond	44.28576333	-121.1714	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
163905	1	2	2	844	June	19	2												

1641293	1	2	2	1296	September	6	2015	Sunday	2:00 PM	Deschutes	Redmond	44.26958333	-121.1840667	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1641679	1	2	2	1450	October	2	2015	Friday	8:00 AM	Deschutes	Redmond	44.28883056	-121.1673	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1641689	1	2	2	1440	October	1	2015	Thursday	12:00 PM	Deschutes	Redmond	44.269425	-121.1732556	Southeast Intersection Quadrant	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1641705	1	2	2	1468	October	5	2015	Monday	9:00 AM	Deschutes	Redmond	44.25383333	-121.1835683	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1641828	1	1	1	1503	October	12	2015	Monday	9:00 AM	Deschutes	Redmond	44.28099167	-121.1939111	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1641839	1	2	2	1500	October	12	2015	Monday	5:00 PM	Deschutes	Redmond	44.30138056	-121.1719833	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1641847	1	2	2	1510	October	13	2015	Tuesday	9:00 AM	Deschutes	Redmond	44.26429444	-121.1761667	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1641999	1	2	2	1552	October	19	2015	Monday	9:00 AM	Deschutes	Redmond	44.26963056	-121.1716306	Outbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1642004	1	2	2	1575	October	22	2015	Thursday	7:00 AM	Deschutes	Redmond	44.25177222	-121.1844222	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1642099	1	1	1	1642	October	17	2015	Saturday	5:00 AM	Deschutes	Redmond	44.28883056	-121.1673	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Rain	Wet	Darkness – with street lights
1642226	1	2	2	1652	November	1	2015	Sunday	5:00 PM	Deschutes	Redmond	44.26921667	-121.1977333	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1642240	1	2	2	1660	November	4	2015	Wednesday	1:00 PM	Deschutes	Redmond	44.263975	-121.1715389	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Unknown	Unknown	Daylight
1642244	1	2	2	1666	November	5	2015	Thursday	3:00 PM	Deschutes	Redmond	44.24280833	-121.1929861	Southeast Intersection Quadrant	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1642506	1	1	1	1735	November	14	2015	Saturday	10:00 PM	Deschutes	Redmond	44.28377778	-121.1698033	Inbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1642643	1	2	2	1746	November	16	2015	Monday	5:00 PM	Deschutes	Redmond	44.29821944	-121.1735853	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1642649	1	2	2	1764	November	18	2015	Wednesday	5:00 PM	Deschutes	Redmond	44.26228333	-121.1775139	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1642652	1	3	3	1781	November	20	2015	Friday	4:00 PM	Deschutes	Redmond	44.26910833	-121.1721056	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1642658	1	2	2	1788	November	21	2015	Saturday	12:00 PM	Deschutes	Redmond	44.25149722	-121.1846333	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1642810	1	2	2	1791	November	23	2015	Monday	10:00 AM	Deschutes	Redmond	44.27155833	-121.1742889	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1643119	1	2	2	1888	November	28	2015	Saturday	9:00 AM	Deschutes	Redmond	44.28555833	-121.1714	Inbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Cloudy	Ice	Daylight
1643124	1	2	2	1894	November	28	2015	Saturday	12:00 PM	Deschutes	Redmond	44.27255556	-121.1742778	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Cloudy	Ice	Daylight
1643134	1	2	2	1908	November	30	2015	Monday	11:00 AM	Deschutes	Redmond	44.28736944	-121.1740028	Inbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1643205	1	1	1	1920	November	29	2015	Sunday	1:00 PM	Deschutes	Redmond	44.30249444	-121.1729778	Midblock location	Non-collision	Property damage only crash (PDO)	Clear	Ice	Daylight
1643278	1	2	2	2145	November	25	2015	Wednesday	5:00 PM	Deschutes	Redmond	44.25177222	-121.1844222	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Ice	Dusk (Twilight)
1643344	1	2	2	1929	December	1	2015	Tuesday	11:00 AM	Deschutes	Redmond	44.29388056	-121.1738917	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Snow	Ice	Daylight
1643371	1	2	2	1962	December	5	2015	Saturday	1:00 PM	Deschutes	Redmond	44.26958889	-121.180775	NE Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1643463	1	2	2	1985	December	9	2015	Wednesday	1:00 PM	Deschutes	Redmond	44.265425	-121.1732556	Unknown	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1643468	1	2	2	1994	December	10	2015	Thursday	4:00 PM	Deschutes	Redmond	44.26375	-121.1765278	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Dusk (Twilight)
1643790	1	2	2	2095	December	21	2015	Monday	8:00 PM	Deschutes	Redmond	44.27255556	-121.1732056	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1643792	1	2	2	2102	December	22	2015	Tuesday	5:00 PM	Deschutes	Redmond	44.25177222	-121.1844222	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1643801	1	2	2	2104	December	22	2015	Tuesday	10:00 PM	Deschutes	Redmond	44.28920556	-121.19355	Southwest Intersection Quadrant	Sideswipe-meeting	Property damage only crash (PDO)	Snow	Ice	Darkness – no street lights
1643857	1	2	2	2132	December	25	2015	Friday	8:00 AM	Deschutes	Redmond	44.27921111	-121.1742917	Southeast Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Ice	Daylight
1644022	1	2	2	2169	December	30	2015	Wednesday	7:00 AM	Deschutes	Redmond	44.24046389	-121.1950639	Midblock location	Turning Movement	Property damage only crash (PDO)	Cloudy	Snow	Daylight
1607753	1	2	2	109	January	21	2015	Wednesday	5:00 PM	Deschutes	Redmond	44.24546944	-121.1974639	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1613050	1	2	4	423	April	5	2015	Sunday	1:00 PM	Deschutes	Redmond	44.25842778	-121.1826056	NE Intersection Quadrant	Rear-End	Non-fatal injury crash	Cloudy	Dry	Daylight
1613072	1	2	2	436	April	7	2015	Tuesday	1:00 PM	Deschutes	Redmond	44.24431944	-121.198825	NE Intersection Quadrant	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1616325	1	2	2	562	May	2	2015	Saturday	10:00 PM	Deschutes	Redmond	44.25386389	-121.1869139	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1617124	1	2	3	690	May	23	2015	Saturday	4:00 PM	Deschutes	Redmond	44.28093889	-121.1891472	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1617688	1	2	2	753	June	5	2015	Friday	3:00 PM	Deschutes	Redmond	44.27886944	-121.1992611	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1619323	1	2	2	928	July	1	2015	Wednesday	6:00 PM	Deschutes	Redmond	44.24232778	-121.2019778	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1619725	1	2	3	1002	July	12	2015	Sunday	11:00 AM	Deschutes	Redmond	44.27654444	-121.1588083	Southwest Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1620842	1	1	2	1721	November	23	2015	Monday	5:00 PM	Deschutes	Redmond	44.2535	-121.1873667	Outbound within 50 feet	Pedestrian	Fatal crash	Cloudy	Dry	Darkness – with street lights
1623015	1	2	2	1303	September	8	2015	Tuesday	7:00 AM	Deschutes	Redmond	44.25830556	-121.2002972	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1624813	1	2	2	1425	September	29	2015	Tuesday	11:00 AM	Deschutes	Redmond	44.29098889	-121.1777472	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1625439	1	2	2	1517	October	15	2015	Thursday	3:00 PM	Deschutes	Redmond	44.29098889	-121.1777472	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1625447	1	2	2	1536	October	13	2015	Tuesday	7:00 PM	Deschutes	Redmond	44.2535	-121.1873667	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1625624	1	2	2	1605	October	27	2015	Tuesday	8:00 PM	Deschutes	Redmond	44.263725	-121.1876867	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Cloudy	Dry	Darkness – with street lights
1626238	1	1	2	1742	November	15	2015	Sunday	5:00 PM	Deschutes	Redmond	44.25456922	-121.1860028	Midblock location	Pedestrian	Non-fatal injury crash	Cloudy	Dry	Darkness – no street lights
1626456	1	2	3	1780	November	20	2015	Friday	12:00 PM	Deschutes	Redmond	44.24107778	-121.1911278	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1626850	1	1	3	1891	November	28	2015	Saturday	6:00 PM	Deschutes	Redmond	44.25341944	-121.1992694	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Fog	Ice	Darkness – no street lights
1627577	1	1	1	1267	August	15	2015	Saturday	10:00 PM	Deschutes	Redmond	44.24821111	-121.1732333	Outbound within 50 feet	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1628011	1	2	2	2167	December	30	2015	Wednesday	12:00 PM	Deschutes	Redmond	44.26808889	-121.1785083	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Dry	Daylight
1631593	1	2	2	140	February	1	2015	Sunday	3:00 PM	Deschutes	Redmond	44.29394444	-121.171825	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1632004	1	2	2	236	February	26	2015	Thursday	9:00 AM	Deschutes	Redmond	44.25190556	-121.1894778	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1636730	1	2	2	422	February	7	2015	Saturday	1:00 PM	Deschutes	Redmond	44.24408611	-121.1991806	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1636944	1	2	2	472	April	13	2015	Monday	12:00 PM	Deschutes	Redmond	44.26296111	-121.1786139	Inbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1637583	1	2	2	606	May	7	2015	Thursday	6:00 PM	Deschutes	Redmond	44.29100833	-121.1638528	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1637890	1	2	2	632	May	11	2015	Monday	6:00 AM	Deschutes	Redmond	44.25786944	-121.1830528	Midblock location	Rear-End	Property damage only crash (PDO)	Rain	Wet	Daylight
1640141	1	2	2	1086	July	30	2015	Thursday	12:00 PM	Deschutes	Redmond	44.26209444	-121.1791806	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1640223	1	2	2	1111	August	4	2015	Tuesday	1:00 PM	Deschutes	Redmond	44.29100833	-121.1638528	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1640504	1	2	2	1184	August	15	2015	Saturday	11:00 AM	Deschutes	Redmond	44.26209444	-121.1791806	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1641093	1	2	2	1257	August	31	2015	Monday	10:00 PM	Deschutes	Redmond	44.26808889	-121.1785083	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1641414	1	2	2	1378	September	21	2015	Monday	11:00 AM	Deschutes	Redmond	44.28326944	-121.1775444	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1641559	1	1	1	1494	August	7	2015	Friday	10:00 PM	Deschutes	Redmond	44.24914722	-121.1930917	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – with street lights
1641673	1	2	2	1441	October	1	2015	Thursday	5:00 PM	Deschutes	Redmond	44.24821111	-121.1732333	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1641700	1	2	2	1452	October	2	2015	Friday	3:00 PM	Deschutes	Redmond	44.263725	-121.1787694	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1641849	1	2	2	1530	October	16	2015	Friday	5:00 PM	Deschutes	Redmond	44.29100833	-121.1638528	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1642435	1	1	1	1680	November	7	2015	Saturday	Unknown Time	Deschutes	Redmond	44.25363611	-121.1992722	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Unknown	Unknown	Unknown
1642439	1	3	3	1703	November	10	2015	Tuesday	7:00 AM	Deschutes	Redmond	44.26183056	-121.1715889	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1642644	1	2	2	1758	November	17	2015	Tuesday	1:00 PM	Deschutes	Redmond	44.29098889	-121.1777472	Southwest Intersection Quadrant	Angle	Property damage only crash (			

1626193	1	2	2	1709	November	11	2015	Wednesday	8:00 PM	Deschutes	Redmond	44.26206111	-121.1845361	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1626233	1	2	3	1739	November	14	2015	Saturday	11:00 AM	Deschutes	Redmond	44.27954444	-121.1892222	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1626478	1	4	4	1801	November	24	2015	Tuesday	2:00 PM	Deschutes	Redmond	44.26031944	-121.1942278	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Snow	Snow	Daylight
1626840	1	2	2	1871	November	28	2015	Saturday	3:00 PM	Deschutes	Redmond	44.27551944	-121.1753583	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Cloudy	Ice	Daylight
1626848	1	2	3	1877	November	28	2015	Saturday	5:00 PM	Deschutes	Redmond	44.25685278	-121.1941917	NE Intersection Quadrant	Turning Movement	Non-fatal injury crash	Cloudy	Ice	Darkness – no street lights
1627078	1	2	3	1964	December	7	2015	Monday	5:00 PM	Deschutes	Redmond	44.27551944	-121.1753583	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Cloudy	Wet	Darkness – no street lights
1627120	1	2	2	1990	December	9	2015	Wednesday	11:00 AM	Deschutes	Redmond	44.276825	-121.1721361	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Wet	Daylight
1627342	1	2	2	2041	March	6	2015	Friday	9:00 AM	Deschutes	Redmond	44.25475278	-121.194175	NW Intersection Quadrant	Turning Movement	Non-fatal injury crash	Clear	Wet	Daylight
1631388	1	2	2	98	January	20	2015	Tuesday	11:00 AM	Deschutes	Redmond	44.28918889	-121.1682917	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1631997	1	2	2	217	February	19	2015	Thursday	2:00 PM	Deschutes	Redmond	44.25477222	-121.1907167	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1636964	1	2	2	491	April	16	2015	Thursday	12:00 PM	Deschutes	Redmond	44.28737778	-121.1707056	Midblock location	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1637902	1	1	1	639	May	13	2015	Wednesday	9:00 PM	Deschutes	Redmond	44.30183333	-121.1687833	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Cloudy	Dry	Darkness – no street lights
1638314	1	2	1	736	June	1	2015	Monday	12:00 PM	Deschutes	Redmond	44.25839722	-121.1902444	Outbound within 50 feet	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Daylight
1638322	1	2	2	766	June	7	2015	Sunday	3:00 PM	Deschutes	Redmond	44.25475278	-121.194175	Inbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1639340	1	2	2	893	June	26	2015	Friday	4:00 PM	Deschutes	Redmond	44.28918889	-121.1682917	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1640239	1	2	2	1142	August	9	2015	Sunday	12:00 PM	Deschutes	Redmond	44.273	-121.18925	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1641149	1	2	2	936	July	2	2015	Thursday	5:00 PM	Deschutes	Redmond	44.28066667	-121.1892139	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1641424	1	1	1	1388	September	22	2015	Tuesday	4:00 PM	Deschutes	Redmond	44.28918889	-121.1682917	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Daylight
1642067	1	2	2	1614	October	29	2015	Thursday	1:00 PM	Deschutes	Redmond	44.27551944	-121.1753583	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1642214	1	2	2	1637	November	2	2015	Monday	4:00 PM	Deschutes	Redmond	44.25477778	-121.1872167	NW Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Rain	Wet	Dusk (Twilight)
1643130	1	2	2	1901	November	30	2015	Monday	3:00 PM	Deschutes	Redmond	44.26928333	-121.1912833	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Cloudy	Ice	Daylight
1643370	1	2	1	1948	December	3	2015	Thursday	11:00 AM	Deschutes	Redmond	44.24831399	-121.2043593	Inbound within 50 feet	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1643458	1	2	2	1965	December	7	2015	Monday	5:00 PM	Deschutes	Redmond	44.27642222	-121.2093917	NW Intersection Quadrant	Angle	Property damage only crash (PDO)	Cloudy	Wet	Darkness – with street lights
1617632	1	2	2	660	May	19	2015	Tuesday	4:00 PM	Deschutes	Redmond	44.26685833	-121.1896639	Southeast Intersection Quadrant	Turning Movement	Non-fatal injury crash	Cloudy	Wet	Daylight
1620737	1	4	2	1180	August	15	2015	Saturday	10:00 PM	Deschutes	Redmond	44.26312778	-121.1876528	Midblock location	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1628027	1	1	1	2188	October	14	2015	Wednesday	2:00 PM	Deschutes	Redmond	44.27921389	-121.1753694	NE Intersection Quadrant	Non-collision	Non-fatal injury crash	Clear	Dry	Daylight
1636990	1	2	2	508	April	20	2015	Monday	8:00 AM	Deschutes	Redmond	44.27831667	-121.1775111	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1640513	1	2	2	1204	August	20	2015	Thursday	4:00 PM	Deschutes	Redmond	44.27921389	-121.1753694	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1643459	1	2	2	1968	December	7	2015	Monday	3:00 PM	Deschutes	Redmond	44.27741667	-121.1775	Southeast Intersection Quadrant	Angle	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1607728	1	2	2	101	January	21	2015	Wednesday	12:00 PM	Deschutes	Redmond	44.26888889	-121.1819278	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1608344	1	3	1	143	February	2	2015	Monday	8:00 PM	Deschutes	Redmond	44.27279167	-121.1668306	Outbound within 50 feet	Head-On	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1608357	1	2	2	166	February	10	2015	Tuesday	8:00 AM	Deschutes	Redmond	44.28918056	-121.1722194	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1614131	1	1	1	361	March	22	2015	Sunday	1:00 AM	Deschutes	Redmond	44.28826389	-121.1764417	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Clear	Dry	Darkness – no street lights
1616697	1	1	1	648	May	14	2015	Thursday	11:00 PM	Deschutes	Redmond	44.26281111	-121.1910833	Midblock location	Fixed-Object or Other-Object	Non-fatal injury crash	Rain	Wet	Darkness – no street lights
1617497	1	2	3	718	May	28	2015	Thursday	4:00 PM	Deschutes	Redmond	44.28201667	-121.1753694	NW Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1618668	1	2	3	814	May	8	2015	Friday	7:00 PM	Deschutes	Redmond	44.26679444	-121.1960806	Midblock location	Angle	Non-fatal injury crash	Clear	Dry	Dusk (Twilight)
1622378	1	1	2	963	July	5	2015	Sunday	7:00 PM	Deschutes	Redmond	44.24925389	-121.2072556	Southeast Intersection Quadrant	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1622397	1	2	2	925	July	1	2015	Wednesday	12:00 PM	Deschutes	Redmond	44.28014167	-121.1863083	Midblock location	Angle	Non-fatal injury crash	Clear	Dry	Daylight
1625153	1	2	2	1453	October	2	2015	Friday	3:00 PM	Deschutes	Redmond	44.27155833	-121.181925	Outbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1627517	1	2	2	1638	November	2	2015	Monday	6:00 AM	Deschutes	Redmond	44.264475	-121.2029139	Midblock location	Turning Movement	Non-fatal injury crash	Clear	Dry	Dawn (Twilight)
1627551	1	2	2	1044	July	21	2015	Tuesday	6:00 AM	Deschutes	Redmond	44.27554444	-121.1623611	Inbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Daylight
1627762	1	3	1	1264	August	30	2015	Sunday	1:00 AM	Deschutes	Redmond	44.26016944	-121.1929694	Outbound within 50 feet	Rear-End	Non-fatal injury crash	Clear	Dry	Darkness – with street lights
1631168	1	2	1	89	January	18	2015	Sunday	7:00 PM	Deschutes	Redmond	44.27890556	-121.1785972	Midblock location	Sideswipe-overtaking	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1632944	1	1	1	362	March	14	2015	Saturday	1:00 AM	Deschutes	Redmond	44.24954167	-121.2093889	Midblock location	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1637268	1	2	1	515	April	4	2015	Saturday	5:00 AM	Deschutes	Redmond	44.25059667	-121.1941306	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Wet	Darkness – no street lights
1637594	1	3	1	607	May	7	2015	Thursday	3:00 AM	Deschutes	Redmond	44.28594167	-121.2002667	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Cloudy	Dry	Darkness – no street lights
1637925	1	2	2	671	May	21	2015	Thursday	12:00 PM	Deschutes	Redmond	44.28375556	-121.1753806	Southwest Intersection Quadrant	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1639220	1	2	2	495	April	17	2015	Friday	7:00 AM	Deschutes	Redmond	44.28728889	-121.1917556	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1641085	1	2	2	1246	August	28	2015	Friday	12:00 PM	Deschutes	Redmond	44.27155833	-121.1764222	Southwest Intersection Quadrant	Angle	Property damage only crash (PDO)	Cloudy	Dry	Daylight
1641135	1	2	1	647	May	14	2015	Thursday	3:00 PM	Deschutes	Redmond	44.24210833	-121.203	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1641451	1	2	2	1399	September	24	2015	Thursday	5:00 PM	Deschutes	Redmond	44.26618333	-121.2024833	Midblock location	Turning Movement	Property damage only crash (PDO)	Clear	Dry	Daylight
1641454	1	2	1	1375	September	21	2015	Monday	7:00 AM	Deschutes	Redmond	44.28410833	-121.1852167	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Dawn (Twilight)
1641458	1	2	1	1334	September	14	2015	Monday	5:00 PM	Deschutes	Redmond	44.28305556	-121.1998028	Midblock location	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1641478	1	2	2	1382	September	21	2015	Monday	7:00 AM	Deschutes	Redmond	44.25524722	-121.19135	NE Intersection Quadrant	Angle	Property damage only crash (PDO)	Clear	Dry	Daylight
1642003	1	1	1	1965	October	21	2015	Wednesday	2:00 AM	Deschutes	Redmond	44.26556667	-121.1853472	Outbound within 50 feet	Fixed-Object or Other-Object	Property damage only crash (PDO)	Clear	Dry	Darkness – no street lights
1642458	1	2	1	1560	October	6	2015	Tuesday	10:00 AM	Deschutes	Redmond	44.29378611	-121.1620722	Midblock location	Rear-End	Property damage only crash (PDO)	Clear	Dry	Daylight
1643114	1	2	2	1880	November	28	2015	Saturday	4:00 PM	Deschutes	Redmond	44.27058889	-121.1753583	Inbound within 50 feet	Rear-End	Property damage only crash (PDO)	Snow	Ice	Dusk (Twilight)
1643938	1	2	2	1945	December	2	2015	Wednesday	9:00 AM	Deschutes	Redmond	44.28308889	-121.1620806	Inbound within 50 feet	Turning Movement	Property damage only crash (PDO)	Clear	Ice	Daylight
1643961	1	2	1	2103	December	22	2015	Tuesday	9:00 PM	Deschutes	Redmond	44.28894444	-121.1834806	Outbound within 50 feet	Rear-End	Property damage only crash (PDO)	Snow	Ice	Darkness – no street lights

Summary of Crashes within the Redmond UGB (2011-2015)

Crash Severity	Frequency	%	Collision Type	Frequency	%
Property Damage Only	610	47.73%	Angle	290	22.69%
Injury C	427	33.41%	Backing	20	1.56%
Injury B	205	16.04%	Fixed-Object or Other-Object	110	8.61%
Injury A	30	2.35%	Head-On	5	0.39%
Fatal	6	0.47%	Non-collision	20	1.56%
Road Conditions	Frequency	%	Parking	5	0.39%
Dry	1065	83.33%	Pedestrian	19	1.49%
Ice	101	7.90%	Rear-End	420	32.86%
Snow	30	2.35%	Sideswipe-meeting	16	1.25%
Wet	64	5.01%	Sideswipe-overtaking	76	5.95%
Unknown	18	1.41%	Turning Movement	284	22.22%
Light Conditions	Frequency	%	Miscellaneous	13	1.02%
Daylight	979	76.60%	Weather Conditions	Frequency	%
Darkness – no street lights	175	13.69%	Clear	1002	78.40%
Darkness – with street lights	44	3.44%	Cloudy	141	11.03%
Twilight (Dusk and Dawn)	78	6.10%	Fog	7	0.55%
Unknown	2	0.16%	Rain	48	3.76%
	Frequency	%	Sleet	2	0.16%
Alcohol Involved	69	5.40%	Snow	52	4.07%
Drugs Involved	15	1.17%	Unknown	26	2.03%
Hit and Run	62	4.85%			
Excessive Speed Involved	84	6.57%			

*Includes Redmond South US 97 Corridor Plan area crashes

Study Segment Crash Data

Roadway	Segment Boundaries	Length (miles)	ADT	Functional Class.	Average Statewide Crash Rate	Crash Rate (2011-2015 average)	Crash Type						Crash Severity			Total
							Rear end	Side swipe	Angle/ Turning Movement	Fixed Object	Non Collision	Misc.	PDO	Injury	Fatal	
US 97	Yew Avenue to south City Limits	Redmond South US 97 Corridor Plan														
US 97	Highland Avenue to Veterans Way	0.5	31,120	Other Principal Arterial	1.55	0.70	2	1	0	1	0	0	3	1	0	4
US 97	Canal Boulevard to north City Limits	0.33	26,628	Other Principal Arterial	1.55	1.87	0	2	1	2	1	0	5	1	0	6
OR 126	SW 35 th Street to SW 27 th Street	0.5	13,373	Other Principal Arterial	1.55	2.05	2	0	1	1	0	1	5	0	0	5
OR 126	Veterans Way to east City Limits	0.96	7,280	Other Principal Arterial	1.55	0.78	0	0	0	0	2	0	1	1	0	2
Canal Boulevard	SW 27 th Street to Badger Avenue	0.82	6,493	Urban Minor Arterial	3.22	2.57	4	0	1	0	0	0	2	3	0	5

Summary of Crashes within the Redmond UGB (2011-2015)

Crash Severity	Frequency	%	Collision Type	Frequency	%
Property Damage Only	610	47.73%	Angle	290	22.46%
Injury C	427	33.41%	Backing	20	1.55%
Injury B	205	16.04%	Fixed-Object or Other-Object	110	8.52%
Injury A	30	2.35%	Head-On	5	0.39%
Fatal	6	0.47%	Non-collision	20	1.55%
Road Conditions	Frequency	%	Parking	5	0.39%
Dry	1065	83.33%	Pedestrian	19	1.47%
Ice	101	7.90%	Bicycle	13	1.01%
Snow	30	2.35%	Rear-End	420	32.53%
Wet	64	5.01%	Sideswipe-meeting	16	1.24%
Unknown	18	1.41%	Sideswipe-overtaking	76	5.89%
Light Conditions	Frequency	%	Turning Movement	284	22.00%
Daylight	979	76.60%	Miscellaneous	13	1.01%
Darkness – no street lights	175	13.69%	Weather Conditions	Frequency	%
Darkness – with street lights	44	3.44%	Clear	1002	78.40%
Twilight (Dusk and Dawn)	78	6.10%	Cloudy	141	11.03%
Unknown	2	0.16%	Fog	7	0.55%
	Frequency	%	Rain	48	3.76%
Alcohol Involved	69	5.40%	Sleet	2	0.16%
Drugs Involved	15	1.17%	Snow	52	4.07%
Hit and Run	62	4.85%	Unknown	26	2.03%
Excessive Speed Involved	84	6.57%			

*Includes *Redmond South US 97 Corridor Plan* area crashes

Study Segment Crash Data

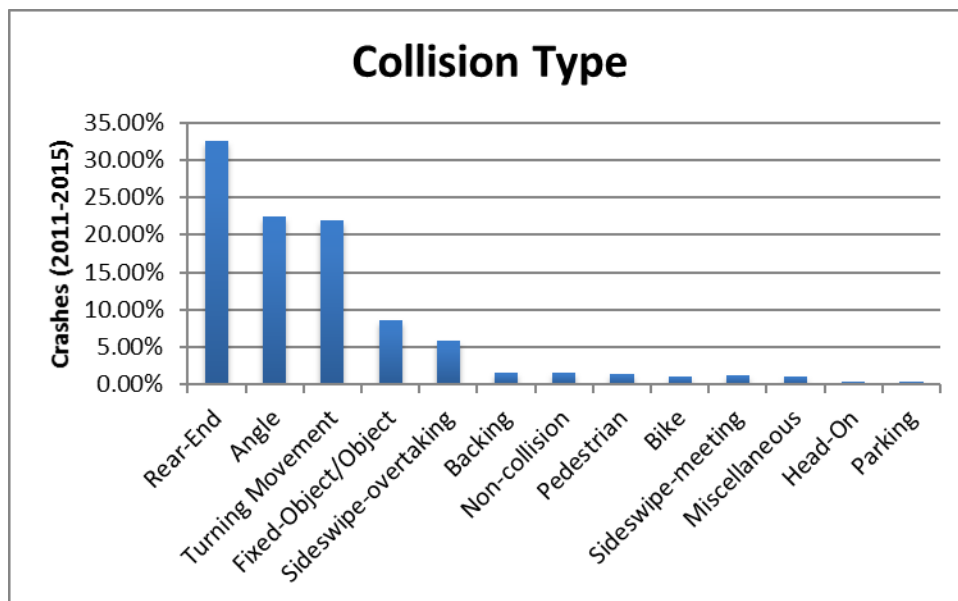
Roadway	Segment Boundaries	Length (miles)	ADT	Functional Class.	Average Statewide Crash Rate (2011- 2015)	Crash Rate (2011-2015 average)	Crash Type						Crash Severity			Total
							Rear end	Side swipe	Angle/ Turning Movement	Fixed Object	Non Collision	Misc.	PDO	Injury	Fatal	
US 97	Yew Avenue to south City Limits	Redmond South US 97 Corridor Plan														
US 97	Highland Avenue to Veterans Way	0.5	31,120	Other Principal Arterial	1.55	0.70	2	1	0	1	0	0	3	1	0	4
US 97	Canal Boulevard to north City Limits	0.33	26,628	Other Principal Arterial	1.55	1.87	0	2	1	2	1	0	5	1	0	6
OR 126	SW 35 th Street to SW 27 th Street	0.5	13,373	Other Principal Arterial	1.55	2.05	2	0	1	1	0	1	5	0	0	5
OR 126	Veterans Way to east City Limits	0.96	7,280	Other Principal Arterial	1.55	0.78	0	0	0	0	2	0	1	1	0	2
Canal Boulevard	SW 27 th Street to Badger Avenue	0.82	6,493	Urban Minor Arterial	3.22	2.57	4	0	1	0	0	0	2	3	0	5

Appendix H – Study Intersection Crash Type and Severity

Study Intersection Crash Type and Severity

ID	Intersection Name	Crash Type								Severity			Total
		Rear-End	Turning	Angle	Fixed-Object	Pedestrian	Bicycle	Sideswipe	Other	Fatal & Severe Injury (K+A)	Moderate & Minor Injury (B+C)	PDO* (O)	
1	NW Canal Blvd/US 97 NB Ramp	0	1	0	0	0	0	0	0	0	1	0	1
2	NW Canal Blvd/US 97 SB Ramp	0	0	0	2	0	0	0	0	0	0	2	2
3	NW Maple Ave/NW 19 th St	0	0	1	0	0	0	0	0	0	1	0	1
4	NW Maple Ave/NW 6 th St	16	10	3	1	1	0	0	2	1	18	14	33
5	NW Larch Ave/NW Canal Blvd	0	1	3	2	0	0	0	0	0	2	4	6
6	NE Hemlock Ave/NE 9 th St	1	0	0	0	0	0	0	0	0	0	1	1
7	W Antler Ave/SW Helmholtz Way	0	0	0	0	0	0	0	0	0	0	0	0
8	W Antler Ave/SW 27 th St	0	0	1	0	0	0	0	0	0	0	1	1
9	W Antler Ave/SW Rimrock Way	6	3	0	1	0	0	0	0	0	3	7	10
10	SW Black Butte Blvd/SW 6 th St	1	1	2	0	0	0	0	0	0	2	2	4
11	SW Black Butte Blvd/SW 5 th St	1	4	0	0	0	0	0	0	0	2	3	5
12	E Antler Ave/NE 9 th St	0	0	1	0	0	0	0	0	0	1	0	1
13	SW Evergreen Ave/SW 6 th St	2	2	0	0	1	0	2	2	0	3	6	9
14	SW Evergreen Ave/SW 5 th St	4	1	11	1	0	0	1	0	0	9	9	18
15	SW Evergreen Ave/US 97	23	1	2	1	0	0	0	0	1	18	8	27
16	OR 126 (SW Glacier Ave)/ SW 11 th St	0	1	2	0	0	0	0	0	0	0	3	3
17	OR 126 (SW Glacier Ave)/SW 9 th St	1	4	2	0	0	0	0	1	0	3	5	8
18	OR 126 (SW Glacier Ave)/SW 6 th St	Analyzed as Part of South Redmond US 97 Corridor Plan											
19	OR 126 (SW Glacier Ave)/SW 5 th St	Analyzed as Part of South Redmond US 97 Corridor Plan											
20	OR 126 (SW Glacier/Highland Ave)/US 97	Analyzed as Part of South Redmond US 97 Corridor Plan											
21	OR 126 (SW Highland Ave)/ SW Helmholtz Way	0	0	0	0	0	0	0	0	0	0	0	0
22	OR 126 (SW Highland Ave)/SW 27 th St	13	2	1	1	0	0	1	0	0	9	9	18
23	OR 126 (SW Highland Ave)/SW Rimrock Way	13	18	2	2	2	0	0	0	0	22	15	37

ID	Intersection Name	Crash Type								Severity			Total
		Rear-End	Turning	Angle	Fixed-Object	Pedestrian	Bicycle	Sideswipe	Other	Fatal & Severe Injury (K+A)	Moderate & Minor Injury (B+C)	PDO* (O)	
24	OR 126 (SW Highland Ave)/SW 15 th St	5	11	2	2	1	1	1	0	0	10	12	22
25	OR 126 (SW Highland Ave)/SW 11 th St	3	1	6	0	0	0	0	0	0	9	1	10
26	OR 126 (SW Highland Ave)/SW 9 th St	5	0	7	0	0	0	2	0	1	8	5	14
27	OR 126 (SW Highland Ave)/SW 6 th St	Analyzed as Part of South Redmond US 97 Corridor Plan											
28	OR 126 (SW Highland Ave)/SW 5 th St	Analyzed as Part of South Redmond US 97 Corridor Plan											
29	OR 126/SE 9 th St (McCaffrey Rd)	0	0	0	0	0	0	0	0	0	0	0	0
30	SW Obsidian Ave/SW 27 th St	0	0	0	1	1	0	0	0	1	0	1	2
31	SW Obsidian Ave/SW 23 rd St	0	1	1	0	1	1	0	0	0	2	1	3
32	SW Veterans Way/SW Canal Blvd	4	5	1	1	0	0	0	0	0	4	7	11
33	SW Veterans Way/US 97	Analyzed as Part of South Redmond US 97 Corridor Plan											
34	SW Veterans Way/SE Airport Way	0	0	0	1	0	0	0	0	0	1	0	1
35	SW Veterans Way/OR 126	0	1	0	1	0	0	0	1	1	1	1	3
36	SW Salmon Ave/SW 27 th St	0	0	2	0	0	0	0	0	0	0	2	2
37	SW Odem Medo Way/SW Canal Blvd	Analyzed as Part of South Redmond US 97 Corridor Plan											
38	SW Odem Medo Way/US 97	Analyzed as Part of South Redmond US 97 Corridor Plan											
39	SW Wickiup Ave/SW Helmholtz Way	0	2	3	1	0	0	0	0	0	3	3	6
40	SW Wickiup Ave/SW 27 th St	0	1	2	0	0	0	0	0	0	2	1	3
41	SW Canal Blvd/SW 27 th St	4	1	4	2	0	0	0	0	0	2	9	11
42	SW Yew Ave/US 97 SB Ramp	Analyzed as Part of South Redmond US 97 Corridor Plan											
43	SE Airport Way/US 97 NB Ramp	Analyzed as Part of South Redmond US 97 Corridor Plan											
44	SE Airport Way/NE 19 th St	0	0	0	0	0	0	0	0	0	0	0	0
45	S Canal Blvd/SW Helmholtz Way	0	0	0	8	0	0	0	1	2	4	3	9



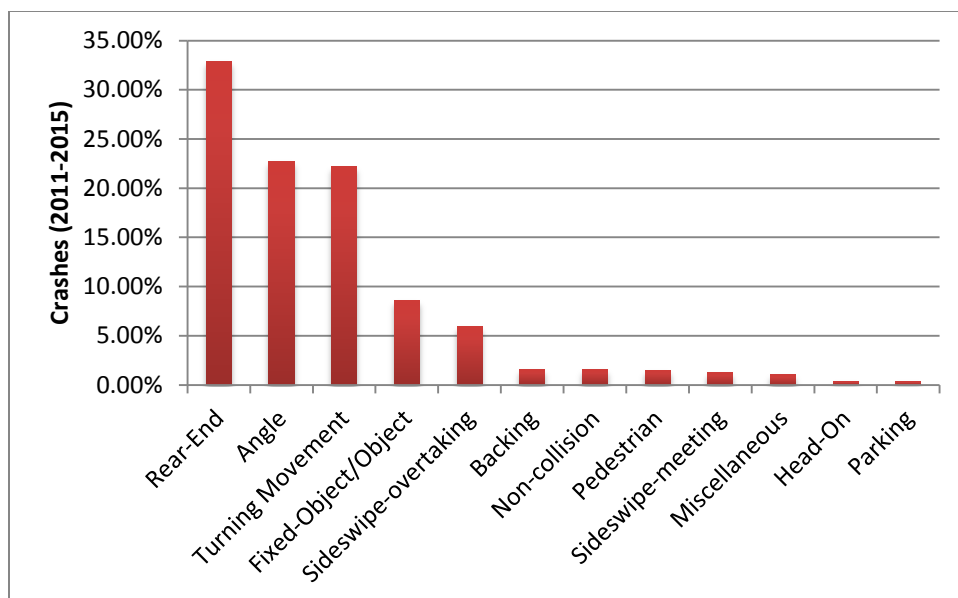
Collision Type during Study Period (2011-2015)

Appendix H – Study Intersection Crash Type and Severity

Study Intersection Crash Type and Severity

ID	Intersection Name	Crash Type							Severity			Total
		Rear-End	Turning	Angle	Fixed-Object	Pedestrian/Bicycle	Sideswipe	Other	Fatal & Severe Injury (K+A)	Moderate & Minor Injury (B+C)	PDO* (O)	
1	NW Canal Blvd/US 97 NB Ramp	0	1	0	0	0	0	0	0	1	0	1
2	NW Canal Blvd/US 97 SB Ramp	0	0	0	2	0	0	0	0	0	2	2
3	NW Maple Ave/NW 19 th St	0	0	1	0	0	0	0	0	1	0	1
4	NW Maple Ave/NW 6 th St	16	10	3	1	1	0	2	1	18	14	33
5	NW Larch Ave/NW Canal Blvd	0	1	3	2	0	0	0	0	2	4	6
6	NE Hemlock Ave/NE 9 th St	1	0	0	0	0	0	0	0	0	1	1
7	W Antler Ave/SW Helmholtz Way	0	0	0	0	0	0	0	0	0	0	0
8	W Antler Ave/SW 27 th St	0	0	1	0	0	0	0	0	0	1	1
9	W Antler Ave/SW Rimrock Way	6	3	0	1	0	0	0	0	3	7	10
10	SW Black Butte Blvd/SW 6 th St	1	1	2	0	0	0	0	0	2	2	4
11	SW Black Butte Blvd/SW 5 th St	1	4	0	0	0	0	0	0	2	3	5
12	E Antler Ave/NE 9 th St	0	0	1	0	0	0	0	0	1	0	1
13	SW Evergreen Ave/SW 6 th St	2	2	0	0	1	2	2	0	3	6	9
14	SW Evergreen Ave/SW 5 th St	4	1	11	1	0	1	0	0	9	9	18
15	SW Evergreen Ave/US 97	23	1	2	1	0	0	0	1	18	8	27
16	OR 126 (SW Glacier Ave)/ SW 11 th St	0	1	2	0	0	0	0	0	0	3	3
17	OR 126 (SW Glacier Ave)/SW 9 th St	1	4	2	0	0	0	1	0	3	5	8
18	OR 126 (SW Glacier Ave)/SW 6 th St	1	3	23	0	0	1	0	0	18	10	28
19	OR 126 (SW Glacier Ave)/SW 5 th St	2	1	8	0	0	0	0	0	7	4	11
20	OR 126 (SW Glacier/Highland Ave)/US 97	22	12	1	1	0	1	1	1	22	15	38
21	OR 126 (SW Highland Ave)/ SW Helmholtz Way	0	0	0	0	0	0	0	0	0	0	0
22	OR 126 (SW Highland Ave)/SW 27 th St	13	2	1	1	0	1	0	0	9	9	18
23	OR 126 (SW Highland Ave)/SW Rimrock Way	13	18	2	2	2	0	0	0	22	15	37
24	OR 126 (SW Highland Ave)/SW	5	11	2	2	1	1	0	0	10	12	22

	15 th St											
25	OR 126 (SW Highland Ave)/SW 11 th St	3	1	6	0	0	0	0	0	9	1	10
26	OR 126 (SW Highland Ave)/SW 9 th St	5	0	7	0	0	2	0	1	8	5	14
27	OR 126 (SW Highland Ave)/SW 6 th St	4	0	21	1	0	0	1	0	10	17	27
28	OR 126 (SW Highland Ave)/SW 5 th St	1	4	8	1	0	1	0	0	5	10	15
29	OR 126/SE 9 th St (McCaffrey Rd)	0	0	0	0	0	0	0	0	0	0	0
30	SW Obsidian Ave/SW 27 th St	0	0	0	1	1	0	0	1	0	1	2
31	SW Obsidian Ave/SW 23 rd St	0	1	1	0	1	0	0	0	2	1	3
32	SW Veterans Way/SW Canal Blvd	4	5	1	1	0	0	0	0	4	7	11
33	SW Veterans Way/US 97	Analyzed as Part of South Redmond US 97 Corridor Plan										
34	SW Veterans Way/SE Airport Way	0	0	0	1	0	0	0	0	1	0	1
35	SW Veterans Way/OR 126	0	1	0	1	0	0	1	1	1	1	3
36	SW Salmon Ave/SW 27 th St	0	0	2	0	0	0	0	0	0	2	2
37	SW Odem Medo Way/SW Canal Blvd	4	0	2	0	2	0	1	1	3	5	9
38	SW Odem Medo Way/US 97	Analyzed as Part of South Redmond US 97 Corridor Plan										
39	SW Wickiup Ave/SW Helmholtz Way	0	2	3	1	0	0	0	0	3	3	6
40	SW Wickiup Ave/SW 27 th St	0	1	2	0	0	0	0	0	2	1	3
41	SW Canal Blvd/SW 27 th St	4	1	4	2	0	0	0	0	2	9	11
42	SW Yew Ave/US 97 SB Ramp	Analyzed as Part of South Redmond US 97 Corridor Plan										
43	SE Airport Way/US 97 NB Ramp	Analyzed as Part of South Redmond US 97 Corridor Plan										
44	SE Airport Way/NE 19 th St	0	0	0	0	0	0	0	0	0	0	0
45	S Canal Blvd/SW Helmholtz Way	0	0	0	8	0	0	1	2	4	3	9



Collision Type during Study Period (2011-2015)

Fatal Crashes Discussion

During this period, there were six fatal crashes, five of which occurred on a major roadway (collector or arterial). One of the crashes occurred approximately a quarter of a mile south of Canal Boulevard on US 97. This collision happened during icy roadway conditions in February of 2012 when a vehicle crossed over the median and crashed into an oncoming vehicle. Two fatalities and several injuries resulted from the crash.

There were three nighttime pedestrian related fatalities that occurred during the study period: one at the intersection of Canal Boulevard/Odem Medo Way, one just north of Yew Avenue on US 97, and one at NW 6th Street/Kingwood Avenue. In two scenarios the pedestrians were wearing dark clothing and were reportedly illegally in the roadway. Alcohol was indicated in two of the pedestrian fatalities.

The remaining two collisions involved a motorcycle animal crash and a sideswipe-overtaking crash. The motorcycle crash occurred on NW Poplar Avenue and alcohol was indicated in the crash report. The sideswipe crash occurred on US 97 just south of Yew Avenue. The crash report indicated a vehicle improperly changed lanes and overtook another vehicle.

Half of the fatal crashes were pedestrian related and half of the fatal crashes occurred on US 97, however, there does not appear to be a trend for fatal crashes associated with location, crash type, time of day, or weather conditions.

Appendix I– 90th Percentile Crash Rate

Study Intersection 90th Percentile Crash Rates

ID	Intersection Name	AADT Entering Intersection	Total Crashes	Urban Intersection Type	Intersection Crash Rate ⁺	Statewide 90th Percentile Crash Rate	Exceeds Statewide 90th Percentile Crash Rate?
1	NW Canal Blvd/US 97 NB Ramp	9,120	1	4-leg Signal	0.060	0.860	No
2	NW Canal Blvd/US 97 SB Ramp	11,220	2	4-leg Signal	0.098	0.860	No
3	NW Maple Ave/NW 19 th St	12,520	1	4-leg Stop	0.044	0.408	No
4	NW Maple Ave/NW 6 th St	21,560	33	4-leg Signal	0.839	0.860	No
5	NW Larch Ave/NW Canal Blvd	4.330	6	3-leg Stop	0.759	0.293	Yes
6	NE Hemlock Ave/NE 9 th St	5,670	1	4-leg Stop	0.097	0.408	No
7	W Antler Ave/SW Helmholtz Way	3,400	0	4-leg Stop	0.000	0.408	No
8	W Antler Ave/SW 27 th St	6,360	1	4-leg Signal	0.086	0.860	No
9	W Antler Ave/SW Rimrock Way	16,260	10	4-leg Signal	0.337	0.860	No
10	SW Black Butte Blvd/SW 6 th St	10,560	4	4-leg Signal	0.208	0.860	No
11	SW Black Butte Blvd/SW 5 th St	10220	5	4-leg Signal	0.268	0.860	No
12	E Antler Ave/NE 9 th St	4990	1	4-leg Stop	0.110	0.408	No
13	SW Evergreen Ave/SW 6 th St	10230	9	4-leg Signal	0.482	0.860	No
14	SW Evergreen Ave/SW 5 th St	12450	18	4-leg Signal	0.792	0.860	No
15	SW Evergreen Ave/US 97	30210	27	4-leg Signal	0.490	0.860	No
16	OR 126 (SW Glacier Ave)/SW 11 th St	10520	3	4-leg Signal	0.156	0.860	No
17	OR 126 (SW Glacier Ave)/SW 9 th St	10910	8	4-leg Signal	0.402	0.860	No
18	OR 126 (SW Glacier Ave)/SW 6th St	11750	28	4-leg Signal	1.306	0.860	Yes
19	OR 126 (SW Glacier Ave)/SW 5 th St	10980	11	4-leg Signal	0.549	0.860	No
20	OR 126 (SW Glacier/Highland Ave)/US 97	33350	38	3-leg Signal	0.624	0.509	Yes
21	OR 126 (SW Highland Ave)/ SW Helmholtz Way	11750	0	4-leg Stop	0.000	0.408	No
22	OR 126 (SW Highland Ave)/SW 27 th St	19150	18	4-leg Signal	0.515	0.860	No
23	OR 126 (SW Highland Ave)/SW Rimrock Way	24520	37	4-leg Signal	0.827	0.860	No
24	OR 126 (SW Highland Ave)/SW 15 th St	20700	22	4-leg Signal	0.582	0.860	No
25	OR 126 (SW Highland Ave)/SW 11 th St	9520	10	4-leg Signal	0.576	0.860	No
26	OR 126 (SW Highland Ave)/SW 9 th St	10430	14	4-leg Signal	0.735	0.860	No
27	OR 126 (SW Highland Ave)/SW 6th St	12630	27	4-leg Signal	1.171	0.860	Yes
28	OR 126 (SW Highland Ave)/SW 5 th St	10730	15	4-leg Signal	0.766	0.860	No
29	OR 126/SE 9 th St (McCaffrey Rd)	8210	0	3-leg Stop	0.000	0.293	No
30	SW Obsidian Ave/SW 27 th St	8100	2	4-leg Stop	0.135	0.408	No
31	SW Obsidian Ave/SW 23 rd	6450	3	4-leg Stop	0.255	0.408	No

	St						
32	SW Veterans Way/SW Canal Blvd	18940	11	4-leg Signal	0.318	0.860	No
33	SW Veterans Way/US 97	Analyzed as Part of South Redmond US 97 Corridor Plan					
34	SW Veterans Way/SE Airport Way	7580	1	3-leg Stop	0.072	0.293	No
35	SW Veterans Way/OR 126	10170	3	3-leg Stop	0.162	0.293	No
36	SW Salmon Ave/SW 27 th St	1039	2	4-leg Stop	1.055	0.408	Yes
37	SW Odem Medo Way/SW Canal Blvd	14610	9	4-leg Signal	0.338	0.860	No
38	SW Odem Medo Way/US 97	Analyzed as Part of South Redmond US 97 Corridor Plan					
39	SW Wickiup Ave/SW Helmholtz Way	4550	6	4-leg Stop	0.723	0.408	Yes
40	SW Wickiup Ave/SW 27 th St	9200	3	4-leg Stop	0.179	0.408	No
41	SW Canal Blvd/SW 27 th St	13090	11	4-leg Stop	0.460	0.408	Yes
42	SW Yew Ave/US 97 SB Ramp	Analyzed as Part of South Redmond US 97 Corridor Plan					
43	SE Airport Way/US 97 NB Ramp	Analyzed as Part of South Redmond US 97 Corridor Plan					
44	SE Airport Way/NE 19 th St	9820	0	3-leg Stop	0.000	0.293	No
45	S Canal Blvd/SW Helmholtz Way	7380	9	4-leg Stop	0.668	0.408	Yes

Appendix J – Critical Crash Comparison

General & Site Information	
Analyst:	JXG
Agency/Company:	Kittelson & Associates, Inc.
Date:	9/15/2017
Project Name:	Redmond TSP Update

Intersection Crash Data							
Intersection	Intersection Type	Year					Total
		2011	2012	2013	2014	2015	
NW Canal Blvd/US 97 NB Ramp	Urban 4SG			1			1
NW Canal Blvd/US 97 SB Ramp	Urban 4SG	1			1		2
NW Maple Ave/NW 19th St	Urban 4ST					1	1
NW Maple Ave/NW 6th St	Urban 4SG	6	10	6	6	5	33
NW Larch Ave/NW Canal Blvd	Urban 3ST	2		1		3	6
NE Hemlock Ave/NE 9th St	Urban 4ST		1				1
W Antler Ave/SW Helmholtz Way	Urban 4ST						0
W Antler Ave/SW 27th St	Urban 4SG	1					1
W Antler Ave/SW Rimrock Way	Urban 4SG		2	5	2	1	10
SW Black Butte Blvd/SW 6th St	Urban 4SG		1	1	2		4
SW Black Butte Blvd/SW 5th St	Urban 4SG	2	3				5
E Antler Ave/NE 9th St	Urban 4ST					1	1
SW Evergreen Ave/SW 6th St	Urban 4SG	3	1		2	3	9
SW Evergreen Ave/SW 5th St	Urban 4SG	5	3	6	2	2	18
SW Evergreen Ave/US 97	Urban 4SG		1	10	11	5	27
OR 126 (SW Glacier Ave)/ SW 11th St	Urban 4SG	1	2				3
OR 126 (SW Glacier Ave)/SW 9th St	Urban 4SG		2	1	3	2	8
OR 126 (SW Glacier Ave)/SW 6th St	Urban 4SG	6	7	5	1	9	28
OR 126 (SW Glacier Ave)/SW 5th St	Urban 4SG	1	3	3	3	1	11
OR 126 (SW Glacier/Highland Ave)/US 97	Urban 3SG	4	1	9	12	12	38
OR 126 (SW Highland Ave)/ SW Helmholtz Way	Urban 4ST						0
OR 126 (SW Highland Ave)/SW 27th St	Urban 4SG	5	5	3	2	3	18
OR 126 (SW Highland Ave)/SW Rimrock Way	Urban 4SG	12	6	8	4	7	37
OR 126 (SW Highland Ave)/SW 15th St	Urban 4SG	2	6	5	4	5	22
OR 126 (SW Highland Ave)/SW 11th St	Urban 4SG	1	2		2	5	10
OR 126 (SW Highland Ave)/SW 9th St	Urban 4SG	2	2	3	3	4	14
OR 126 (SW Highland Ave)/SW 6th St	Urban 4SG	3	4	5	9	6	27
OR 126 (SW Highland Ave)/SW 5th St	Urban 4SG	3	2	5	4	1	15
OR 126/SE 9th St (McCaffrey Rd)	Urban 3ST						0
SW Obsidian Ave/SW 27th St	Urban 4ST	1		1			2
SW Obsidian Ave/SW 23rd St	Urban 4ST		1	1		1	3
SW Veterans Way/SW Canal Blvd	Urban 4SG	1		2	6	2	11
SW Veterans Way/SE Airport Way	Urban 3ST				1		1
SW Veterans Way/OR 126	Urban 3ST		2	1			3
SW Salmon Ave/SW 27th St	Urban 4ST		1		1		2
SW Odem Medo Way/SW Canal Blvd	Urban 4SG	1	1	1	2	4	9
SW Wickiup Ave/SW Helmholtz Way	Urban 4ST	1	2	2	1		6
SW Wickiup Ave/SW 27th St	Urban 4ST	2		1			3
SW Canal Blvd/SW 27th St	Urban 4ST		2	2	3	4	11
SE Airport Way/NE 19th St	Urban 3ST						0
S Canal Blvd/SW Helmholtz Way	Urban 4ST	3	3			3	9
Total		52	56	64	57	65	294

Intersection Population Type Crash Rate				
Average Crash Rate per intersection type				
Intersection Pop. Type	Sum of Crashes	Sum of 5-year MEV	Avg Crash Rate for Ref Pop.	INT in Pop
Rural 3SG	0	0		
Rural 3ST	0	0		
Rural 4SG	0	0		
Rural 4ST	0	0		
Urban 3ST	10	73	0.1366	5
Urban 3SG	38	61	0.6243	1
Urban 4ST	39	161	0.2425	12
Urban 4SG	323	591	0.5470	23

Critical Rate Calculation								
Intersection	AADT Entering Intersection	5-year MEV	Crash Total	Intersection Population Type	Intersection Crash Rate	Reference Population Crash Rate	Critical Rate	Over Critical
NW Canal Blvd/US 97 NB Ramp	9,120	16.6	1	Urban 4SG	0.06	0.55	0.88	Under
NW Canal Blvd/US 97 SB Ramp	11,220	20.5	2	Urban 4SG	0.10	0.55	0.84	Under
NW Maple Ave/NW 19th St	12,520	22.8	1	Urban 4ST	0.04	0.24	0.43	Under
NW Maple Ave/NW 6th St	21,560	39.3	33	Urban 4SG	0.84	0.55	0.75	Over
NW Larch Ave/NW Canal Blvd	4,330	7.9	6	Urban 3ST	0.76	0.14	0.42	Over
NE Hemlock Ave/NE 9th St	5,670	10.3	1	Urban 4ST	0.10	0.24	0.54	Under
W Antler Ave/SW Helmholtz Way	3,400	6.2	0	Urban 4ST	0.00	0.24	0.65	Under
W Antler Ave/SW 27th St	6,360	11.6	1	Urban 4SG	0.09	0.55	0.95	Under
W Antler Ave/SW Rimrock Way	16,260	29.7	10	Urban 4SG	0.34	0.55	0.79	Under
SW Black Butte Blvd/SW 6th St	10,560	19.3	4	Urban 4SG	0.21	0.55	0.85	Under
SW Black Butte Blvd/SW 5th St	10,220	18.7	5	Urban 4SG	0.27	0.55	0.86	Under
E Antler Ave/NE 9th St	4,990	9.1	1	Urban 4ST	0.11	0.24	0.57	Under
SW Evergreen Ave/SW 6th St	10,230	18.7	9	Urban 4SG	0.48	0.55	0.86	Under
SW Evergreen Ave/SW 5th St	12,450	22.7	18	Urban 4SG	0.79	0.55	0.82	Under
SW Evergreen Ave/US 97	30,210	55.1	27	Urban 4SG	0.49	0.55	0.72	Under
OR 126 (SW Glacier Ave)/ SW 11th St	10,520	19.2	3	Urban 4SG	0.16	0.55	0.85	Under
OR 126 (SW Glacier Ave)/SW 9th St	10,910	19.9	8	Urban 4SG	0.40	0.55	0.84	Under
OR 126 (SW Glacier Ave)/SW 6th St	11,750	21.4	28	Urban 4SG	1.31	0.55	0.83	Over
OR 126 (SW Glacier Ave)/SW 5th St	10,980	20.0	11	Urban 4SG	0.55	0.55	0.84	Under
OR 126 (SW Glacier/Highland Ave)/US 97	33,350	60.9	38	Urban 3SG	0.62	0.62	0.80	Under
OR 126 (SW Highland Ave)/ SW Helmholtz Way	11,750	21.4	0	Urban 4ST	0.00	0.24	0.44	Under
OR 126 (SW Highland Ave)/SW 27th St	19,150	34.9	18	Urban 4SG	0.52	0.55	0.77	Under
OR 126 (SW Highland Ave)/SW Rimrock Way	24,520	44.7	37	Urban 4SG	0.83	0.55	0.74	Over
OR 126 (SW Highland Ave)/SW 15th St	20,700	37.8	22	Urban 4SG	0.58	0.55	0.76	Under
OR 126 (SW Highland Ave)/SW 11th St	9,520	17.4	10	Urban 4SG	0.58	0.55	0.87	Under
OR 126 (SW Highland Ave)/SW 9th St	10,430	19.0	14	Urban 4SG	0.74	0.55	0.85	Under
OR 126 (SW Highland Ave)/SW 6th St	12,630	23.0	27	Urban 4SG	1.17	0.55	0.82	Over
OR 126 (SW Highland Ave)/SW 5th St	10,730	19.6	15	Urban 4SG	0.77	0.55	0.85	Under
OR 126/SE 9th St (McCaffrey Rd)	8,210	15.0	0	Urban 3ST	0.00	0.14	0.33	Under
SW Obsidian Ave/SW 27th St	8,100	14.8	2	Urban 4ST	0.14	0.24	0.49	Under
SW Obsidian Ave/SW 23rd St	6,450	11.8	3	Urban 4ST	0.25	0.24	0.52	Under
SW Veterans Way/SW Canal Blvd	18,940	34.6	11	Urban 4SG	0.32	0.55	0.77	Under
SW Veterans Way/SE Airport Way	7,580	13.8	1	Urban 3ST	0.07	0.14	0.34	Under
SW Veterans Way/OR 126	10,170	18.6	3	Urban 3ST	0.16	0.14	0.30	Under
SW Salmon Ave/SW 27th St	1,039	1.9	2	Urban 4ST	1.05	0.24	1.09	Under
SW Odem Medo Way/SW Canal Blvd	14,610	26.7	9	Urban 4SG	0.34	0.55	0.80	Under
SW Wickiup Ave/SW Helmholtz Way	4,550	8.3	6	Urban 4ST	0.72	0.24	0.58	Over
SW Wickiup Ave/SW 27th St	9,200	16.8	3	Urban 4ST	0.18	0.24	0.47	Under
SW Canal Blvd/SW 27th St	13,090	23.9	11	Urban 4ST	0.46	0.24	0.43	Over
SE Airport Way/NE 19th St	9,820	17.9	0	Urban 3ST	0.00	0.14	0.31	Under
S Canal Blvd/SW Helmholtz Way	7,380	13.5	9	Urban 4ST	0.67	0.24	0.50	Over

Appendix K –Statewide Crash Performance Standards Summary

90th Percentile Crash Rate Comparisons

A method used to identify intersections with more crashes than expected is to compare the crash rate to the statewide 90th percentile rates for similar intersection types, as documented in Table 4-1 of the ODOT APM. The daily total entering vehicles used to determine the crash rate was based on the peak hour intersection turning movement counts. The peak hour was assumed to be ten percent of the daily volume. Appendix I shows a table of all the study intersection crash rates compared to the statewide 90th percentile rates for similar facilities and the table below identifies the study intersection that exceed the 90th percentile rates. Eight locations were identified as having crash rates above the 90th percentile.

Study Intersections that Exceed 90th Percentile Crash Rate

Intersection	Intersection Control Type	Statewide 90 th Perc. Crash Rate	Intersection Crash Rate
NW Larch Avenue/NW Canal Boulevard ¹	3-Leg Stop	0.293	0.759
OR 126 (Glacier Avenue)/SW 6 th Street	4-Leg Signal	0.860	1.306
OR 126 (Highland Avenue)/SW 6 th Street	4-Leg Signal	0.860	1.171
OR 126/US 97	3-Leg Signal	0.509	0.624
SW Salmon Avenue/SW 27 th Street	4-Leg Stop	0.408	1.055 ²
SW Wickiup Avenue/Helmholtz Way	4-Leg Stop	0.408	0.723
SW Canal Boulevard/SW 27 th Street	Roundabout	0.408	0.460
S Canal Boulevard/SW Helmholtz Way	4-Leg Stop	0.408	0.668

¹Estimated 10,000 ADT

²Two crashes at intersection with 1,000 ADT

Reported crashes along the study segments are summarized in the table below. The ADT was based on an average of the 48-hour count data. The crash rate for each segment was compared to the statewide five-year average for similar facilities as reported in the *ODOT 2015 Crash Rate Table II Five-Year Comparison of State Highway Crash Rates*. Both US 97 and OR 126 were classified as *Other Urban Principal Arterials* and Canal Boulevard was classified as a *Minor Arterial*. As indicated by the shaded cells, the segment of US97 from Canal Boulevard and the northern most city limits and the segment of OR 126 from SW 35th Street to SW 27th Street both exceed the statewide crash data. Additional discussion of these two segments is included in the *Key Intersection and Segment Safety Observations* section below. A detailed table with segment crash types and crash severity is provided in Appendix H.

Study Segment Crash Rates

Roadway	Segment Boundaries	Length (miles)	ADT	Average Statewide Crash Rate	Crash Rate (2011-2015 Average)	Exceeds Statewide Crash Rate?
US 97	Yew Avenue to south City Limits	<i>Included in Redmond South US 97 Corridor Plan</i>				
US 97	Highland Avenue to Veterans Way	0.50	31,120	1.55	0.70	No
US 97	Canal Boulevard to north City Limits	0.33	26,628	1.55	1.87	Yes
OR 126	SW 35 th Street to SW 27 th Street	0.50	13,373	1.55	2.05	Yes
OR 126	Veterans Way to east City Limits	0.96	7,280	1.55	0.78	No
Canal Boulevard	SW 27 th Street to Badger Avenue	0.82	6,493	3.22	2.57	No

Critical Crash Rate Comparisons

A critical crash rate may be used to identify intersections that warrant further investigation and may represent opportunities to reduce crash frequency and severity. The critical crash rate establishes a threshold for comparison among intersections with similar number of approaches and similar traffic control. Appendix J includes the Critical Crash Rate data as provided by ODOT and defined in Chapter 4 of the ODOT APM. The following intersections are identified in the table below the intersection control type.

Study Intersections that Exceed the Critical Crash Rate

Intersection	Intersection Control Type
NW Maple Avenue/NW 6th Street	Urban 4-Legged Traffic Signal
NW Larch Avenue/NW Canal Boulevard	Urban 3-Legged Stop Controlled
OR 126 (Glacier Avenue)/SW 6 th Street	Urban 4-Legged Traffic Signal
OR 126 (Highland Avenue)/SW Rimrock Way	Urban 4-Legged Traffic Signal
OR 126 (Highland Avenue)/SW 6 th Street	Urban 4-Legged Traffic Signal
SW Wickiup Avenue/Helmholtz Way	Urban 4-Legged Stop Controlled
SW Canal Boulevard/SW 27th Street	Urban 4-Legged Stop Controlled
S Canal Boulevard/SW Helmholtz Way	Urban 4-Legged Stop Controlled

Statewide Safety Priority Index System

The ODOT Statewide Safety Priority Index System (SPIS) identifies sites along state highways where safety issues warrant further investigation. The SPIS is a method developed by ODOT for identifying hazardous locations on state highways through consideration of crash frequency, crash rate, and

crash severity. Figure 14 shows the locations of the SPIS sites in the City of Redmond. The sites are listed under the 2015 SPIS based on 2012 through 2014 crash data. The table below identifies the study intersections that are above the 85% SPIS percentile.

2015 ODOT SPIS Study Intersection Locations in Redmond

Intersection	SPIS Percentile Range
OR 126 (Glacier Avenue)/SW 5 th Street	90%-95%
OR 126 (Glacier Avenue)/SW 6 th Street	90%-95%
OR 126 (Highland Avenue)/SW 5 th Street	90%-95%
OR 126 (Highland Avenue)/SW 6 th Street	90%-95%
US 97/Evergreen Avenue	95%-100%

Summary of Key Study Intersections and Study Segments

The following is a summary of key observations at intersections that exceed the 90th percentile crash rate, are above the critical crash rate, are identified as SPIS sites, or are flagged due to other reported trends in the data:

- **NW Maple Avenue/NW 6th Street**
 - Exceeds the ODOT critical crash rate
 - A total of 16 rear-end crashes (48%) and 10 turning movement crashes (30%) were reported at this signalized intersection.
 - One crash involved a pedestrian and resulted in moderate injuries.
 - The primary causes of crashes were reported as vehicles “following too closely” and “disregarding the traffic signal”.
- **NW Larch Avenue/NE Canal Boulevard**
 - Exceeds both the statewide 90th percentile crash rate and critical crash rate.
 - Of the six crashes at the intersection three were angle crashes, two were fixed object collisions and one was a turning movement crash.
 - Two crashes resulted in injury.
- **SW Evergreen Avenue/US 97**
 - Identified on the SPIS site list.
 - One of the highest volume intersections in city, 27 crashes occurred at this intersection.
 - The majority of the crashes (85%) were rear-end collisions. Most of these crashes involved southbound vehicles. This intersection is the first signalized intersection on US 97 for southbound vehicles.
- **OR 126 (Glacier Avenue)/SW 6th Street**

- Exceeds both the statewide 90th percentile crash rate and critical crash rate and is identified on the SPIS site list.
- The intersection is one way in the southbound and westbound directions.
- The majority of the reported crashes were angle (82%) crashes. Nearly all the angle crashes were reported as “disregarding the traffic signal”.
- **OR 126 (Highland Avenue/Glacier/Avenue)/US 97**
 - Exceeds the 90th percentile crash rate.
 - This intersection has the highest demand and one of the highest number of crashes in the city during the study period.
 - A total of 22 rear-end crashes (58%) and 12 turning movement crashes (32%) were reported at this signalized intersection.
- **OR 126 (Highland Avenue)/Rimrock Way**
 - Exceeds the ODOT critical crash rate
 - A total of 13 rear-end crashes (35%) and 18 turning movement crashes (49%) were reported at this signalized intersection.
 - One crash involved a pedestrian during nighttime conditions and resulted in minor injuries.
 - The primary reported causes include “following too closely” and “did not yield right-of-way”.
- **OR 126 (Highland Avenue)/SW 6th Street**
 - Exceeds both the statewide 90th percentile crash rate and critical crash rate and is identified on the SPIS site list.
 - The intersection is one way in the southbound and eastbound directions.
 - The majority of the crashes (78%) were angle collisions.
 - The primary reported cause crashes (74%) were reported as “disregarding the traffic signal”.
 - Most crashes (81%) resulted in minor injuries or property damage only.
- **Canal Boulevard/SW 27th Street**
 - Exceeds both the statewide 90th percentile crash rate and critical crash rate.
 - A roundabout was installed at this intersection in 2012.
 - Five of the eleven crashes occurred during adverse weather conditions.
 - All of the crashes resulted in minor injuries or property damage only.
- **Canal Boulevard/Hemholtz Way**
 - Exceeds both the statewide 90th percentile crash rate and critical crash rate.
 - Located southeast of Redmond city limits with a posted speed of 55 miles per hour on Canal Boulevard.
 - Over half of crashes occurred in dark lighting conditions. There is no street lighting at the stop controlled intersection.
 - All crashes were non collision related (cutting slope embankment, hitting power pole, sliding, tire failure).

- **US 97 between Canal Boulevard and the northern city limits**
 - Exceeds the statewide crash rate for a state highway classified as an “Other Principal Arterial”
 - The segment had two side swipe crashes, one turning movement crash, two fixed object crashes and one non collision crash.
 - One crash resulted in injuries and five resulted in PDO.
 - Three of the crashes occurred during icy or wet pavement conditions. The horizontal curvature of the roadway may be a contributing factor to the crashes during adverse weather conditions.
 - The short segment (0.33 miles) likely contributes to the high crash rate.
- **OR 126 between SW 35th Street and SW 27th Street**
 - Exceeds the statewide crash rate for a state highway classified as an “Other Principal Arterial”
 - The segment had two rear end collisions, one animal crash, one turning movement crash and one fixed object crash.
 - All crashes resulted in PDO.
 - Four of the five crashes occurred during the nighttime. Street lighting is only accounted for at intersections along the segment.

Appendix L - Bridge Analysis Locations

1. 20416 – ODOT/ODOT
2. 20465 – City/City
3. 19839 – City/City
4. 20672 – City/City
5. 19838 – ODOT/ODOT
6. 19837 – ODOT/ODOT
7. 20417 – ODOT/ODOT
8. 17C19 – City/City
9. 20438 – ODOT/ODOT
10. 20023 – ODOT/ODOT
11. 20441 – ODOT/ODOT
12. 17C560 – City/City
13. 16561 – ODOT/ODOT

Appendix E Future Systems Conditions



REDMOND

Transportation System Plan

Technical Memorandum #5

Date: April 13, 2018

Project #: 17720

ODOT PA #27456

To: Redmond TSP Project Management Team (PMT)

Subject: Future Systems Conditions

This technical memorandum presents the key findings related to the year 2040 Baseline Needs Analyses (i.e., No Build) for the Redmond Transportation System Plan (TSP). The following analyses relate primarily to the street system. The memo addresses the “quality of service” anticipated in the future for active modes of travel (i.e., walking, cycling, and transit) and the operational conditions projected to occur along key streets and intersections. Information contained in this memorandum can be used to inform the identification and evaluation of future multimodal transportation system alternatives that meet the goals and objectives guiding the TSP.

All of the technical analyses summarized herein assume that the City will continue to see growth in employment and population between now and the year 2040 in a manner consistent with the existing Comprehensive Plan land use designations, within the existing Urban Growth Boundary (UGB) and consistent with the statewide and regional growth forecasts. At the same time, the analyses assume that the street, transit, pedestrian and bicycle systems will remain as they exist today. This “No Build” scenario is used as a foundation by which cities can test the effectiveness of potential transportation projects, policies, and programs and to help policy makers to weigh trade-offs regarding future funding priorities in a manner that ensures that the transportation system supports and enhances the continued economic growth in a manner that is safe, sustainable, fundable and diverse.

As will be discussed in this memorandum, the baseline analyses highlight the following primary deficiencies:

- Increasing congestion along OR 126 within the UGB, Maple Avenue between US 97 and Northwest Way, Yew Avenue between Airport Way and S 27th Street and US 97 south of SW Glacier Avenue. The City and ODOT are currently engaged in the South US 97 corridor planning efforts to address long-term transportation and land use needs in this segment of the highway. That study will also evaluate portions of Yew Avenue and the OR 126 corridor near US 97.
- Localized intersection improvement needs occur along the congested corridors identified. Improvement needs are most notable along the OR 126 corridor within the UGB.
- Several of the streets within the City, especially in the residential neighborhoods to the west of US 97, lack sidewalks. As future alternatives, the potential to prioritize new sidewalks and pathways that connect neighborhoods to schools, commercial areas and other key destinations should be considered.

- Today, cyclists are required to “share the road” on most streets within Redmond or ride on busier collector and arterial bike lanes, which are classified as “high-stress” under existing and year 2040 baseline conditions and are not suitable for riders of all ages and abilities. When bike lanes are provided, the facilities are often non-buffered and located on higher volume/higher speed roads, which typically offset the “stress reducing” attributes of the bike lane. As part of future alternatives, the need for additional low stress bike facilities to support commuting, recreational and personal travel will be identified.
- A higher level of transit service providing fixed route service throughout the City.

The remainder of this memorandum outlines the Baseline Deficiencies analyses assumptions and findings. Most of the analysis results are presented in figures and tables, with supplemental text provided to explain the illustrated information.

BASIS OF NEEDS ASSESSMENT

The following sections describe the assumptions used to develop the assessment of needs for the TSP.

Planning Area and Land Use Assumptions

The TSP addresses the projects, programs, and policies needed to support growth in population and jobs within the Redmond UGB as well as the travel associated with regional and state economic growth over the next twenty years. The TSP defines the transportation facilities needs within Redmond’s adopted Urban Growth Boundary (UGB), as defined in the adopted comprehensive plan. Over time, the City, Deschutes County, and ODOT will monitor the multimodal transportation needs and can update the TSP to respond to changing conditions.

The TSP will establish the multimodal system needed to support the land use designations in the City’s Comprehensive Plan. The establishment of the multimodal projects will reflect Redmond policy makers’ and community members’ priorities to maintain existing facilities and provide multiple transportation options for local and regional travel. These priorities are based on the premise that the City can reduce congestion, save money, and provide health benefits for the entire community by providing alternatives to single-occupancy vehicle travel and by making existing streets safer and more efficient without costly increases to automobile-oriented infrastructure.

2040 Population and Employment Forecasts

The future needs were identified based on forecast year 2040 traffic volumes. These volumes reflect estimates of household and job growth within the adopted Redmond UGB (as shown in Appendix A, Figure 1) as well as in Deschutes County and the overall Central Oregon region. These population and employment forecasts were “coordinated” for compliance with Oregon transportation and land use planning requirements.



Table 1 shows the household and job growth forecasts within the City's UGB. The City of Redmond, in coordination with ODOT, allocated this growth to developable areas within the UGB consistent with the land use designations shown in the adopted Comprehensive Plan.

Table 1: City of Redmond Land Use Estimates

	Year 2010	Year 2040	Growth
Households	10,061	22,433	12,372 ()
Employees	10,134	28,550	18,416 (181%)

Traffic Volume Development

Based on the geographic allocations of future job and household growth within the UGB, ODOT's Transportation Planning and Analysis Unit (TPAU) developed traffic volume forecasts for the City's collector and arterial street system using the Bend-Redmond regional" travel demand model, which is a tool that is used to forecast future street volumes based on projected increases in jobs and housing as well as changing travel preferences. This model is calibrated to existing traffic volumes measured on streets and highways within the City. In addition to land use and street network inputs, the model also relies on information about existing traveler behavior and trip-making characteristics derived from surveys, and from research that forecasts how people might use the transportation system in the future.

The travel demand forecasts and measured traffic counts at 45 intersections within the City were used to calculate year 2040 intersection and roadway volumes for use in the analyses of future system deficiencies. The future volume calculations were performed using the procedures outlined in ODOT's Analysis and Procedures Manual (APM).

Baseline Streets and Intersections Analyses

Previously adopted plans and policies for the City, Deschutes County and ODOT all identified a variety of street, pedestrian, bicycle, and transit projects that could be implemented in the future. As discussed above, the baseline Analysis (also known as a "no build alternative") was performed to help identify multimodal projects and programs needed to support economic growth through the year 2040. This analysis will inform the potential project list that will be developed in Spring/Summer 2018.

The Baseline Analysis assumes the 2040 population and employment forecast and the existing transportation system will not change by 2040 except for the construction of transportation improvements that have already been started or for which funding is already allocated. At the time the analysis was prepared, there were no guaranteed funding sources for any major projects that will materially affect traveler behaviors and traffic volumes on the City's street network in the future. This City is upgrading S Canal Boulevard between SW Obsidian Avenue and SW Yew Avenue within the 2018/2019 construction season; this cross-section to the upgrade is reflected within the analyses.



IDENTIFIED TRANSPORTATION NEEDS

For the purposes of identifying future transportation system alternatives, it is helpful to look at a holistic, corridor approach to understand the baseline deficiencies. This broader system approach can be guided by the comparison of anticipated demand on key corridors within the city to planning-level estimates of street capacity. Review of the street segments can identify network connectivity, functional issues, potential corridor management strategies, and multimodal opportunities. This can ensure that the future transportation system looks, feels and operates in a manner consistent with the community's vision.

The baseline streets and intersection needs are based on the information contained in Technical Memorandum #4 , and in adherence with the following overarching TSP goals:

Goal 1. Provide a safe and efficient transportation network that complements key economic development priority areas, the comprehensive plan, and adopted state, regional and local plans and policies.

Goal 2. Advance community and statewide emergency preparedness efforts through support of the Oregon Resiliency Plan.

Safety Needs

A safety analysis and review was completed as part of the existing conditions analysis. Key findings from that memorandum have been used to identify safety needs within Redmond. These include:

- Most injury and fatal crashes during the 2011-2015 timeframe occurred along arterial and collector corridors.
- Six study intersections do not meet one or more statewide crash performance standards (critical crash rate or identified on Safety Priority Index System (SPIS) lists). These include:
 - NW 6th Street at NW Maple Avenue
 - NW Canal Boulevard at NW Larch Avenue
 - US 97 at OR 126
 - SW 23rd Street at SW Highland Avenue
 - SW 27th Street at SW Salmon Avenue
 - SW Helmholtz Way at SW Reservoir Drive
- The central area of Redmond near 5th Street, 6th Street, OR 126, and US 97 has several intersections identified on SPIS lists and with crash rates that exceed statewide crash performance standards. This TSP update will work with the US 97 South Corridor Plan,



whose study area extends to this vicinity, to identify improvement options for these intersections.

Systemic or spot policies or improvements to address these findings should be considered as part of the Alternatives Analysis for this TSP update.

Severe and fatal crashes during the study period as well as study intersection safety performance are shown in Figure 2 and Figure 3.

Operational Needs

To inform the baseline assessment, the comparison of the year 2040 traffic demand to capacity for individual arterial and collector streets within Redmond was assessed and then classified within three categories:

- Streets that operate “well” – defined for the purposes of this memo as the baseline demand is less than 80 percent of the capacity. These streets are shown in green in Figure 4.
- Streets that are “nearing capacity” – the demand is between 80 and 100 percent of the capacity. These streets are shown in yellow in the figure.
- Streets that are “over capacity” – the baseline demand exceeds the capacity, which is shown in red on the figure.

Together, with the intersection analyses results (also shown on Figure 4), the corridor analyses can be used to identify the baseline street system deficiencies throughout Redmond. The results of the year 2040 Baseline Analyses are detailed in Appendix B. Per this analysis, key corridors that could experience vehicular congestion and long queues at intersections include:

- OR 126 between SW 15th and Hemholtz
- OR 126 from US 97 east to SE 9th
- Maple Avenue between US 97 and Northwest Way
- US 97 south of SW Glacier Avenue (this segment of the highway is under study by the US 97 South Corridor Plan)
- Yew Avenue/Airport Way between SW 19th and SW Canal



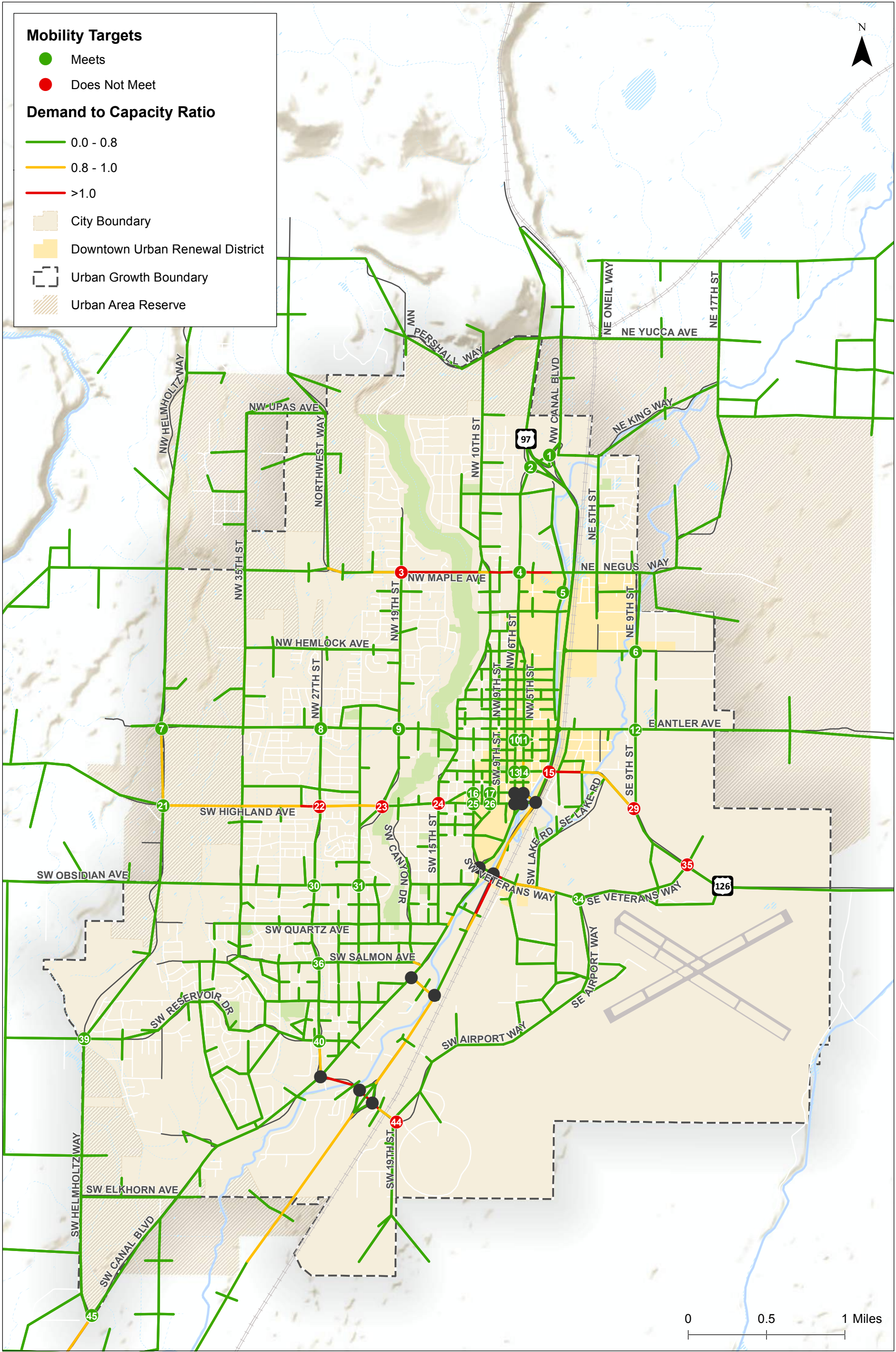


Severe and Fatal Crashes (2011-2015) Redmond, Oregon

Figure
2



Figure 3



Future Conditions (2040) Intersection and Segment Operational Analyses
Redmond, Oregon

Figure
4

H:\1717720 - Redmond Transportation System Plans\Future Mobility\02.mxd - mbarrus - 4:08 PM 12/8/2017



Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl

As noted on Figure 4, several study intersections along these corridors are expected to exceed applicable performance standards under 2040 conditions. Individual intersection needs are most notable along the OR 126 corridor within the UGB. Improvements at these locations should be considered in conjunction with the overall context of each corridor.

Alternative Mobility Targets

Two intersections within the City of Redmond currently have established Alternative Mobility Targets, as adopted by the Oregon Transportation Commission (OTC), including

- US 97/Evergreen Avenue – a volume-to-capacity (v/c) ratio of less than 1.0 based on Annual Average Weekday PM Peak conditions during no more than two hours; and,
- US 97/Veterans Way – v/c ratio of less than 0.98.

Both Alternatives Mobility Targets were established through the Senate Bill 1544 transportation analysis and subsequent mitigation plan specifically to allow more traffic congestion associated with economic development benefits from the industrial area. This TSP update and the US 97 South Corridor Study will evaluate the continued need for these Alternative Mobility Standards or if there are mitigation measures that would alleviate the need for them.

ACTIVE TRANSPORTATION NEEDS

The baseline pedestrian, bicycle and transit needs are based on the findings summarized in Technical Memorandum #4 regarding existing system deficiencies as well as other adopted and ongoing planning efforts, and in adherence with the following overarching TSP goals:

Goal 3. Provide transportation choices and address the needs and safety of all travelers, including people of all ages, abilities, ethnicities, and incomes.

Goal 4. Provide comfortable, convenient and safe pedestrian and bicycle facilities for all users.

Goal 5. Provide reliable and convenient transit service to Redmond residents and businesses as well as special transit options for the City's elderly and disabled residents.

Pedestrian Needs

As discussed in Technical Memorandum #4, the City's sidewalk and multi-use pathways contribute to support an economically vital, healthy and equitable community. Today, many of the streets in the residential areas west of US 97 lack a complete sidewalk network. As part of their Access Plan, the City has designated certain streets as American with Disabilities Act (ADA) routes and, within these routes, has identified where infrastructure is missing or in need of updating to meet applicable ADA standards



to connect residents, schools, shopping and parking. The City's ADA Transition Plan prioritizes these routes. Figure 5 illustrates the Access Plan routes.

Figure 6 identifies the presence of sidewalks or existing gaps in the sidewalk network along collector and arterial facilities. Filling these gaps is a need that will be evaluated during the Alternatives Analysis.

As future alternatives are considered, the potential to prioritize sidewalk improvements that connect neighborhoods with key destinations in the City will be analyzed. Also, as identified in the existing conditions deficiencies analyses, the City's Neighborhood Revitalization Project rated several key pedestrian facilities related to "Pedestrian Level of Traffic Stress (PLTS)." The PLTS can communicate the level of comfort pedestrians experience while using specific facilities and generally accounts for the presence and condition of sidewalks and ADA ramps, the nature of crossings, and the characteristics of the adjacent roadways. Using this measure and based on community input, the City's Neighborhood Revitalization Plan identified the following deficiencies:

- Citywide sidewalk coverage is largely limited and incomplete.
- The majority of city sidewalks are classified as PLTS 3 (medium stress).
- The only low stress facilities (PLTS 1) throughout the city are separate multiuse paths such as the Dry Canyon Trail.
- Overall, the high stress scores citywide are predominately a result of sidewalk width and condition. Other characteristics affecting the scores included proximity to higher speed and higher volume vehicle corridors, curb ramp conditions and high-stress crossings.

With the anticipated increase in traffic volumes between now and 2040, the level of stress observed today is expected to further degrade in the future.

Bicycle Needs

As discussed in Technical Memorandum #4, most of the arterial and collector streets within the City are planned to include bike lanes in the future but very few do today, as shown in Figure 7. Rather, most cyclists "share the road" on most streets within Redmond.

As a complement to the on-street bike lanes, the City is planning to sign and stripe bicycle boulevards on a number of low volume, low speed streets throughout the City as well as to develop off-street pathways to provide lower stress environments for cyclists.

As part of future alternatives, the need for additional bike facilities to support commuting, recreational and personal travel will be identified. Also, as identified in the existing conditions deficiencies analyses, the City's Neighborhood Revitalization Project used this Bicycle Level of Street methodology to identify the following deficiencies:



- Neighborhood communities provide a low-stress environment for bicycles, but are generally isolated by high-stress collector and arterial roadways
- Nearly all higher order roadways that provide continuous north-south and east-west connectivity scored as LTS 3 (medium stress) or LTS 4 (high stress)
- Where on-street bike lanes are provided, high posted speeds often reduce the benefit of the dedicated bike facility
- The eastern portion of the city has large areas connected by low stress bicycle environments
- The western portion of the city has frequent instances of high stress roadways acting as barriers between destinations and residential areas
- The Dry Canyon Trail provides a low stress north-south facility through the city, but has limited east-west crossings, causing significant out of direction travel for east-west travelers

With the anticipated increase in traffic volumes between now and 2040, the level of stress observed today is expected to further degrade in the future.

Transit Needs

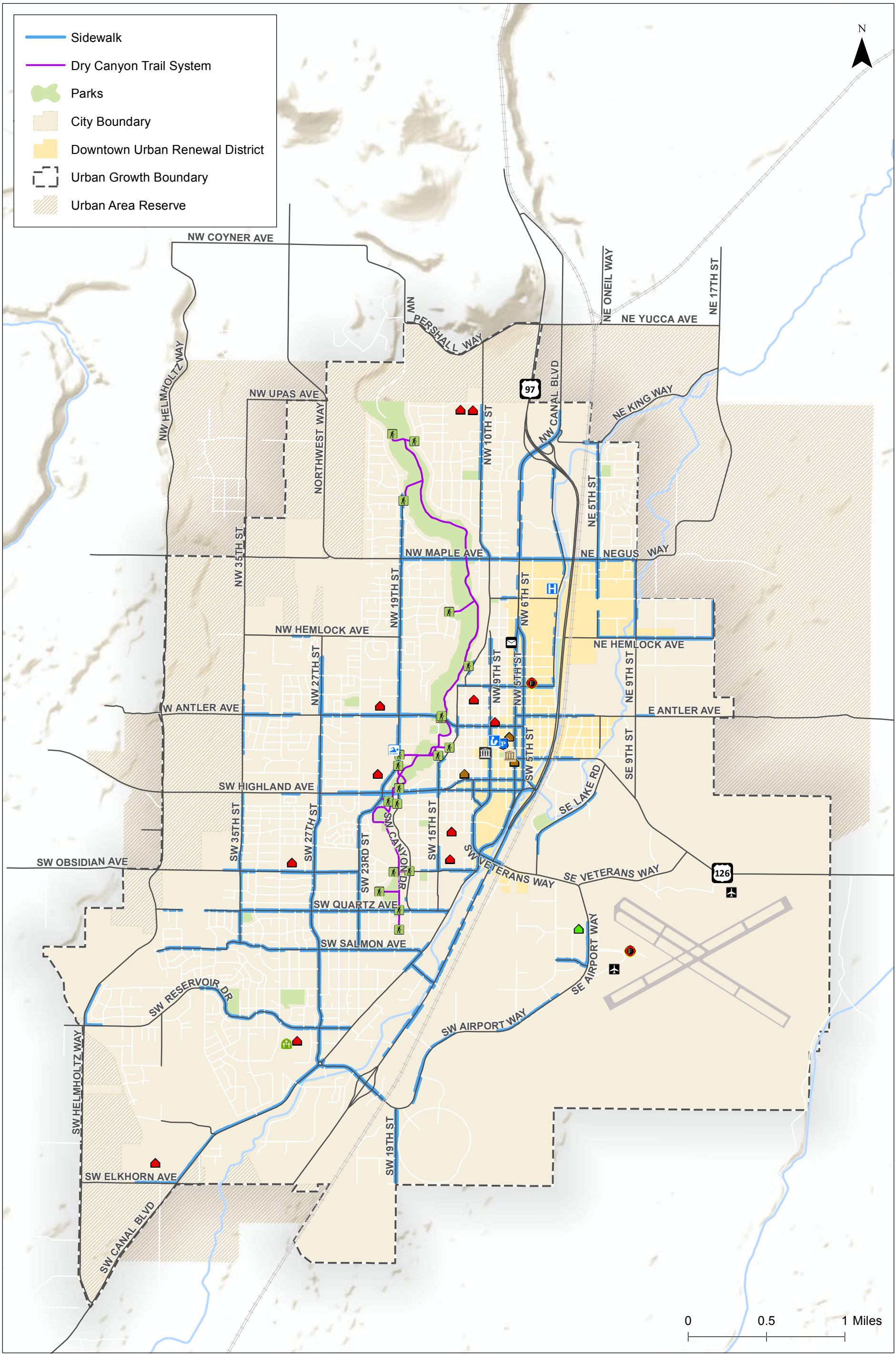
The City of Redmond, in cooperation with Cascades East Transit, ODOT and the City of Bend, will be undertaking a planning effort to update the Regional Transit Master Plan (RTMP) that will “provide opportunities for transit to “expand mobility options, support community vibrancy and economic vitality, and promote environmental stewardship.” These efforts will support the identification of future transit alternatives for the Redmond TSP.

The transit alternatives will also reflect ongoing discussions between CET and the City of Redmond regarding future system needs.





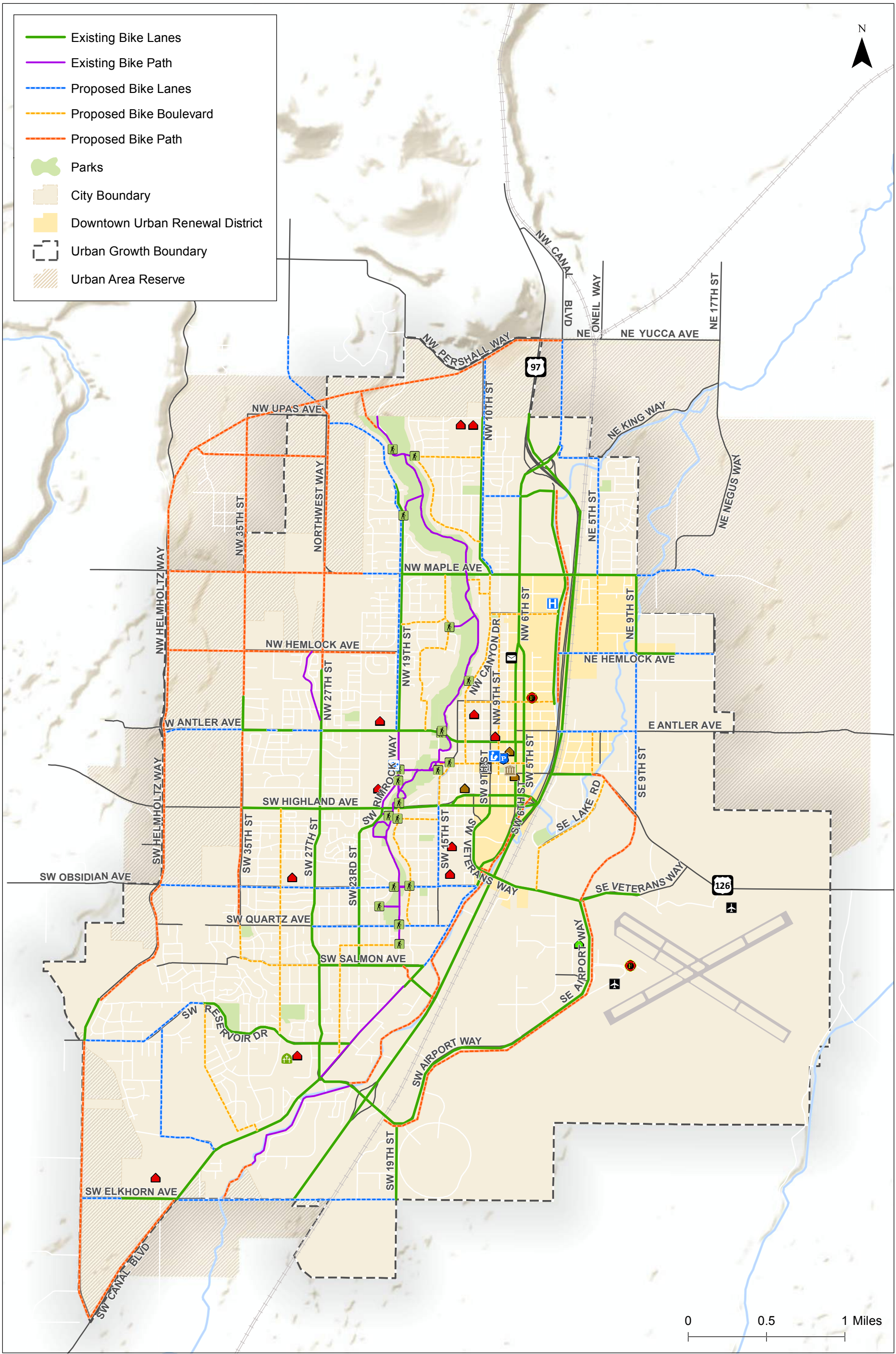
Figure 5



**Sidewalk Gaps along Major Corridors
Redmond, Oregon**

**Figure
6**





Existing and Planned Bicycle Facilities
Redmond, Oregon

Figure
7

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl

ALTERNATIVES EVALUATION FRAMEWORK

As discussed in Technical Memorandum #3, the identification and evaluation of future alternatives considered for the TSP will be informed by the following activities:

- Feedback received through the stakeholder interviews related to needed transportation investments;
- Existing and future baseline deficiencies analyses (as identified in Technical Memorandum #4 and summarized herein);
- Feedback received through the first Public Open House;
- Feedback from the Project Advisory Committee (PAC) and PMT;
- Workshop with City and ODOT staff, and the PMT to consider the feedback obtained to date and weigh the feasibility of potential alternatives.

A preliminary screen of the ideas gathered through the above activities will be conducted by evaluating the ideas against the following key questions:

- Does the project address an identified transportation need, deficiency, or opportunity?
- Is the project within the City's Urban Growth Boundary? Is it within the City's control, or the control of its partnering agencies, to implement?
- Is it technically feasible to construct and/or implement?
- Could the project be reasonably funded within the next 20 years?

If the answer to any question is "no," the project idea will not be further considered. The remaining ideas would be evaluated by City staff and the PMT against the criteria that are intended to help differentiate between alternatives. There are likely other important criteria for consideration that may not be "differentiators" but the following criteria are anticipated for the more detailed review:

- Balances impacts to developable parcels with system and community needs;
- Minimizes impacts to Goal 5 resources;
- Supports or enhances the ability to implement the Oregon Resiliency Plan and/or other key state or regional projects;
- Leverages future transportation investments to reduce access, economic, safety and health disparities between neighborhoods, particularly those with greater populations of low income, minority, youth and/or elderly population than the City as a whole.
- Addresses key connectivity needs on the collector and arterial street system;
- Addresses known safety issues;



- Supports enhanced multimodal access to major activity centers and/or economic development priority areas within the City as well as the region;
- Provides pedestrian and bicycle connectivity to key transit corridors;
- Provides pedestrian and bicycle connectivity to key routes to school;
- Addresses key gaps in the bicycle system;
- Addresses key gaps in the pedestrian system;
- Improves freight mobility on designated freight, truck, rail and air routes;
- Improves mobility for through traffic on state highways; and,
- Leverages public and private investments.

The results of the more detailed analyses against the evaluation criteria will be presented to the PAC for review. The evaluation results will be presented in tabular format with a rating provided for how each alternative addresses the criteria via the following:

- The project idea addresses the criterion and/or makes substantial improvements in the criteria category
- ◐ The project idea partially addresses the criterion and/or makes moderate improvements in the criteria category
- The project idea does not support the intent of, provides minor or incidental benefit and/or negatively impacts the criteria category
- N/A The project idea neither meets nor does not meet intent of criterion. The project idea has no effect, or criterion does not apply

The results of this evaluation will define a 20-year project list that could address the identified transportation needs, and meet the TSP goals as well as criteria contained on ORS 660-012-0035.

SUMMARY OF IDENTIFIED BASELINE DEFICIENCIES

As discussed herein, the 2040 Baseline Analyses identified the following deficiencies for consideration as part of the alternatives analyses:

- Increasing congestion along OR 126 within the UGB, Maple Avenue between US 97 and Northwest Way, Yew Avenue between Airport Way and S 27th Street and US 97 south of SW Glacier Avenue. The City and ODOT are currently engaged in the South US 97 corridor planning efforts to address long-term transportation and land use needs in this segment of the highway. That study will also evaluate portions of Yew Avenue and the OR 126 corridor near US 97.
- Several of the intersections along the congested corridors do not meet adopted standards. Notable locations include:

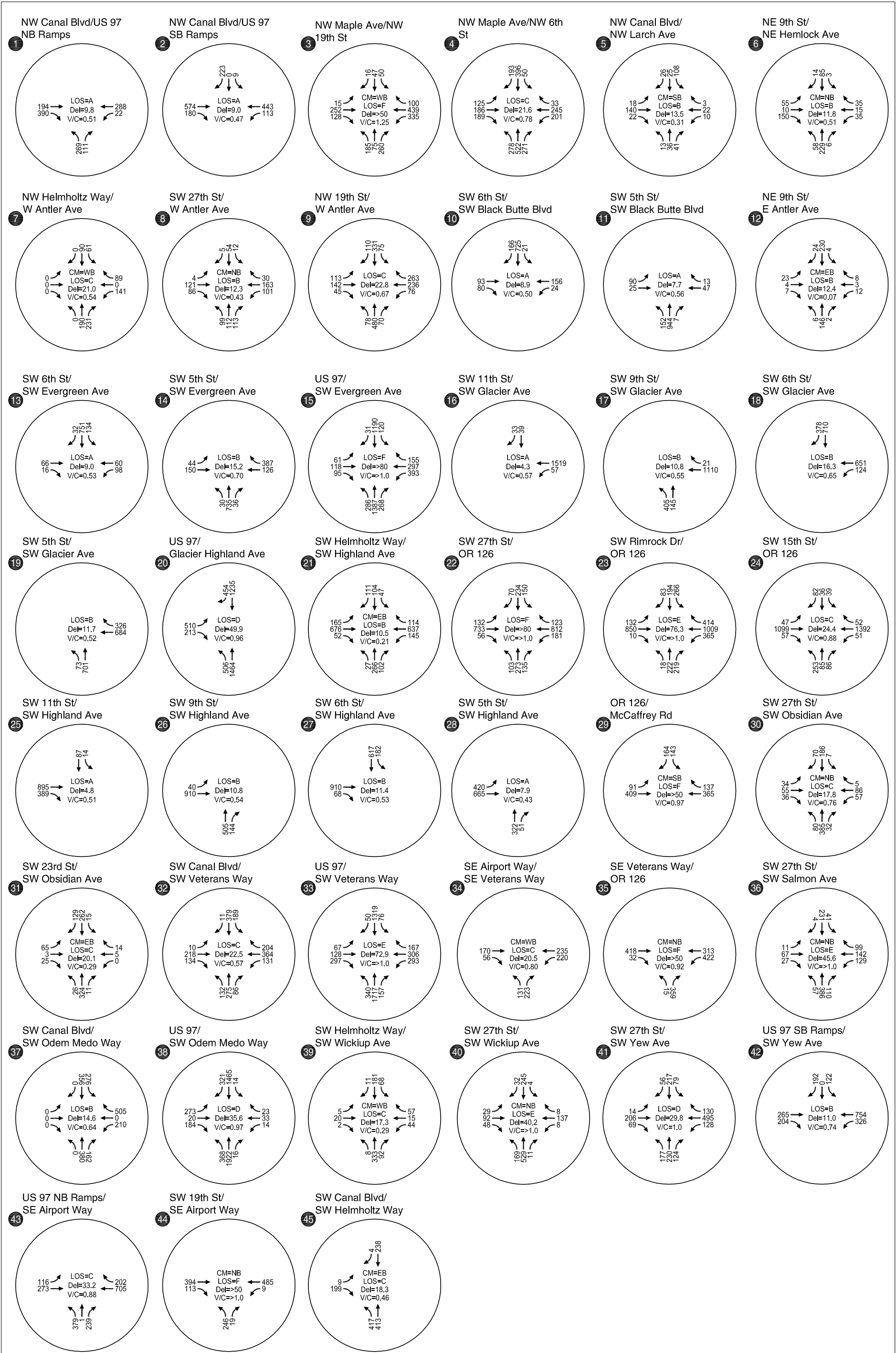


- OR 126 (SW Highland) corridor intersections including SW 15th, Rimrock, SW 27th, and SW 35th.
 - OR 126 (east) corridor intersection including SE 9th and SE Veteran's Way;
 - US 97 intersections including Veteran's Way, Odem Meadow and the Yew Avenue ramps.
 - Maple/NW 19th; and
 - Yew Avenue at SW 27th and at SW 19th (Airport Way).
- Several of the streets within the City, especially in the residential neighborhoods to the west of US 97, lack sidewalks today. As future alternatives, the potential to prioritize new sidewalks and pathways that connect neighborhoods to schools, commercial areas and other key destinations should be considered.
 - Today, cyclists are required to "share the road" on most streets within Redmond or ride on busier collector and arterial bike lanes, which are classified as "high-stress" under existing and year 2040 baseline conditions and are not suitable for riders of all ages and abilities. When bike lanes are provided, the facilities are often non-buffered and located on higher volume/higher speed roads, which typically offset the "stress reducing" attributes of the bike lane. As part of future alternatives, the need for additional low stress bike facilities to support commuting, recreational and personal travel will be identified.
 - A higher level of transit service providing fixed route service throughout the City.



Appendix A 2040 Traffic Volumes





2040 Intersection Peak Hour Volumes and Lane Configurations
Redmond, Oregon

Figure
XX

Appendix B Operational Analyses



HCM Signalized Intersection Capacity Analysis

101: US-97 NB Ramps & SW Canal Blvd

2040 Peak Hour
12/08/2017

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	194	390	22	288	269	111
Future Volume (vph)	194	390	22	288	269	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1881	1583	1543	1863	1770	1583
Flt Permitted	1.00	1.00	0.46	1.00	0.95	1.00
Satd. Flow (perm)	1881	1583	750	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	211	424	24	313	292	121
RTOR Reduction (vph)	0	286	0	0	0	84
Lane Group Flow (vph)	211	138	24	313	292	37
Heavy Vehicles (%)	1%	2%	17%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	6		5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	12.7	12.7	18.0	18.0	12.0	12.0
Effective Green, g (s)	12.7	12.7	18.0	18.0	12.0	12.0
Actuated g/C Ratio	0.33	0.33	0.46	0.46	0.31	0.31
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	612	515	362	859	544	487
v/s Ratio Prot	0.11		0.00	c0.17	c0.17	
v/s Ratio Perm		0.09	0.03			0.02
v/c Ratio	0.34	0.27	0.07	0.36	0.54	0.08
Uniform Delay, d1	10.0	9.7	6.0	6.8	11.2	9.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.3	0.1	0.3	1.0	0.1
Delay (s)	10.3	10.0	6.1	7.1	12.2	9.6
Level of Service	B	A	A	A	B	A
Approach Delay (s)	10.1			7.0	11.5	
Approach LOS	B			A	B	
Intersection Summary						
HCM 2000 Control Delay			9.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.51			
Actuated Cycle Length (s)			39.0		Sum of lost time (s)	13.5
Intersection Capacity Utilization			40.7%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

2040 Peak Hour

101: US-97 NB Ramps & SW Canal Blvd

12/08/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	211	424	24	313	292	121
v/c Ratio	0.32	0.51	0.05	0.43	0.49	0.20
Control Delay	11.8	4.2	7.4	10.1	13.9	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	4.2	7.4	10.1	13.9	4.0
Queue Length 50th (ft)	22	0	2	35	35	0
Queue Length 95th (ft)	101	53	12	100	139	28
Internal Link Dist (ft)	689			452	761	
Turn Bay Length (ft)			200			175
Base Capacity (vph)	1775	1518	450	1831	1514	1371
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.28	0.05	0.17	0.19	0.09
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

102: US-97 SB Ramps & NW Canal Blvd

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 									 	
Traffic Volume (vph)	0	574	180	113	443	0	0	0	0	9	0	223
Future Volume (vph)	0	574	180	113	443	0	0	0	0	9	0	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5						4.5	4.5
Lane Util. Factor		0.95		1.00	1.00						1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Frt		0.96		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		3437		1805	1863						1805	1583
Flt Permitted		1.00		0.22	1.00						0.95	1.00
Satd. Flow (perm)		3437		413	1863						1805	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	624	196	123	482	0	0	0	0	10	0	242
RTOR Reduction (vph)	0	34	0	0	0	0	0	0	0	0	0	202
Lane Group Flow (vph)	0	786	0	123	482	0	0	0	0	0	10	40
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	0%	0%	0%	0%	0%	2%
Turn Type		NA		pm+pt	NA					Perm	NA	Perm
Protected Phases		6		5	2						8	
Permitted Phases				2						8		8
Actuated Green, G (s)		17.7		27.2	27.2						7.2	7.2
Effective Green, g (s)		17.7		27.2	27.2						7.2	7.2
Actuated g/C Ratio		0.41		0.63	0.63						0.17	0.17
Clearance Time (s)		4.5		4.5	4.5						4.5	4.5
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1401		419	1167						299	262
v/s Ratio Prot		c0.23		0.03	c0.26							
v/s Ratio Perm				0.15							0.01	c0.03
v/c Ratio		0.56		0.29	0.41						0.03	0.15
Uniform Delay, d1		9.9		4.2	4.1						15.2	15.5
Progression Factor		1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2		0.5		0.4	0.2						0.0	0.3
Delay (s)		10.4		4.6	4.3						15.2	15.8
Level of Service		B		A	A						B	B
Approach Delay (s)		10.4			4.4			0.0			15.7	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			9.0			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			43.4			Sum of lost time (s)			13.5			
Intersection Capacity Utilization			44.6%			ICU Level of Service			A			
Analysis Period (min)			15									

c Critical Lane Group

Queues
102: US-97 SB Ramps & NW Canal Blvd

2040 Peak Hour
12/08/2017

	→	↘	←	↓	↙
Lane Group	EBT	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	820	123	482	10	242
v/c Ratio	0.56	0.26	0.42	0.03	0.52
Control Delay	11.5	4.9	5.7	16.9	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	11.5	4.9	5.7	16.9	7.7
Queue Length 50th (ft)	71	8	41	2	0
Queue Length 95th (ft)	135	28	109	13	47
Internal Link Dist (ft)	3583		689	648	
Turn Bay Length (ft)		250			275
Base Capacity (vph)	2294	470	1663	1412	1291
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.36	0.26	0.29	0.01	0.19
Intersection Summary					

Intersection

Intersection Delay, s/veh 71.9

Intersection LOS F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	252	128	335	439	100	185	76	260	50	47	16
Future Vol, veh/h	15	252	128	335	439	100	185	76	260	50	47	16
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	3	0	1	0	0	0	0	1	0	0	0
Mvmt Flow	16	268	136	356	467	106	197	81	277	53	50	17
Number of Lanes	1	1	0	1	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay	55.1	114.8	24.6	17.6
HCM LOS	F	F	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	71%	0%	100%	0%	100%	0%	44%
Vol Thru, %	29%	0%	0%	66%	0%	81%	42%
Vol Right, %	0%	100%	0%	34%	0%	19%	14%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	261	260	15	380	335	539	113
LT Vol	185	0	15	0	335	0	50
Through Vol	76	0	0	252	0	439	47
RT Vol	0	260	0	128	0	100	16
Lane Flow Rate	278	277	16	404	356	573	120
Geometry Grp	7	7	7	7	7	7	6
Degree of Util (X)	0.67	0.586	0.04	0.926	0.85	1.261	0.321
Departure Headway (Hd)	8.974	7.881	9.318	8.606	8.584	7.914	9.989
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	405	462	387	424	424	459	362
Service Time	6.674	5.581	7.018	6.306	6.331	5.66	7.989
HCM Lane V/C Ratio	0.686	0.6	0.041	0.953	0.84	1.248	0.331
HCM Control Delay	28.1	21.1	12.4	56.8	44.2	158.6	17.6
HCM Lane LOS	D	C	B	F	E	F	C
HCM 95th-tile Q	4.7	3.7	0.1	10.3	8.3	23.8	1.4

HCM Signalized Intersection Capacity Analysis

104: NW 6th St & NW Maple Ave

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	186	189	201	245	33	278	522	271	50	396	193
Future Volume (vph)	125	186	189	201	245	33	278	522	271	50	396	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1735	1881	1579	1787	1831		1787	3403		1671	3372	
Flt Permitted	0.42	1.00	1.00	0.47	1.00		0.23	1.00		0.23	1.00	
Satd. Flow (perm)	769	1881	1579	885	1831		441	3403		410	3372	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	137	204	208	221	269	36	305	574	298	55	435	212
RTOR Reduction (vph)	0	0	157	0	6	0	0	66	0	0	64	0
Lane Group Flow (vph)	137	204	51	221	299	0	305	806	0	55	583	0
Confl. Peds. (#/hr)	2		1	1		2	2					2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	1%	1%	1%	2%	0%	1%	1%	0%	8%	1%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6			2		
Actuated Green, G (s)	22.9	17.6	17.6	26.9	19.6		34.6	26.9		26.0	22.3	
Effective Green, g (s)	22.9	17.6	17.6	26.9	19.6		34.6	26.9		26.0	22.3	
Actuated g/C Ratio	0.32	0.24	0.24	0.37	0.27		0.48	0.37		0.36	0.31	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	315	459	385	422	498		367	1271		212	1044	
v/s Ratio Prot	0.03	0.11		c0.05	c0.16		c0.10	0.24		0.01	0.17	
v/s Ratio Perm	0.11		0.03	0.14			c0.30			0.08		
v/c Ratio	0.43	0.44	0.13	0.52	0.60		0.83	0.63		0.26	0.56	
Uniform Delay, d1	18.4	23.1	21.2	16.3	22.8		13.1	18.5		15.5	20.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.7	0.2	1.2	2.0		14.7	1.0		0.7	0.7	
Delay (s)	19.3	23.7	21.4	17.5	24.8		27.9	19.6		16.2	21.4	
Level of Service	B	C	C	B	C		C	B		B	C	
Approach Delay (s)		21.7			21.8			21.7			21.0	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			21.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			72.0			Sum of lost time (s)				16.5		
Intersection Capacity Utilization			69.5%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
104: NW 6th St & NW Maple Ave

2040 Peak Hour
12/08/2017

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	137	204	208	221	305	305	872	55	647
v/c Ratio	0.38	0.46	0.39	0.54	0.59	0.84	0.63	0.19	0.62
Control Delay	18.4	27.0	6.1	21.7	28.6	38.6	19.4	12.7	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	27.0	6.1	21.7	28.6	38.6	19.4	12.7	21.0
Queue Length 50th (ft)	38	75	0	64	117	77	154	12	104
Queue Length 95th (ft)	85	150	49	131	221	#222	253	35	178
Internal Link Dist (ft)	3891				719		1235		3583
Turn Bay Length (ft)	200		200		100		100		100
Base Capacity (vph)	364	927	883	411	906	361	1656	297	1585
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.22	0.24	0.54	0.34	0.84	0.53	0.19	0.41

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection												
Int Delay, s/veh	7.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	140	22	10	22	3	13	36	41	108	25	26
Future Vol, veh/h	18	140	22	10	22	3	13	36	41	108	25	26
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	0	0	20	0	0	0	0	0	0	0	11	0
Mvmt Flow	21	165	26	12	26	4	15	42	48	127	29	31

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	29	0	0	193	0	0	303	275	182	318	286	28
Stage 1	-	-	-	-	-	-	222	222	-	51	51	-
Stage 2	-	-	-	-	-	-	81	53	-	267	235	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.61	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.61	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.61	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.099	3.3
Pot Cap-1 Maneuver	1597	-	-	1392	-	-	653	636	866	639	609	1053
Stage 1	-	-	-	-	-	-	785	723	-	967	835	-
Stage 2	-	-	-	-	-	-	932	855	-	743	694	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1597	-	-	1389	-	-	598	620	863	560	593	1053
Mov Cap-2 Maneuver	-	-	-	-	-	-	598	620	-	560	593	-
Stage 1	-	-	-	-	-	-	772	711	-	952	827	-
Stage 2	-	-	-	-	-	-	865	847	-	649	682	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	2.2	11	13.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	707	1597	-	-	1389	-	-	612
HCM Lane V/C Ratio	0.15	0.013	-	-	0.008	-	-	0.306
HCM Control Delay (s)	11	7.3	0	-	7.6	0	-	13.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	1.3

Intersection	
Intersection Delay, s/veh	11.8
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Vol, veh/h	55	10	150	35	15	35	58	229	6	3	85	14
Future Vol, veh/h	55	10	150	35	15	35	58	229	6	3	85	14
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	0	11	6	0	8	0	23	1	0	0	3	62
Mvmt Flow	63	11	170	40	17	40	66	260	7	3	97	16
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	10.5	9.3	14.2	9.5
HCM LOS	B	A	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	20%	26%	41%	3%	0%
Vol Thru, %	78%	5%	18%	97%	0%
Vol Right, %	2%	70%	41%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	293	215	85	88	14
LT Vol	58	55	35	3	0
Through Vol	229	10	15	85	0
RT Vol	6	150	35	0	14
Lane Flow Rate	333	244	97	100	16
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.51	0.338	0.145	0.163	0.023
Departure Headway (Hd)	5.512	4.987	5.391	5.86	5.185
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	656	726	665	612	690
Service Time	3.541	2.987	3.431	3.596	2.92
HCM Lane V/C Ratio	0.508	0.336	0.146	0.163	0.023
HCM Control Delay	14.2	10.5	9.3	9.7	8
HCM Lane LOS	B	B	A	A	A
HCM 95th-tile Q	2.9	1.5	0.5	0.6	0.1

Intersection												
Int Delay, s/veh	6.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	141	0	89	0	190	231	61	90	0
Future Vol, veh/h	0	0	0	141	0	89	0	190	231	61	90	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	0	0	0	0	0	1	0	8	0
Mvmt Flow	0	0	0	160	0	101	0	216	263	69	102	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	639	719	102	588	588	347	102	0	0	478	0	0
Stage 1	241	241	-	347	347	-	-	-	-	-	-	-
Stage 2	398	478	-	241	241	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	392	357	959	423	424	701	1503	-	-	1095	-	-
Stage 1	767	710	-	673	638	-	-	-	-	-	-	-
Stage 2	632	559	-	767	710	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	318	333	959	401	396	701	1503	-	-	1095	-	-
Mov Cap-2 Maneuver	318	333	-	401	396	-	-	-	-	-	-	-
Stage 1	767	662	-	673	638	-	-	-	-	-	-	-
Stage 2	541	559	-	716	662	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	21	0	3.4
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1503	-	-	-	481	1095	-
HCM Lane V/C Ratio	-	-	-	-	0.543	0.063	-
HCM Control Delay (s)	0	-	-	0	21	8.5	0
HCM Lane LOS	A	-	-	A	C	A	A
HCM 95th %tile Q(veh)	0	-	-	-	3.2	0.2	-

Intersection	
Intersection Delay, s/veh	12.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	121	86	101	163	30	99	112	113	12	54	5
Future Vol, veh/h	4	121	86	101	163	30	99	112	113	12	54	5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	0	3	2	1	0	0	0	0	1	0	0	0
Mvmt Flow	5	138	98	115	185	34	113	127	128	14	61	6
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	12.8	12.1	12.5	10.5
HCM LOS	B	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	50%	0%	58%	0%	84%	0%	92%
Vol Right, %	0%	50%	0%	42%	0%	16%	0%	8%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	99	225	4	207	101	193	12	59
LT Vol	99	0	4	0	101	0	12	0
Through Vol	0	112	0	121	0	163	0	54
RT Vol	0	113	0	86	0	30	0	5
Lane Flow Rate	112	256	5	235	115	219	14	67
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.213	0.422	0.009	0.4	0.215	0.372	0.028	0.126
Departure Headway (Hd)	6.812	5.948	6.873	6.122	6.739	6.104	7.323	6.752
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	525	603	519	586	531	588	487	528
Service Time	4.569	3.704	4.633	3.882	4.496	3.861	5.098	4.527
HCM Lane V/C Ratio	0.213	0.425	0.01	0.401	0.217	0.372	0.029	0.127
HCM Control Delay	11.4	13	9.7	12.9	11.3	12.5	10.3	10.5
HCM Lane LOS	B	B	A	B	B	B	B	B
HCM 95th-tile Q	0.8	2.1	0	1.9	0.8	1.7	0.1	0.4

HCM Signalized Intersection Capacity Analysis

109: NW 19th St & W Antler Ave

2040 Peak Hour
12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	142	45	76	236	263	78	480	70	75	331	110
Future Volume (vph)	113	142	45	76	236	263	78	480	70	75	331	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1762	1808		1768	1881	1570	1805	1837		1805	1819	
Flt Permitted	0.40	1.00		0.52	1.00	1.00	0.34	1.00		0.17	1.00	
Satd. Flow (perm)	746	1808		966	1881	1570	646	1837		326	1819	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	122	153	48	82	254	283	84	516	75	81	356	118
RTOR Reduction (vph)	0	14	0	0	0	148	0	5	0	0	12	0
Lane Group Flow (vph)	122	187	0	82	254	135	84	586	0	81	462	0
Confl. Peds. (#/hr)	12		2	2		12	1		4	4		1
Heavy Vehicles (%)	2%	1%	0%	2%	1%	0%	0%	1%	2%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	20.9	16.1		20.7	16.0	22.5	34.7	30.0		38.3	31.8	
Effective Green, g (s)	20.9	16.1		20.7	16.0	22.5	34.7	30.0		38.3	31.8	
Actuated g/C Ratio	0.28	0.21		0.27	0.21	0.30	0.46	0.40		0.51	0.42	
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	3.5		2.0	3.5	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	271	386		315	399	562	370	731		293	768	
v/s Ratio Prot	c0.03	0.10		0.02	c0.14	c0.02	0.01	c0.32		0.02	0.25	
v/s Ratio Perm	0.10			0.06		0.07	0.09			0.12		
v/c Ratio	0.45	0.48		0.26	0.64	0.24	0.23	0.80		0.28	0.60	
Uniform Delay, d1	21.3	26.0		20.8	27.0	19.9	12.1	20.0		12.3	16.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.1		0.2	3.5	0.1	0.1	6.3		0.2	1.3	
Delay (s)	21.8	27.1		21.0	30.5	20.0	12.2	26.3		12.5	18.2	
Level of Service	C	C		C	C	C	B	C		B	B	
Approach Delay (s)		25.1			24.4			24.6			17.4	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			22.8									
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			75.3									
Intersection Capacity Utilization			70.5%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues
109: NW 19th St & W Antler Ave

2040 Peak Hour
12/08/2017

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	122	201	82	254	283	84	591	81	474
v/c Ratio	0.40	0.49	0.24	0.62	0.45	0.20	0.82	0.28	0.59
Control Delay	21.9	28.5	19.0	34.5	8.0	11.4	32.5	12.6	22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	28.5	19.0	34.5	8.0	11.4	32.5	12.6	22.1
Queue Length 50th (ft)	42	80	27	115	24	18	244	18	172
Queue Length 95th (ft)	78	142	56	189	76	46	#476	44	312
Internal Link Dist (ft)		2545		3983			2700		5211
Turn Bay Length (ft)	125		150		225	175		225	
Base Capacity (vph)	305	713	348	731	631	418	823	299	823
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.28	0.24	0.35	0.45	0.20	0.72	0.27	0.58

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

110: SW 6th St & SW Black Butte Blvd

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	93	80	24	156	0	0	0	0	21	725	166
Future Volume (vph)	0	93	80	24	156	0	0	0	0	21	725	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0						5.0	
Lane Util. Factor		1.00			1.00						0.95	
Frpb, ped/bikes		1.00			1.00						1.00	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		0.94			1.00						0.97	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1782			1888						3453	
Flt Permitted		1.00			0.93						1.00	
Satd. Flow (perm)		1782			1775						3453	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	98	84	25	164	0	0	0	0	22	763	175
RTOR Reduction (vph)	0	52	0	0	0	0	0	0	0	0	27	0
Lane Group Flow (vph)	0	130	0	0	189	0	0	0	0	0	933	0
Confl. Peds. (#/hr)	1					1	1			1	1	1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		8			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		10.3			10.3						21.3	
Effective Green, g (s)		10.3			10.3						21.3	
Actuated g/C Ratio		0.25			0.25						0.51	
Clearance Time (s)		5.0			5.0						5.0	
Vehicle Extension (s)		3.0			3.0						3.0	
Lane Grp Cap (vph)		441			439						1768	
v/s Ratio Prot		0.07										
v/s Ratio Perm					0.11						0.27	
v/c Ratio		0.29			0.43						0.53	
Uniform Delay, d1		12.7			13.2						6.8	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.4			0.7						0.3	
Delay (s)		13.1			13.9						7.1	
Level of Service		B			B						A	
Approach Delay (s)		13.1			13.9			0.0			7.1	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			8.9			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			41.6			Sum of lost time (s)				10.0		
Intersection Capacity Utilization			61.3%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
110: SW 6th St & SW Black Butte Blvd

2040 Peak Hour
12/08/2017

	→	←	↓
Lane Group	EBT	WBT	SBT
Lane Group Flow (vph)	182	189	960
v/c Ratio	0.37	0.44	0.54
Control Delay	12.4	18.7	7.9
Queue Delay	0.0	0.0	0.0
Total Delay	12.4	18.7	7.9
Queue Length 50th (ft)	21	37	63
Queue Length 95th (ft)	75	103	127
Internal Link Dist (ft)	3983	187	3118
Turn Bay Length (ft)			
Base Capacity (vph)	1140	1110	2899
Starvation Cap Reductn	0	10	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.16	0.17	0.33
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

111: SW 5th St & SW Black Butte Blvd

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	25	0	0	47	13	152	944	7	0	0	0
Future Volume (vph)	90	25	0	0	47	13	152	944	7	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			1.00			1.00				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.97			1.00				
Flt Protected		0.96			1.00			0.99				
Satd. Flow (prot)		1828			1788			3546				
Flt Permitted		0.73			1.00			0.99				
Satd. Flow (perm)		1381			1788			3546				
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	102	28	0	0	53	15	173	1073	8	0	0	0
RTOR Reduction (vph)	0	0	0	0	12	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	130	0	0	56	0	0	1254	0	0	0	0
Confl. Peds. (#/hr)							2		1	1		2
Heavy Vehicles (%)	0%	0%	0%	0%	4%	0%	0%	1%	17%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		8			4			6				
Permitted Phases	8						6					
Actuated Green, G (s)		8.6			8.6			31.7				
Effective Green, g (s)		8.6			8.6			31.7				
Actuated g/C Ratio		0.17			0.17			0.63				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		236			305			2234				
v/s Ratio Prot					0.03							
v/s Ratio Perm		0.09						0.35				
v/c Ratio		0.55			0.18			0.56				
Uniform Delay, d1		19.1			17.8			5.3				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		2.8			0.3			0.3				
Delay (s)		21.9			18.1			5.6				
Level of Service		C			B			A				
Approach Delay (s)		21.9			18.1			5.6			0.0	
Approach LOS		C			B			A			A	
Intersection Summary												
HCM 2000 Control Delay		7.7			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.56										
Actuated Cycle Length (s)		50.3			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		55.3%			ICU Level of Service			B				
Analysis Period (min)		15										

c Critical Lane Group

Queues
111: SW 5th St & SW Black Butte Blvd

2040 Peak Hour
12/08/2017

	→	←	↑
Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	130	68	1254
v/c Ratio	0.45	0.18	0.53
Control Delay	24.3	16.0	7.3
Queue Delay	0.0	0.0	0.0
Total Delay	24.3	16.0	7.3
Queue Length 50th (ft)	31	12	100
Queue Length 95th (ft)	86	43	185
Internal Link Dist (ft)	187	470	1008
Turn Bay Length (ft)			
Base Capacity (vph)	617	806	2826
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.21	0.08	0.44
Intersection Summary			

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	23	4	7	12	3	8	6	146	2	4	230	24
Future Vol, veh/h	23	4	7	12	3	8	6	146	2	4	230	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	4	0	0	0	0	25	50	4	0	50	8	4
Mvmt Flow	26	5	8	14	3	9	7	166	2	5	261	27

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	471	466	275	471	479	167	289	0	0	168	0	0
Stage 1	284	284	-	181	181	-	-	-	-	-	-	-
Stage 2	187	182	-	290	298	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.5	6.2	7.1	6.5	6.45	4.6	-	-	4.6	-	-
Critical Hdwy Stg 1	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4	3.3	3.5	4	3.525	2.65	-	-	2.65	-	-
Pot Cap-1 Maneuver	500	497	769	506	489	821	1042	-	-	1165	-	-
Stage 1	719	680	-	825	754	-	-	-	-	-	-	-
Stage 2	810	753	-	722	671	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	487	491	769	493	483	821	1042	-	-	1165	-	-
Mov Cap-2 Maneuver	487	491	-	493	483	-	-	-	-	-	-	-
Stage 1	714	677	-	819	749	-	-	-	-	-	-	-
Stage 2	792	748	-	706	668	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.4		11.6		0.3		0.1	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1042	-	-	527 571	1165	-	-
HCM Lane V/C Ratio	0.007	-	-	0.073 0.046	0.004	-	-
HCM Control Delay (s)	8.5	0	-	12.4 11.6	8.1	0	-
HCM Lane LOS	A	A	-	B B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0.1	0	-	-

HCM Signalized Intersection Capacity Analysis

113: SW 6th St & SW Evergreen Ave

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											  	
Traffic Volume (vph)	0	66	16	98	60	0	0	0	0	134	751	32
Future Volume (vph)	0	66	16	98	60	0	0	0	0	134	751	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0						5.0	
Lane Util. Factor		1.00			1.00						0.95	
Frpb, ped/bikes		0.99			1.00						1.00	
Flpb, ped/bikes		1.00			0.99						0.99	
Frt		0.97			1.00						0.99	
Flt Protected		1.00			0.97						0.99	
Satd. Flow (prot)		1810			1826						3503	
Flt Permitted		1.00			0.76						0.99	
Satd. Flow (perm)		1810			1427						3503	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	73	18	109	67	0	0	0	0	149	834	36
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	78	0	0	176	0	0	0	0	0	1016	0
Confl. Peds. (#/hr)	21		19	19		21	16		26	26		16
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	1%	1%	3%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		8			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5			11.5						23.5	
Effective Green, g (s)		11.5			11.5						23.5	
Actuated g/C Ratio		0.26			0.26						0.52	
Clearance Time (s)		5.0			5.0						5.0	
Vehicle Extension (s)		3.0			3.0						3.0	
Lane Grp Cap (vph)		462			364						1829	
v/s Ratio Prot		0.04										
v/s Ratio Perm					c0.12						0.29	
v/c Ratio		0.17			0.48						0.56	
Uniform Delay, d1		13.0			14.2						7.2	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.2			1.0						0.4	
Delay (s)		13.2			15.2						7.6	
Level of Service		B			B						A	
Approach Delay (s)		13.2			15.2			0.0			7.6	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			9.0			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.53									
Actuated Cycle Length (s)			45.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			52.6%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
113: SW 6th St & SW Evergreen Ave

2040 Peak Hour
12/08/2017

	→	←	↓
Lane Group	EBT	WBT	SBT
Lane Group Flow (vph)	91	176	1019
v/c Ratio	0.19	0.49	0.57
Control Delay	14.0	21.7	9.0
Queue Delay	0.0	0.0	0.0
Total Delay	14.0	21.7	9.0
Queue Length 50th (ft)	15	38	79
Queue Length 95th (ft)	51	106	158
Internal Link Dist (ft)	369	175	1004
Turn Bay Length (ft)			
Base Capacity (vph)	1061	827	2743
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.09	0.21	0.37
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

114: SW 5th St & SW Evergreen Ave

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	150	0	0	126	387	30	735	36	0	0	0
Future Volume (vph)	44	150	0	0	126	387	30	735	36	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.99			1.00				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.90			0.99				
Flt Protected		0.99			1.00			1.00				
Satd. Flow (prot)		1851			1642			3575				
Flt Permitted		0.70			1.00			1.00				
Satd. Flow (perm)		1308			1642			3575				
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	49	167	0	0	140	430	33	817	40	0	0	0
RTOR Reduction (vph)	0	0	0	0	46	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	216	0	0	524	0	0	885	0	0	0	0
Confl. Peds. (#/hr)	2		3	3		2	1		1	1		1
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	3%	1%	0%	0%	2%	3%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		8			4			6				
Permitted Phases	8						6					
Actuated Green, G (s)		22.5			22.5			21.6				
Effective Green, g (s)		22.5			22.5			21.6				
Actuated g/C Ratio		0.42			0.42			0.40				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		543			682			1427				
v/s Ratio Prot					c0.32							
v/s Ratio Perm		0.17						0.25				
v/c Ratio		0.40			0.77			0.62				
Uniform Delay, d1		11.1			13.6			13.0				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		0.5			5.2			0.8				
Delay (s)		11.5			18.8			13.8				
Level of Service		B			B			B				
Approach Delay (s)		11.5			18.8			13.8			0.0	
Approach LOS		B			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			15.2			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			54.1			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			79.3%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
114: SW 5th St & SW Evergreen Ave

2040 Peak Hour
12/08/2017

	→	←	↑
Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	216	570	890
v/c Ratio	0.40	0.79	0.63
Control Delay	14.7	22.0	16.3
Queue Delay	0.1	0.0	0.0
Total Delay	14.8	22.0	16.3
Queue Length 50th (ft)	47	131	117
Queue Length 95th (ft)	110	291	206
Internal Link Dist (ft)	175	838	646
Turn Bay Length (ft)			
Base Capacity (vph)	791	1023	2025
Starvation Cap Reductn	107	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.32	0.56	0.44
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

115: US-97 & SW Evergreen Ave

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	118	95	393	297	155	286	1387	268	120	1190	31
Future Volume (vph)	61	118	95	393	297	155	286	1387	268	120	1190	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1745		1752	1743		1770	3374	1538	1787	3374	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1745		1752	1743		1770	3374	1538	1787	3374	1615
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	64	124	100	414	313	163	301	1460	282	126	1253	33
RTOR Reduction (vph)	0	21	0	0	13	0	0	0	166	0	0	22
Lane Group Flow (vph)	64	203	0	414	463	0	301	1460	116	126	1253	11
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	2%	1%	1%	3%	1%	8%	2%	7%	5%	1%	7%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Prot	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6	6	5	2	
Permitted Phases												2
Actuated Green, G (s)	7.3	26.6		24.6	43.9		22.6	57.3	57.3	10.5	45.2	45.2
Effective Green, g (s)	7.3	26.6		24.6	43.9		22.6	57.3	57.3	10.5	45.2	45.2
Actuated g/C Ratio	0.05	0.19		0.18	0.32		0.16	0.41	0.41	0.08	0.33	0.33
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	92	333		310	550		287	1390	634	134	1097	525
v/s Ratio Prot	0.04	0.12		c0.24	c0.27		c0.17	0.43	0.08	0.07	c0.37	
v/s Ratio Perm												0.01
v/c Ratio	0.70	0.61		1.34	0.84		1.05	1.05	0.18	0.94	1.14	0.02
Uniform Delay, d1	64.8	51.4		57.2	44.3		58.2	40.9	26.0	63.9	46.9	31.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.4	3.2		171.3	11.2		66.5	38.5	0.1	59.5	75.2	0.0
Delay (s)	85.2	54.6		228.5	55.5		124.7	79.4	26.1	123.4	122.1	31.9
Level of Service	F	D		F	E		F	E	C	F	F	C
Approach Delay (s)		61.4			136.0			78.7			120.1	
Approach LOS		E			F			E			F	
Intersection Summary												
HCM 2000 Control Delay			101.3			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.11									
Actuated Cycle Length (s)			139.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			99.9%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
115: US-97 & SW Evergreen Ave

2040 Peak Hour
12/08/2017

										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	64	224	414	476	301	1460	282	126	1253	33
v/c Ratio	0.58	0.65	1.33	0.84	1.04	1.04	0.35	0.93	1.13	0.05
Control Delay	85.7	54.3	211.2	56.9	119.4	75.9	4.5	123.1	114.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.7	54.3	211.2	56.9	119.4	75.9	4.5	123.1	114.4	0.2
Queue Length 50th (ft)	57	166	~483	396	~293	~751	0	115	~691	0
Queue Length 95th (ft)	#120	254	#765	540	#536	#1014	60	#267	#937	0
Internal Link Dist (ft)		838		3278		1074			1019	
Turn Bay Length (ft)	150		450		275		575	350		100
Base Capacity (vph)	122	501	312	684	289	1399	802	136	1104	626
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.45	1.33	0.70	1.04	1.04	0.35	0.93	1.13	0.05

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

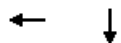
116: SW 11th St & SW Glacier Ave

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					 						 	
Traffic Volume (vph)	0	0	0	57	1519	0	0	0	0	0	39	33
Future Volume (vph)	0	0	0	57	1519	0	0	0	0	0	39	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.5						4.5	
Lane Util. Factor					0.95						0.95	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					1.00						1.00	
Frt					1.00						0.93	
Flt Protected					1.00						1.00	
Satd. Flow (prot)					3535						3336	
Flt Permitted					1.00						1.00	
Satd. Flow (perm)					3535						3336	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	62	1651	0	0	0	0	0	42	36
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	33	0
Lane Group Flow (vph)	0	0	0	0	1710	0	0	0	0	0	45	0
Confl. Peds. (#/hr)	3		1	1		3	3		2	2		3
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA						NA	
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					55.7						5.1	
Effective Green, g (s)					55.7						5.1	
Actuated g/C Ratio					0.80						0.07	
Clearance Time (s)					4.5						4.5	
Vehicle Extension (s)					3.0						3.0	
Lane Grp Cap (vph)					2820						243	
v/s Ratio Prot											c0.01	
v/s Ratio Perm					0.48							
v/c Ratio					0.61						0.18	
Uniform Delay, d1					2.8						30.4	
Progression Factor					1.00						1.00	
Incremental Delay, d2					0.4						0.4	
Delay (s)					3.1						30.8	
Level of Service					A						C	
Approach Delay (s)		0.0			3.1			0.0			30.8	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			4.3		HCM 2000 Level of Service					A		
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			69.8		Sum of lost time (s)					9.0		
Intersection Capacity Utilization			60.3%		ICU Level of Service					B		
Analysis Period (min)			15									

c Critical Lane Group



Lane Group	WBT	SBT
Lane Group Flow (vph)	1713	78
v/c Ratio	0.58	0.21
Control Delay	3.8	22.3
Queue Delay	0.1	0.0
Total Delay	4.0	22.3
Queue Length 50th (ft)	114	9
Queue Length 95th (ft)	175	32
Internal Link Dist (ft)	472	448
Turn Bay Length (ft)		
Base Capacity (vph)	3379	977
Starvation Cap Reductn	545	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.60	0.08
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

117: SW 9th St & SW Glacier Ave

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1110	21	405	145	0	0	0	0
Future Volume (vph)	0	0	0	0	1110	21	405	145	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.5		4.5	4.5				
Lane Util. Factor					0.95		0.91	0.91				
Frpb, ped/bikes					1.00		1.00	1.00				
Flpb, ped/bikes					1.00		1.00	1.00				
Frt					1.00		1.00	1.00				
Flt Protected					1.00		0.95	0.97				
Satd. Flow (prot)					3530		1609	3320				
Flt Permitted					1.00		0.95	0.97				
Satd. Flow (perm)					3530		1609	3320				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1207	23	440	158	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	0	49	49	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1229	0	171	329	0	0	0	0
Confl. Peds. (#/hr)	3					3	1					1
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					6			8				
Permitted Phases							8					
Actuated Green, G (s)					29.9		13.5	13.5				
Effective Green, g (s)					29.9		13.5	13.5				
Actuated g/C Ratio					0.57		0.26	0.26				
Clearance Time (s)					4.5		4.5	4.5				
Vehicle Extension (s)					3.0		3.0	3.0				
Lane Grp Cap (vph)					2014		414	855				
v/s Ratio Prot					c0.35							
v/s Ratio Perm							c0.11	0.10				
v/c Ratio					0.61		0.41	0.38				
Uniform Delay, d1					7.4		16.2	16.0				
Progression Factor					1.00		1.00	1.00				
Incremental Delay, d2					0.6		0.7	0.3				
Delay (s)					8.0		16.8	16.3				
Level of Service					A		B	B				
Approach Delay (s)		0.0			8.0			16.5			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			10.8		HCM 2000 Level of Service						B	
HCM 2000 Volume to Capacity ratio			0.55									
Actuated Cycle Length (s)			52.4		Sum of lost time (s)						9.0	
Intersection Capacity Utilization			82.9%		ICU Level of Service						E	
Analysis Period (min)			15									

c Critical Lane Group

Queues
117: SW 9th St & SW Glacier Ave

2040 Peak Hour
12/08/2017



Lane Group	WBT	NBL	NBT
Lane Group Flow (vph)	1230	220	378
v/c Ratio	0.62	0.48	0.42
Control Delay	9.6	17.2	16.2
Queue Delay	0.0	0.0	0.0
Total Delay	9.6	17.2	16.2
Queue Length 50th (ft)	110	40	41
Queue Length 95th (ft)	237	131	103
Internal Link Dist (ft)	765		275
Turn Bay Length (ft)			
Base Capacity (vph)	3319	1117	2283
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.37	0.20	0.17
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

118: SW 6th St & SW Glacier Ave

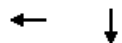
2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					 						 	
Traffic Volume (vph)	0	0	0	124	651	0	0	0	0	0	710	378
Future Volume (vph)	0	0	0	124	651	0	0	0	0	0	710	378
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.5						4.5	
Lane Util. Factor					0.95						0.95	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					1.00						1.00	
Frt					1.00						0.95	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					3492						3382	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					3492						3382	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	133	700	0	0	0	0	0	763	406
RTOR Reduction (vph)	0	0	0	0	16	0	0	0	0	0	41	0
Lane Group Flow (vph)	0	0	0	0	817	0	0	0	0	0	1128	0
Confl. Peds. (#/hr)			2	2			2		2	2		2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Perm	NA						NA	
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					25.3						36.8	
Effective Green, g (s)					25.3						36.8	
Actuated g/C Ratio					0.36						0.52	
Clearance Time (s)					4.5						4.5	
Vehicle Extension (s)					3.0						3.0	
Lane Grp Cap (vph)					1242						1750	
v/s Ratio Prot											c0.33	
v/s Ratio Perm					0.23							
v/c Ratio					0.66						0.64	
Uniform Delay, d1					19.3						12.4	
Progression Factor					1.00						1.00	
Incremental Delay, d2					1.3						0.8	
Delay (s)					20.5						13.2	
Level of Service					C						B	
Approach Delay (s)		0.0			20.5			0.0			13.2	
Approach LOS		A			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			16.3		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			71.1		Sum of lost time (s)					9.0		
Intersection Capacity Utilization			60.9%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
118: SW 6th St & SW Glacier Ave

2040 Peak Hour
12/08/2017



Lane Group	WBT	SBT
Lane Group Flow (vph)	833	1169
v/c Ratio	0.67	0.66
Control Delay	23.2	14.2
Queue Delay	0.3	0.0
Total Delay	23.5	14.2
Queue Length 50th (ft)	152	167
Queue Length 95th (ft)	288	303
Internal Link Dist (ft)	179	644
Turn Bay Length (ft)		
Base Capacity (vph)	1916	2660
Starvation Cap Reductn	448	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.57	0.44
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

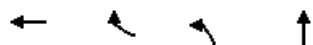
119: SW 5th St & SW Glacier Ave

2040 Peak Hour
12/08/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑	↑	↑	↑↑				
Traffic Volume (vph)	0	0	0	0	684	326	73	701	0	0	0	0
Future Volume (vph)	0	0	0	0	684	326	73	701	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.5	4.5	4.5	4.5				
Lane Util. Factor					0.95	1.00	0.91	0.91				
Frpb, ped/bikes					1.00	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	1.00	1.00				
Frt					1.00	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	1.00				
Satd. Flow (prot)					3505	1563	1643	3456				
Flt Permitted					1.00	1.00	0.95	1.00				
Satd. Flow (perm)					3505	1563	1643	3456				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	743	354	79	762	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	81	29	10	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	743	273	42	760	0	0	0	0
Confl. Peds. (#/hr)	1					1			1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	3%	2%	0%	0%	0%	0%	0%	0%
Turn Type					NA	Perm	Perm	NA				
Protected Phases					4			6				
Permitted Phases						4	6					
Actuated Green, G (s)					22.9	22.9	21.3	21.3				
Effective Green, g (s)					22.9	22.9	21.3	21.3				
Actuated g/C Ratio					0.43	0.43	0.40	0.40				
Clearance Time (s)					4.5	4.5	4.5	4.5				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1508	672	657	1383				
v/s Ratio Prot					c0.21							
v/s Ratio Perm						0.17	0.03	0.22				
v/c Ratio					0.49	0.41	0.06	0.55				
Uniform Delay, d1					11.0	10.5	9.8	12.3				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					0.3	0.4	0.0	0.5				
Delay (s)					11.2	10.9	9.9	12.7				
Level of Service					B	B	A	B				
Approach Delay (s)		0.0			11.1			12.5			0.0	
Approach LOS		A			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			11.7		HCM 2000 Level of Service						B	
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			53.2		Sum of lost time (s)						9.0	
Intersection Capacity Utilization			68.9%		ICU Level of Service						C	
Analysis Period (min)			15									
c Critical Lane Group												

Queues
119: SW 5th St & SW Glacier Ave

2040 Peak Hour
12/08/2017



Lane Group	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	743	354	71	770
v/c Ratio	0.50	0.48	0.10	0.56
Control Delay	13.2	9.5	6.4	14.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.2	9.5	6.4	14.8
Queue Length 50th (ft)	82	40	4	92
Queue Length 95th (ft)	170	128	31	198
Internal Link Dist (ft)	478			255
Turn Bay Length (ft)		125	75	
Base Capacity (vph)	2772	1265	1452	3044
Starvation Cap Reductn	0	0	0	129
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.27	0.28	0.05	0.26

Intersection Summary

HCM Signalized Intersection Capacity Analysis

120: US97 & Glacier Highland Ave

2040 Peak Hour
12/08/2017

										
Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER	
Lane Configurations										
Traffic Volume (vph)	510	213	506	1464	1235	454	0	0	0	
Future Volume (vph)	510	213	506	1464	1235	454	0	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.5	4.5	4.5	5.5	5.5					
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95					
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99					
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00					
Frt	1.00	0.85	1.00	1.00	0.96					
Flt Protected	0.95	1.00	0.95	1.00	1.00					
Satd. Flow (prot)	3400	1599	3433	3438	3275					
Flt Permitted	0.95	1.00	0.95	1.00	1.00					
Satd. Flow (perm)	3400	1599	3433	3438	3275					
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	
Adj. Flow (vph)	537	224	533	1541	1300	478	0	0	0	
RTOR Reduction (vph)	0	180	0	0	0	0	0	0	0	
Lane Group Flow (vph)	537	44	533	1541	1778	0	0	0	0	
Confl. Bikes (#/hr)						1				
Heavy Vehicles (%)	3%	1%	2%	5%	6%	3%	2%	2%	2%	
Turn Type	Prot	Perm	Prot	NA	NA		Perm			
Protected Phases	8		1	6	2					
Permitted Phases		3					2			
Actuated Green, G (s)	26.3	26.3	25.5	97.0	67.0					
Effective Green, g (s)	26.3	26.3	25.5	97.0	67.0					
Actuated g/C Ratio	0.20	0.20	0.19	0.73	0.50					
Clearance Time (s)	4.5	4.5	4.5	5.5	5.5					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0					
Lane Grp Cap (vph)	670	315	656	2501	1646					
v/s Ratio Prot	c0.16		c0.16	0.45	c0.54					
v/s Ratio Perm		0.03								
v/c Ratio	0.80	0.14	0.81	0.62	1.08					
Uniform Delay, d1	51.0	44.2	51.6	9.0	33.2					
Progression Factor	1.00	1.00	1.00	1.00	1.00					
Incremental Delay, d2	6.9	0.2	7.6	0.5	47.3					
Delay (s)	57.9	44.4	59.2	9.4	80.5					
Level of Service	E	D	E	A	F					
Approach Delay (s)	53.9			22.2	80.5			0.0		
Approach LOS	D			C	F			A		
Intersection Summary										
HCM 2000 Control Delay			49.9			HCM 2000 Level of Service			D	
HCM 2000 Volume to Capacity ratio			0.96							
Actuated Cycle Length (s)			133.3			Sum of lost time (s)			14.5	
Intersection Capacity Utilization			89.7%			ICU Level of Service			E	
Analysis Period (min)			15							
c Critical Lane Group										

Queues
120: US97 & Glacier Highland Ave

2040 Peak Hour
12/08/2017

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	537	224	533	1541	1778
v/c Ratio	0.80	0.45	0.81	0.62	1.08
Control Delay	61.1	8.6	62.5	10.8	80.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	61.2	8.6	62.5	10.8	80.7
Queue Length 50th (ft)	230	0	228	309	~905
Queue Length 95th (ft)	310	69	313	460	#1235
Internal Link Dist (ft)	383			2738	1074
Turn Bay Length (ft)		200	325		
Base Capacity (vph)	936	602	841	2685	1643
Starvation Cap Reductn	17	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.58	0.37	0.63	0.57	1.08

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↕			↕	
Traffic Vol, veh/h	165	676	52	145	637	114	27	266	102	47	104	111
Future Vol, veh/h	165	676	52	145	637	114	27	266	102	47	104	111
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	525	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	5	5	3	3	0	0	0	1	0	8	0
Mvmt Flow	176	719	55	154	678	121	29	283	109	50	111	118

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	799	0	0	774	0	0	2259	2205	747	2341	2173	738
Stage 1	-	-	-	-	-	-	1098	1098	-	1047	1047	-
Stage 2	-	-	-	-	-	-	1161	1107	-	1294	1126	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.1	6.5	6.21	7.1	6.58	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.58	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.5	4	3.309	3.5	4.072	3.3
Pot Cap-1 Maneuver	833	-	-	837	-	-	30	~ 45	415	~ 26	~ 45	421
Stage 1	-	-	-	-	-	-	260	291	-	278	298	-
Stage 2	-	-	-	-	-	-	240	288	-	202	273	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	833	-	-	837	-	-	-	~ 29	415	-	~ 29	421
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 29	-	-	~ 29	-
Stage 1	-	-	-	-	-	-	205	~ 230	-	219	243	-
Stage 2	-	-	-	-	-	-	77	~ 235	-	-	215	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	1.7		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	833	-	-	837	-	-	-
HCM Lane V/C Ratio	-	0.211	-	-	0.184	-	-	-
HCM Control Delay (s)	-	10.5	-	-	10.3	-	-	-
HCM Lane LOS	-	B	-	-	B	-	-	-
HCM 95th %tile Q(veh)	-	0.8	-	-	0.7	-	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM Signalized Intersection Capacity Analysis

122: SW 27th St & OR-126

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	733	56	181	812	123	103	273	135	150	234	70
Future Volume (vph)	132	733	56	181	812	123	103	273	135	150	234	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.0		4.7	5.0		4.7	5.0		4.7	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.98		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	1812		1805	1810		1718	1763		1769	1881	1531
Flt Permitted	0.10	1.00		0.09	1.00		0.42	1.00		0.17	1.00	1.00
Satd. Flow (perm)	187	1812		169	1810		754	1763		324	1881	1531
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	139	772	59	191	855	129	108	287	142	158	246	74
RTOR Reduction (vph)	0	3	0	0	6	0	0	18	0	0	0	57
Lane Group Flow (vph)	139	828	0	191	979	0	108	411	0	158	246	17
Confl. Peds. (#/hr)	1						1	1		1	1	1
Confl. Bikes (#/hr)							1					1
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	5%	2%	1%	2%	1%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	47.0	40.7		55.6	45.0		29.3	23.0		29.3	23.0	23.0
Effective Green, g (s)	47.0	40.7		55.6	45.0		29.3	23.0		29.3	23.0	23.0
Actuated g/C Ratio	0.47	0.41		0.56	0.45		0.29	0.23		0.29	0.23	0.23
Clearance Time (s)	4.7	5.0		4.7	5.0		4.7	5.0		4.7	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	189	737		267	814		281	405		185	432	352
v/s Ratio Prot	0.05	0.46		c0.08	c0.54		0.02	c0.23		c0.05	0.13	
v/s Ratio Perm	0.30			0.32			0.09			0.20		0.01
v/c Ratio	0.74	1.12		0.72	1.20		0.38	1.02		0.85	0.57	0.05
Uniform Delay, d1	22.5	29.6		23.0	27.5		27.0	38.5		30.8	34.1	30.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.8	72.6		8.8	102.6		0.9	48.7		29.8	1.7	0.1
Delay (s)	36.3	102.2		31.7	130.1		27.8	87.2		60.5	35.8	30.0
Level of Service	D	F		C	F		C	F		E	D	C
Approach Delay (s)		92.8			114.1			75.3			43.1	
Approach LOS		F			F			E			D	
Intersection Summary												
HCM 2000 Control Delay			90.2			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.10									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			19.4			
Intersection Capacity Utilization			104.6%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
122: SW 27th St & OR-126

2040 Peak Hour
12/08/2017

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	139	831	191	984	108	429	158	246	74
v/c Ratio	0.74	1.12	0.72	1.20	0.38	1.02	0.84	0.57	0.15
Control Delay	41.0	102.0	33.8	129.6	27.8	85.6	63.6	40.1	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.0	102.0	33.8	129.6	27.8	85.6	63.6	40.1	0.7
Queue Length 50th (ft)	39	~624	64	~767	48	~269	72	140	0
Queue Length 95th (ft)	#133	#872	138	#1013	89	#470	#161	220	0
Internal Link Dist (ft)		5185		2015		2675		2548	
Turn Bay Length (ft)	225		275		125		150		150
Base Capacity (vph)	189	740	296	819	283	422	187	432	487
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	1.12	0.65	1.20	0.38	1.02	0.84	0.57	0.15

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

123: SW Rimrock Dr & OR-126

2040 Peak Hour
12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	850	10	365	1009	414	18	222	219	266	194	83
Future Volume (vph)	132	850	10	365	1009	414	18	222	219	266	194	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	3499		1805	1881	1529	1804	1881	1594	1805	1881	1578
Flt Permitted	0.13	1.00		0.12	1.00	1.00	0.63	1.00	1.00	0.35	1.00	1.00
Satd. Flow (perm)	240	3499		236	1881	1529	1194	1881	1594	668	1881	1578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	140	904	11	388	1073	440	19	236	233	283	206	88
RTOR Reduction (vph)	0	1	0	0	0	148	0	0	182	0	0	65
Lane Group Flow (vph)	140	914	0	388	1073	292	19	236	51	283	206	23
Confl. Peds. (#/hr)	3		2	2		3	1		1	1		1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	5%	3%	0%	0%	1%	3%	0%	1%	0%	0%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	36.6	30.1		48.1	37.1	37.1	21.5	19.0	19.0	29.5	23.0	23.0
Effective Green, g (s)	36.6	30.1		48.1	37.1	37.1	21.5	19.0	19.0	29.5	23.0	23.0
Actuated g/C Ratio	0.42	0.35		0.55	0.43	0.43	0.25	0.22	0.22	0.34	0.26	0.26
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	211	1209		373	801	651	312	410	347	311	496	416
v/s Ratio Prot	0.05	0.26		c0.16	c0.57		0.00	0.13		c0.07	0.11	
v/s Ratio Perm	0.23			0.41		0.19	0.01		0.03	c0.24		0.01
v/c Ratio	0.66	0.76		1.04	1.34	0.45	0.06	0.58	0.15	0.91	0.42	0.06
Uniform Delay, d1	20.2	25.3		23.6	25.0	17.7	25.0	30.4	27.5	27.1	26.5	23.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.6	2.7		57.4	161.2	0.5	0.1	2.0	0.2	28.7	0.6	0.1
Delay (s)	27.8	28.0		81.0	186.2	18.2	25.0	32.4	27.7	55.8	27.1	24.0
Level of Service	C	C		F	F	B	C	C	C	E	C	C
Approach Delay (s)		28.0			125.9			29.9			40.7	
Approach LOS		C			F			C			D	
Intersection Summary												
HCM 2000 Control Delay			76.3									
HCM 2000 Volume to Capacity ratio			1.22									
Actuated Cycle Length (s)			87.1							18.0		
Intersection Capacity Utilization			102.3%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

123: SW Rimrock Dr & OR-126

2040 Peak Hour

12/08/2017

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	140	915	388	1073	440	19	236	233	283	206	88
v/c Ratio	0.64	0.73	1.01	1.30	0.54	0.05	0.66	0.47	0.98	0.40	0.16
Control Delay	29.0	28.7	71.2	167.7	10.2	19.2	40.3	7.4	77.0	29.0	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	28.7	71.2	167.7	10.2	19.2	40.3	7.4	77.0	29.0	0.6
Queue Length 50th (ft)	31	215	148	~727	58	7	116	0	119	82	0
Queue Length 95th (ft)	#113	328	#382	#1086	166	21	189	55	#269	165	1
Internal Link Dist (ft)	2015		1820		1014		2700				
Turn Bay Length (ft)	225		200			200		175	250		250
Base Capacity (vph)	218	1247	386	827	816	368	715	750	289	715	701
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.73	1.01	1.30	0.54	0.05	0.33	0.31	0.98	0.29	0.13

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

124: SW 15th St & OR-126

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	1099	57	51	1392	52	253	85	86	39	36	82
Future Volume (vph)	47	1099	57	51	1392	52	253	85	86	39	36	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.97			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1805	3480		1805	3520			1761			1702	
Flt Permitted	0.09	1.00		0.12	1.00			0.71			0.85	
Satd. Flow (perm)	163	3480		223	3520			1288			1471	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	1195	62	55	1513	57	275	92	93	42	39	89
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0	0	10	0
Lane Group Flow (vph)	51	1257	0	55	1568	0	0	460	0	0	160	0
Confl. Peds. (#/hr)	1		8	8		1	6		1	1		6
Heavy Vehicles (%)	0%	3%	0%	0%	2%	0%	1%	3%	0%	0%	0%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	46.6	46.6		46.6	46.6			36.7			36.7	
Effective Green, g (s)	46.6	46.6		46.6	46.6			36.7			36.7	
Actuated g/C Ratio	0.51	0.51		0.51	0.51			0.40			0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	83	1776		113	1796			517			591	
v/s Ratio Prot		0.36			c0.45							
v/s Ratio Perm	0.31			0.25				c0.36			0.11	
v/c Ratio	0.61	0.71		0.49	0.87			0.89			0.27	
Uniform Delay, d1	15.9	17.1		14.6	19.7			25.4			18.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	12.8	1.3		3.3	5.0			16.9			0.2	
Delay (s)	28.7	18.4		17.8	24.7			42.3			18.6	
Level of Service	C	B		B	C			D			B	
Approach Delay (s)		18.8			24.5			42.3			18.6	
Approach LOS		B			C			D			B	
Intersection Summary												
HCM 2000 Control Delay			24.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			91.3			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			79.5%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

Queues

2040 Peak Hour

12/08/2017

124: SW 15th St & OR-126

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	51	1257	55	1570	460	170
v/c Ratio	0.62	0.71	0.49	0.87	0.89	0.28
Control Delay	55.7	20.9	35.4	27.8	47.2	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.7	20.9	35.4	27.8	47.2	18.3
Queue Length 50th (ft)	23	314	22	451	254	61
Queue Length 95th (ft)	#92	407	#81	#632	#438	109
Internal Link Dist (ft)		1820		1191	423	675
Turn Bay Length (ft)	125		125			
Base Capacity (vph)	89	1907	121	1931	619	715
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.66	0.45	0.81	0.74	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

125: SW 11th St & SW Highland Way

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 									 	
Traffic Volume (vph)	0	895	389	0	0	0	0	0	0	14	87	0
Future Volume (vph)	0	895	389	0	0	0	0	0	0	14	87	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5									4.0	
Lane Util. Factor		0.95									0.95	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.95									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		3365									3586	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		3365									3586	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	973	423	0	0	0	0	0	0	15	95	0
RTOR Reduction (vph)	0	43	0	0	0	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	1353	0	0	0	0	0	0	0	0	96	0
Confl. Peds. (#/hr)							3					3
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA								Perm	NA	
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		37.7									5.5	
Effective Green, g (s)		37.7									5.5	
Actuated g/C Ratio		0.73									0.11	
Clearance Time (s)		4.5									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2453									381	
v/s Ratio Prot		c0.40										
v/s Ratio Perm											0.03	
v/c Ratio		0.55									0.25	
Uniform Delay, d1		3.2									21.2	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.3									0.3	
Delay (s)		3.4									21.6	
Level of Service		A									C	
Approach Delay (s)		3.4			0.0			0.0			21.6	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			4.8									
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			51.7							8.5		
Intersection Capacity Utilization			50.1%							A		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
125: SW 11th St & SW Highland Way

2040 Peak Hour
12/08/2017

	→	↓
Lane Group	EBT	SBT
Lane Group Flow (vph)	1396	110
v/c Ratio	0.53	0.21
Control Delay	4.0	20.0
Queue Delay	0.0	0.0
Total Delay	4.0	20.0
Queue Length 50th (ft)	67	13
Queue Length 95th (ft)	118	36
Internal Link Dist (ft)	1097	269
Turn Bay Length (ft)		
Base Capacity (vph)	3367	1616
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.41	0.07
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

126: SW 9th St & SW Highland Ave

2040 Peak Hour
12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 				
Traffic Volume (vph)	40	910	0	0	0	0	0	505	144	0	0	0
Future Volume (vph)	40	910	0	0	0	0	0	505	144	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5	4.5			
Lane Util. Factor		0.95						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		3529						3539	1615			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		3529						3539	1615			
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	43	978	0	0	0	0	0	543	155	0	0	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	63	0	0	0
Lane Group Flow (vph)	0	1013	0	0	0	0	0	543	92	0	0	0
Confl. Peds. (#/hr)								2				2
Heavy Vehicles (%)	4%	2%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
Turn Type	Perm	NA						NA	Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		23.9						15.4	15.4			
Effective Green, g (s)		23.9						15.4	15.4			
Actuated g/C Ratio		0.49						0.32	0.32			
Clearance Time (s)		4.5						4.5	4.5			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		1746						1128	514			
v/s Ratio Prot								c0.15				
v/s Ratio Perm		0.29							0.06			
v/c Ratio		0.58						0.48	0.18			
Uniform Delay, d1		8.6						13.2	11.9			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.5						0.3	0.2			
Delay (s)		9.1						13.6	12.1			
Level of Service		A						B	B			
Approach Delay (s)		9.1			0.0			13.2			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		10.8										
HCM 2000 Volume to Capacity ratio		0.54										
Actuated Cycle Length (s)		48.3							9.0			
Intersection Capacity Utilization		49.4%							A			
Analysis Period (min)		15										
c Critical Lane Group												

Queues
126: SW 9th St & SW Highland Ave

2040 Peak Hour
12/08/2017

	→	↑	↗
Lane Group	EBT	NBT	NBR
Lane Group Flow (vph)	1021	543	155
v/c Ratio	0.59	0.49	0.27
Control Delay	10.6	16.1	8.4
Queue Delay	0.0	0.0	0.0
Total Delay	10.6	16.1	8.4
Queue Length 50th (ft)	93	62	12
Queue Length 95th (ft)	186	133	55
Internal Link Dist (ft)	460	568	
Turn Bay Length (ft)			175
Base Capacity (vph)	3350	2857	1321
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.30	0.19	0.12
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

127: SW 6th St & SW Highland Ave

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑							↑	↑↑	
Traffic Volume (vph)	0	910	68	0	0	0	0	0	0	182	617	0
Future Volume (vph)	0	910	68	0	0	0	0	0	0	182	617	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0							4.0	4.0	
Lane Util. Factor		0.95	1.00							1.00	0.95	
Frpb, ped/bikes		1.00	0.99							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	1.00	
Satd. Flow (prot)		3539	1595							1799	3574	
Flt Permitted		1.00	1.00							0.95	1.00	
Satd. Flow (perm)		3539	1595							1799	3574	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	958	72	0	0	0	0	0	0	192	649	0
RTOR Reduction (vph)	0	0	29	0	0	0	0	0	0	62	0	0
Lane Group Flow (vph)	0	958	43	0	0	0	0	0	0	130	649	0
Confl. Peds. (#/hr)										4	4	
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type		NA	Perm								Perm	NA
Protected Phases		2									4	
Permitted Phases			2									4
Actuated Green, G (s)		25.5	25.5							20.1	20.1	
Effective Green, g (s)		25.5	25.5							20.1	20.1	
Actuated g/C Ratio		0.48	0.48							0.38	0.38	
Clearance Time (s)		4.0	4.0							4.0	4.0	
Vehicle Extension (s)		3.0	3.0							3.0	3.0	
Lane Grp Cap (vph)		1683	758							674	1340	
v/s Ratio Prot		c0.27									c0.18	
v/s Ratio Perm			0.03							0.07		
v/c Ratio		0.57	0.06							0.19	0.48	
Uniform Delay, d1		10.1	7.6							11.3	12.8	
Progression Factor		1.00	1.00							1.00	1.00	
Incremental Delay, d2		0.4	0.0							0.1	0.3	
Delay (s)		10.5	7.6							11.4	13.1	
Level of Service		B	A							B	B	
Approach Delay (s)		10.3			0.0			0.0			12.7	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			11.4									
HCM 2000 Volume to Capacity ratio			0.53									
Actuated Cycle Length (s)			53.6							8.0		
Intersection Capacity Utilization			60.9%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues
127: SW 6th St & SW Highland Ave

2040 Peak Hour
12/08/2017

	→	↘	↙	↓
Lane Group	EBT	EBR	SBL	SBT
Lane Group Flow (vph)	958	72	192	649
v/c Ratio	0.58	0.09	0.26	0.49
Control Delay	12.5	4.5	8.2	15.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.5	4.5	8.2	15.3
Queue Length 50th (ft)	102	3	18	76
Queue Length 95th (ft)	215	23	70	166
Internal Link Dist (ft)	782			261
Turn Bay Length (ft)		100	150	
Base Capacity (vph)	3200	1448	1384	2707
Starvation Cap Reductn	0	0	0	130
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.30	0.05	0.14	0.25
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

128: SW 5th St & SW Highland Ave

2040 Peak Hour

12/08/2017

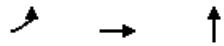
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	420	665	0	0	0	0	0	322	51	0	0	0
Future Volume (vph)	420	665	0	0	0	0	0	322	51	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5						4.5				
Lane Util. Factor	0.91	0.91						0.95				
Frt	1.00	1.00						0.98				
Flt Protected	0.95	1.00						1.00				
Satd. Flow (prot)	1643	3381						3536				
Flt Permitted	0.95	1.00						1.00				
Satd. Flow (perm)	1643	3381						3536				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	452	715	0	0	0	0	0	346	55	0	0	0
RTOR Reduction (vph)	154	8	0	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	226	779	0	0	0	0	0	386	0	0	0	0
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA						NA				
Protected Phases		8						6				
Permitted Phases	8											
Actuated Green, G (s)	21.4	21.4						10.9				
Effective Green, g (s)	21.4	21.4						10.9				
Actuated g/C Ratio	0.52	0.52						0.26				
Clearance Time (s)	4.5	4.5						4.5				
Vehicle Extension (s)	3.0	3.0						3.0				
Lane Grp Cap (vph)	851	1751						933				
v/s Ratio Prot								c0.11				
v/s Ratio Perm	0.14	0.23										
v/c Ratio	0.27	0.45						0.41				
Uniform Delay, d1	5.6	6.2						12.6				
Progression Factor	1.00	1.00						1.00				
Incremental Delay, d2	0.2	0.2						0.3				
Delay (s)	5.7	6.4						12.9				
Level of Service	A	A						B				
Approach Delay (s)		6.2			0.0			12.9			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		7.9			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.43										
Actuated Cycle Length (s)		41.3			Sum of lost time (s)			9.0				
Intersection Capacity Utilization		42.3%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2040 Peak Hour

128: SW 5th St & SW Highland Ave

12/08/2017



Lane Group	EBL	EBT	NBT
Lane Group Flow (vph)	380	787	401
v/c Ratio	0.38	0.45	0.43
Control Delay	2.6	7.2	14.9
Queue Delay	0.1	0.0	0.0
Total Delay	2.7	7.2	14.9
Queue Length 50th (ft)	6	50	37
Queue Length 95th (ft)	42	106	91
Internal Link Dist (ft)		156	664
Turn Bay Length (ft)	75		
Base Capacity (vph)	1615	3307	3159
Starvation Cap Reductn	286	618	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.29	0.29	0.13

Intersection Summary

Intersection

Int Delay, s/veh 18.7

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations		↔	↔		↔	
Traffic Vol, veh/h	91	409	365	137	143	164
Future Vol, veh/h	91	409	365	137	143	164
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	4	6	6	4
Mvmt Flow	99	445	397	149	155	178

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	397	0	-	0	1039	397
Stage 1	-	-	-	-	397	-
Stage 2	-	-	-	-	642	-
Critical Hdwy	4.12	-	-	-	6.46	6.24
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.218	-	-	-	3.554	3.336
Pot Cap-1 Maneuver	1162	-	-	-	251	648
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	517	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1162	-	-	-	223	648
Mov Cap-2 Maneuver	-	-	-	-	223	-
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	459	-

Approach EB WB SB

HCM Control Delay, s	1.5	0	77.5
HCM LOS			F

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1162	-	-	-	343
HCM Lane V/C Ratio	0.085	-	-	-	0.973
HCM Control Delay (s)	8.4	0	-	-	77.5
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.3	-	-	-	10.6

Intersection

Intersection Delay, s/veh 17.8
Intersection LOS C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↵	↵		↵	↵	
Traffic Vol, veh/h	34	55	36	57	86	5	80	385	32	7	186	70
Future Vol, veh/h	34	55	36	57	86	5	80	385	32	7	186	70
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	3	0	4	0	0	0	3	1	0	0	1	0
Mvmt Flow	38	61	40	63	96	6	89	428	36	8	207	78
Number of Lanes	0	1	0	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	1
HCM Control Delay	11.8	12.5	22.7	14.5
HCM LOS	B	B	C	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	27%	39%	100%	0%
Vol Thru, %	0%	92%	44%	58%	0%	73%
Vol Right, %	0%	8%	29%	3%	0%	27%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	417	125	148	7	256
LT Vol	80	0	34	57	7	0
Through Vol	0	385	55	86	0	186
RT Vol	0	32	36	5	0	70
Lane Flow Rate	89	463	139	164	8	284
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.161	0.76	0.254	0.303	0.015	0.484
Departure Headway (Hd)	6.503	5.906	6.596	6.642	6.913	6.126
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	548	607	547	544	521	583
Service Time	4.288	3.69	4.603	4.642	4.613	3.925
HCM Lane V/C Ratio	0.162	0.763	0.254	0.301	0.015	0.487
HCM Control Delay	10.5	25.1	11.8	12.5	9.7	14.6
HCM Lane LOS	B	D	B	B	A	B
HCM 95th-tile Q	0.6	6.9	1	1.3	0	2.6

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	65	3	25	0	5	14	26	324	11	15	262	129
Future Vol, veh/h	65	3	25	0	5	14	26	324	11	15	262	129
Conflicting Peds, #/hr	4	0	0	0	0	4	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	0	0
Mvmt Flow	69	3	27	0	5	15	28	345	12	16	279	137

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	801	793	349	800	856	355	418	0	0	356	0	0
Stage 1	381	381	-	406	406	-	-	-	-	-	-	-
Stage 2	420	412	-	394	450	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	305	323	699	306	297	693	1152	-	-	1214	-	-
Stage 1	645	617	-	626	601	-	-	-	-	-	-	-
Stage 2	615	598	-	635	575	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	282	307	698	281	282	690	1152	-	-	1209	-	-
Mov Cap-2 Maneuver	282	307	-	281	282	-	-	-	-	-	-	-
Stage 1	624	605	-	607	583	-	-	-	-	-	-	-
Stage 2	576	580	-	597	564	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	20.1		12.5		0.6		0.3	
HCM LOS	C		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1152	-	-	337	500	1209	-
HCM Lane V/C Ratio	0.024	-	-	0.294	0.04	0.013	-
HCM Control Delay (s)	8.2	0	-	20.1	12.5	8	0
HCM Lane LOS	A	A	-	C	B	A	A
HCM 95th %tile Q(veh)	0.1	-	-	1.2	0.1	0	-

HCM Signalized Intersection Capacity Analysis

132: SW Canal Blvd & SW Veterans Way

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	218	134	131	364	204	132	275	86	189	379	11
Future Volume (vph)	10	218	134	131	364	204	132	275	86	189	379	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1803	1845	1599	1787	3505	1561	1787	1881	1568	3467	1873	1873
Flt Permitted	0.53	1.00	1.00	0.40	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1000	1845	1599	754	3505	1561	1787	1881	1568	3467	1873	1873
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	10	227	140	136	379	212	138	286	90	197	395	11
RTOR Reduction (vph)	0	0	84	0	0	141	0	0	53	0	1	0
Lane Group Flow (vph)	10	227	56	136	379	72	138	286	37	197	405	0
Confl. Peds. (#/hr)	3					3	3		1	1		3
Heavy Vehicles (%)	0%	3%	1%	1%	3%	1%	1%	1%	2%	1%	1%	0%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	NA
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)	19.4	18.4	29.1	29.5	24.5	24.5	10.7	22.7	29.8	8.6	20.6	
Effective Green, g (s)	19.4	18.4	29.1	29.5	24.5	24.5	10.7	22.7	29.8	8.6	20.6	
Actuated g/C Ratio	0.27	0.25	0.40	0.41	0.34	0.34	0.15	0.31	0.41	0.12	0.28	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	277	466	727	406	1179	525	262	586	728	409	529	
v/s Ratio Prot	0.00	c0.12	0.01	c0.03	0.11		c0.08	0.15	0.00	0.06	c0.22	
v/s Ratio Perm	0.01		0.02	0.10		0.05			0.02			
v/c Ratio	0.04	0.49	0.08	0.33	0.32	0.14	0.53	0.49	0.05	0.48	0.77	
Uniform Delay, d1	19.7	23.2	13.5	14.4	18.0	16.8	28.7	20.3	13.0	30.0	23.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.8	0.0	0.5	0.2	0.1	1.9	0.6	0.0	0.9	6.5	
Delay (s)	19.7	24.0	13.6	14.9	18.1	16.9	30.6	21.0	13.0	30.9	30.4	
Level of Service	B	C	B	B	B	B	C	C	B	C	C	
Approach Delay (s)		20.0			17.2			22.2			30.6	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.5				HCM 2000 Level of Service		C			
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			72.8				Sum of lost time (s)		16.0			
Intersection Capacity Utilization			60.6%				ICU Level of Service		B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2040 Peak Hour

132: SW Canal Blvd & SW Veterans Way

12/08/2017

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	10	227	140	136	379	213	138	286	90	197	406
v/c Ratio	0.03	0.58	0.18	0.36	0.31	0.31	0.50	0.47	0.12	0.46	0.74
Control Delay	17.5	33.2	3.5	20.4	20.2	5.3	37.1	21.4	3.0	35.8	31.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	33.2	3.5	20.4	20.2	5.3	37.1	21.4	3.0	35.8	31.6
Queue Length 50th (ft)	3	87	0	38	57	0	54	94	0	40	152
Queue Length 95th (ft)	14	186	32	96	141	54	132	177	21	91	288
Internal Link Dist (ft)		693			446			553			1860
Turn Bay Length (ft)	125		200	175		150	225		125	250	
Base Capacity (vph)	399	851	839	383	1617	834	372	1036	724	464	892
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.27	0.17	0.36	0.23	0.26	0.37	0.28	0.12	0.42	0.46
Intersection Summary											

HCM Signalized Intersection Capacity Analysis

133: US-97 & SW Veterans Way

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	128	297	293	306	167	340	1717	157	76	1319	50
Future Volume (vph)	67	128	297	293	306	167	340	1717	157	76	1319	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1804	1827	1590	1719	3317		1787	3314		1736	3331	
Flt Permitted	0.22	1.00	1.00	0.45	1.00		0.06	1.00		0.06	1.00	
Satd. Flow (perm)	417	1827	1590	807	3317		112	3314		117	3331	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	72	138	319	315	329	180	366	1846	169	82	1418	54
RTOR Reduction (vph)	0	0	31	0	54	0	0	4	0	0	2	0
Lane Group Flow (vph)	72	138	288	315	455	0	366	2011	0	82	1470	0
Confl. Peds. (#/hr)	7					7			2	2		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	4%	1%	5%	2%	3%	1%	7%	12%	4%	8%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	26.8	21.7	46.3	33.6	25.1		91.5	74.9		74.5	62.4	
Effective Green, g (s)	26.8	21.7	46.3	33.6	25.1		91.5	74.9		74.5	62.4	
Actuated g/C Ratio	0.20	0.16	0.34	0.25	0.18		0.67	0.55		0.55	0.46	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	292	595	256	613		379	1829		208	1531	
v/s Ratio Prot	0.02	0.08	0.09	c0.08	0.14		c0.17	c0.61		0.04	0.44	
v/s Ratio Perm	0.09		0.09	c0.23			0.47			0.18		
v/c Ratio	0.54	0.47	0.48	1.23	0.74		0.97	1.10		0.39	0.96	
Uniform Delay, d1	46.0	51.8	35.3	50.6	52.2		45.7	30.4		27.6	35.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	1.2	0.6	133.0	4.8		36.9	53.8		1.2	14.6	
Delay (s)	50.1	53.0	35.9	183.6	57.1		82.6	84.2		28.9	50.1	
Level of Service	D	D	D	F	E		F	F		C	D	
Approach Delay (s)		42.3			105.5			84.0			49.0	
Approach LOS		D			F			F			D	
Intersection Summary												
HCM 2000 Control Delay			72.9			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			1.17									
Actuated Cycle Length (s)			135.7			Sum of lost time (s)			18.5			
Intersection Capacity Utilization			100.9%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
133: US-97 & SW Veterans Way

2040 Peak Hour
12/08/2017

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	72	138	319	315	509	366	2015	82	1472
v/c Ratio	0.48	0.49	0.56	1.28	0.76	0.96	1.09	0.39	0.95
Control Delay	49.8	57.7	31.9	190.2	53.2	78.0	80.8	25.1	49.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.8	57.7	31.9	190.2	53.2	78.0	80.8	25.1	49.8
Queue Length 50th (ft)	49	112	183	~326	200	268	~1053	22	645
Queue Length 95th (ft)	91	179	273	#532	264	#516	#1312	78	#902
Internal Link Dist (ft)		446			2921		4483		2738
Turn Bay Length (ft)	175			150		150		175	
Base Capacity (vph)	151	493	565	247	992	382	1844	216	1543
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.28	0.56	1.28	0.51	0.96	1.09	0.38	0.95

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection

Intersection Delay, s/veh 20.5

Intersection LOS C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↘	
Traffic Vol, veh/h	170	56	220	235	131	223
Future Vol, veh/h	170	56	220	235	131	223
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	3	9	5	9	4	4
Mvmt Flow	185	61	239	255	142	242
Number of Lanes	1	1	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	11.7	27.4	17.3
HCM LOS	B	D	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1
Vol Left, %	37%	0%	0%	48%
Vol Thru, %	0%	100%	0%	52%
Vol Right, %	63%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	354	170	56	455
LT Vol	131	0	0	220
Through Vol	0	170	0	235
RT Vol	223	0	56	0
Lane Flow Rate	385	185	61	495
Geometry Grp	2	7	7	5
Degree of Util (X)	0.608	0.332	0.099	0.793
Departure Headway (Hd)	5.693	6.465	5.855	5.774
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	631	554	609	623
Service Time	3.758	4.236	3.626	3.829
HCM Lane V/C Ratio	0.61	0.334	0.1	0.795
HCM Control Delay	17.3	12.5	9.3	27.4
HCM Lane LOS	C	B	A	D
HCM 95th-tile Q	4.1	1.4	0.3	7.7

Intersection						
Int Delay, s/veh	16.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	418	32	422	313	15	359
Future Vol, veh/h	418	32	422	313	15	359
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	3	40	2	5	0	3
Mvmt Flow	449	34	454	337	16	386
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	484	0	1711	467
Stage 1	-	-	-	-	467	-
Stage 2	-	-	-	-	1244	-
Critical Hdwy	-	-	4.12	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.327
Pot Cap-1 Maneuver	-	-	1079	-	101	594
Stage 1	-	-	-	-	635	-
Stage 2	-	-	-	-	274	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1079	-	59	594
Mov Cap-2 Maneuver	-	-	-	-	59	-
Stage 1	-	-	-	-	635	-
Stage 2	-	-	-	-	159	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		6.2		56.9	
HCM LOS					F	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	436	-	-	1079	-	
HCM Lane V/C Ratio	0.922	-	-	0.421	-	
HCM Control Delay (s)	56.9	-	-	10.7	-	
HCM Lane LOS	F	-	-	B	-	
HCM 95th %tile Q(veh)	10.3	-	-	2.1	-	

Intersection	
Intersection Delay, s/veh	45.6
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	67	27	129	142	99	57	386	110	41	231	4
Future Vol, veh/h	11	67	27	129	142	99	57	386	110	41	231	4
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	0	0	0	1	1	3	0	1	0	0	2	0
Mvmt Flow	13	76	31	147	161	113	65	439	125	47	263	5
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	13.7	17.9	83.8	18.5
HCM LOS	B	C	F	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	78%	0%	71%	0%	59%	0%	98%
Vol Right, %	0%	22%	0%	29%	0%	41%	0%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	57	496	11	94	129	241	41	235
LT Vol	57	0	11	0	129	0	41	0
Through Vol	0	386	0	67	0	142	0	231
RT Vol	0	110	0	27	0	99	0	4
Lane Flow Rate	65	564	12	107	147	274	47	267
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.137	1.091	0.03	0.24	0.328	0.554	0.102	0.552
Departure Headway (Hd)	7.621	6.968	9.247	8.518	8.426	7.614	8.253	7.76
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	473	524	390	424	430	477	437	467
Service Time	5.321	4.668	6.947	6.218	6.126	5.314	5.953	5.46
HCM Lane V/C Ratio	0.137	1.076	0.031	0.252	0.342	0.574	0.108	0.572
HCM Control Delay	11.5	92.1	12.2	13.9	15.2	19.4	11.9	19.6
HCM Lane LOS	B	F	B	B	C	C	B	C
HCM 95th-tile Q	0.5	17.8	0.1	0.9	1.4	3.3	0.3	3.3

HCM Signalized Intersection Capacity Analysis

137: SW Canal Blvd & SW Odem Medo Way

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	210	0	505	0	380	162	276	356	0
Future Volume (vph)	0	0	0	210	0	505	0	380	162	276	356	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0		5.0	5.0	5.0	5.0	
Lane Util. Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes					1.00	0.98		1.00	1.00	1.00	1.00	
Flpb, ped/bikes					0.99	1.00		1.00	1.00	1.00	1.00	
Frt					1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected					0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)					1783	1559		1881	1599	1805	1881	
Flt Permitted					0.76	1.00		1.00	1.00	0.28	1.00	
Satd. Flow (perm)					1421	1559		1881	1599	532	1881	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	219	0	526	0	396	169	288	371	0
RTOR Reduction (vph)	0	0	0	0	0	305	0	0	115	0	0	0
Lane Group Flow (vph)	0	0	0	0	219	221	0	396	54	288	371	0
Confl. Peds. (#/hr)	4		10	10		4	3					3
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	1%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)					14.0	14.0		17.3	17.3	30.5	30.5	
Effective Green, g (s)					14.0	14.0		17.3	17.3	30.5	30.5	
Actuated g/C Ratio					0.26	0.26		0.32	0.32	0.56	0.56	
Clearance Time (s)					5.0	5.0		5.0	5.0	5.0	5.0	
Vehicle Extension (s)					2.0	2.0		3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)					365	400		597	507	489	1052	
v/s Ratio Prot								0.21		c0.09	0.20	
v/s Ratio Perm					c0.15	0.14			0.03	c0.24		
v/c Ratio					0.60	0.55		0.66	0.11	0.59	0.35	
Uniform Delay, d1					17.8	17.5		16.1	13.1	7.7	6.6	
Progression Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2					1.8	0.9		2.8	0.1	1.2	0.2	
Delay (s)					19.6	18.5		18.9	13.2	8.9	6.8	
Level of Service					B	B		B	B	A	A	
Approach Delay (s)		0.0			18.8			17.2			7.7	
Approach LOS		A			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			14.6		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			54.5		Sum of lost time (s)					15.0		
Intersection Capacity Utilization			66.1%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2040 Peak Hour

137: SW Canal Blvd & SW Odem Medo Way

12/08/2017



Lane Group	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	219	526	396	169	288	371
v/c Ratio	0.61	0.75	0.68	0.28	0.59	0.36
Control Delay	27.0	12.6	24.1	4.5	12.9	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	12.6	24.1	4.5	12.9	8.7
Queue Length 50th (ft)	64	31	111	0	43	58
Queue Length 95th (ft)	138	134	226	36	105	136
Internal Link Dist (ft)	931		2881			465
Turn Bay Length (ft)				100	100	
Base Capacity (vph)	593	891	860	823	513	1112
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.59	0.46	0.21	0.56	0.33

Intersection Summary

HCM Signalized Intersection Capacity Analysis

138: US-97 & SW Odem Medo Way

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	20	184	14	33	23	368	1922	16	14	1465	321
Future Volume (vph)	273	20	184	14	33	23	368	1922	16	14	1465	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	5.0
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1697	1714	1560	1804	1721		1787	3467		1805	3374	1548
Flt Permitted	0.49	0.49	1.00	0.65	1.00		0.06	1.00		0.06	1.00	1.00
Satd. Flow (perm)	882	877	1560	1239	1721		104	3467		113	3374	1548
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	290	21	196	15	35	24	391	2045	17	15	1559	341
RTOR Reduction (vph)	0	0	61	0	19	0	0	0	0	0	0	101
Lane Group Flow (vph)	154	157	135	15	40	0	391	2062	0	15	1559	240
Confl. Peds. (#/hr)	1		1	1		1	2		1	1		2
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	1%	0%	3%	0%	0%	7%	1%	4%	0%	0%	7%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	3	8	1	7	4		1	6		5	2	3
Permitted Phases	8		8	4			6			2		2
Actuated Green, G (s)	25.1	25.1	43.9	13.3	11.0		98.4	90.3		70.4	67.3	76.4
Effective Green, g (s)	25.1	25.1	43.9	13.3	11.0		98.4	90.3		70.4	67.3	76.4
Actuated g/C Ratio	0.19	0.19	0.33	0.10	0.08		0.73	0.67		0.52	0.50	0.57
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	219	220	567	132	140		402	2327		98	1688	879
v/s Ratio Prot	0.05	c0.05	0.05	0.00	0.02		c0.19	0.59		0.00	0.46	0.02
v/s Ratio Perm	0.08	c0.08	0.04	0.01			c0.52			0.08		0.14
v/c Ratio	0.70	0.71	0.24	0.11	0.28		0.97	0.89		0.15	0.92	0.27
Uniform Delay, d1	49.9	51.3	33.1	55.1	58.0		45.6	17.9		21.1	31.2	14.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.8	10.4	0.2	0.4	1.1		37.5	4.5		0.7	8.9	0.2
Delay (s)	59.7	61.8	33.3	55.4	59.2		83.0	22.4		21.9	40.1	15.0
Level of Service	E	E	C	E	E		F	C		C	D	B
Approach Delay (s)		50.1			58.4			32.1			35.5	
Approach LOS		D			E			C			D	
Intersection Summary												
HCM 2000 Control Delay			35.6				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			134.5				Sum of lost time (s)			21.0		
Intersection Capacity Utilization			89.3%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2040 Peak Hour

138: US-97 & SW Odem Medo Way

12/08/2017

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	154	157	196	15	59	391	2062	15	1559	341
v/c Ratio	0.77	0.78	0.33	0.09	0.38	0.93	0.85	0.09	0.92	0.34
Control Delay	73.8	75.1	16.9	44.1	45.2	69.5	20.9	9.1	40.9	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.8	75.1	16.9	44.1	45.2	69.5	20.9	9.1	40.9	5.2
Queue Length 50th (ft)	124	126	54	11	30	269	497	3	612	35
Queue Length 95th (ft)	#198	#206	126	31	75	#520	#1139	11	#895	97
Internal Link Dist (ft)		931			261		4040		4483	
Turn Bay Length (ft)	150		125	150		100		150		275
Base Capacity (vph)	201	306	592	171	433	419	2440	169	1687	993
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.51	0.33	0.09	0.14	0.93	0.85	0.09	0.92	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection												
Int Delay, s/veh	3.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔		↔	↔	
Traffic Vol, veh/h	5	20	2	44	15	57	8	333	92	68	181	11
Future Vol, veh/h	5	20	2	44	15	57	8	333	92	68	181	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	5	0
Mvmt Flow	5	21	2	45	15	59	8	343	95	70	187	11

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	776	787	192	751	745	391	198	0	0	438	0	0
Stage 1	332	332	-	407	407	-	-	-	-	-	-	-
Stage 2	444	455	-	344	338	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	317	326	855	330	345	662	1387	-	-	1133	-	-
Stage 1	686	648	-	625	601	-	-	-	-	-	-	-
Stage 2	597	572	-	676	644	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	264	303	855	296	321	662	1387	-	-	1133	-	-
Mov Cap-2 Maneuver	264	303	-	296	321	-	-	-	-	-	-	-
Stage 1	681	608	-	620	596	-	-	-	-	-	-	-
Stage 2	526	567	-	611	604	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	17.8		17.3		0.1		2.2	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1387	-	-	309	412	1133	-
HCM Lane V/C Ratio	0.006	-	-	0.09	0.29	0.062	-
HCM Control Delay (s)	7.6	0	-	17.8	17.3	8.4	-
HCM Lane LOS	A	A	-	C	C	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	1.2	0.2	-

Intersection	
Intersection Delay, s/veh	40.2
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↵	↵		↵	↵	
Traffic Vol, veh/h	29	92	48	8	137	8	169	529	11	4	245	32
Future Vol, veh/h	29	92	48	8	137	8	169	529	11	4	245	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	3	1	0	0	0	0	2	1	0	0	1	3
Mvmt Flow	32	100	52	9	149	9	184	575	12	4	266	35
Number of Lanes	0	1	0	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	1
HCM Control Delay	14.2	14	60.6	18.7
HCM LOS	B	B	F	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	17%	5%	100%	0%
Vol Thru, %	0%	98%	54%	90%	0%	88%
Vol Right, %	0%	2%	28%	5%	0%	12%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	169	540	169	153	4	277
LT Vol	169	0	29	8	4	0
Through Vol	0	529	92	137	0	245
RT Vol	0	11	48	8	0	32
Lane Flow Rate	184	587	184	166	4	301
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.355	1.046	0.36	0.332	0.009	0.575
Departure Headway (Hd)	6.956	6.413	7.233	7.358	7.625	7.047
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	520	569	500	492	472	515
Service Time	4.656	4.113	5.233	5.358	5.325	4.747
HCM Lane V/C Ratio	0.354	1.032	0.368	0.337	0.008	0.584
HCM Control Delay	13.4	75.4	14.2	14	10.4	18.8
HCM Lane LOS	B	F	B	B	B	C
HCM 95th-tile Q	1.6	16.5	1.6	1.4	0	3.6

HCM Signalized Intersection Capacity Analysis

142: US-97 SB Ramps & SW Yew Ave

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	265	204	326	754	0	0	0	0	122	0	192
Future Volume (vph)	0	265	204	326	754	0	0	0	0	122	0	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1810	1545	1701	1881						1805	1583
Flt Permitted		1.00	1.00	0.43	1.00						0.95	1.00
Satd. Flow (perm)		1810	1545	779	1881						1805	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	288	222	354	820	0	0	0	0	133	0	209
RTOR Reduction (vph)	0	0	137	0	0	0	0	0	0	0	0	85
Lane Group Flow (vph)	0	288	85	354	820	0	0	0	0	0	133	124
Confl. Peds. (#/hr)			4	4								
Heavy Vehicles (%)	0%	5%	2%	6%	1%	0%	0%	0%	0%	0%	0%	2%
Turn Type		NA	Perm	pm+pt	NA						Perm	NA
Protected Phases		2		1	6						4	
Permitted Phases			2	6						4		4
Actuated Green, G (s)		18.1	18.1	29.3	29.3						9.7	9.7
Effective Green, g (s)		18.1	18.1	29.3	29.3						9.7	9.7
Actuated g/C Ratio		0.37	0.37	0.60	0.60						0.20	0.20
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		668	570	582	1124						357	313
v/s Ratio Prot		0.16		0.08	c0.44							
v/s Ratio Perm			0.05	0.29							0.07	c0.08
v/c Ratio		0.43	0.15	0.61	0.73						0.37	0.40
Uniform Delay, d1		11.6	10.3	5.5	7.0						17.0	17.1
Progression Factor		1.00	1.00	1.00	1.00						1.00	1.00
Incremental Delay, d2		0.4	0.1	1.8	2.4						0.7	0.8
Delay (s)		12.0	10.4	7.3	9.4						17.7	17.9
Level of Service		B	B	A	A						B	B
Approach Delay (s)		11.3			8.8			0.0			17.8	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			11.0			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			49.0			Sum of lost time (s)				15.0		
Intersection Capacity Utilization			77.0%			ICU Level of Service				D		
Analysis Period (min)			15									

c Critical Lane Group

Queues
142: US-97 SB Ramps & SW Yew Ave

2040 Peak Hour
12/08/2017

	→	↘	↙	←	↓	↗
Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	288	222	354	820	133	209
v/c Ratio	0.44	0.32	0.61	0.73	0.37	0.53
Control Delay	14.3	3.6	11.3	12.7	21.7	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	3.6	11.3	12.7	21.7	15.5
Queue Length 50th (ft)	58	1	41	134	34	26
Queue Length 95th (ft)	128	36	104	330	79	81
Internal Link Dist (ft)	1380			488	462	
Turn Bay Length (ft)		75	150			200
Base Capacity (vph)	906	880	577	1373	1129	1030
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.25	0.61	0.60	0.12	0.20
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

143: US-97 NB Ramps & SE Airport Way

2040 Peak Hour

12/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	273	0	0	705	202	379	1	239	0	0	0
Future Volume (vph)	116	273	0	0	705	202	379	1	239	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0	5.0	5.0	5.0				
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00				
Frpb, ped/bikes	1.00	1.00			1.00	0.98	1.00	1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	0.85				
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00				
Satd. Flow (prot)	1736	1810			1827	1515	1770	1554				
Flt Permitted	0.12	1.00			1.00	1.00	0.95	1.00				
Satd. Flow (perm)	220	1810			1827	1515	1770	1554				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	297	0	0	766	220	412	1	260	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	58	0	176	0	0	0	0
Lane Group Flow (vph)	126	297	0	0	766	162	412	85	0	0	0	0
Confl. Peds. (#/hr)	3		1	1		3						
Heavy Vehicles (%)	4%	5%	0%	0%	4%	4%	2%	0%	4%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8					
Actuated Green, G (s)	36.6	36.6			28.2	28.2	22.3	22.3				
Effective Green, g (s)	36.6	36.6			28.2	28.2	22.3	22.3				
Actuated g/C Ratio	0.53	0.53			0.41	0.41	0.32	0.32				
Clearance Time (s)	5.0	5.0			5.0	5.0	5.0	5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	191	961			747	620	572	502				
v/s Ratio Prot	c0.03	0.16			c0.42			0.05				
v/s Ratio Perm	0.32					0.11	c0.23					
v/c Ratio	0.66	0.31			1.03	0.26	0.72	0.17				
Uniform Delay, d1	14.8	9.1			20.4	13.5	20.5	16.7				
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00				
Incremental Delay, d2	8.0	0.2			39.6	0.2	4.4	0.2				
Delay (s)	22.8	9.2			59.9	13.7	25.0	16.8				
Level of Service	C	A			E	B	C	B				
Approach Delay (s)		13.3			49.6			21.8			0.0	
Approach LOS		B			D			C			A	
Intersection Summary												
HCM 2000 Control Delay			33.2				HCM 2000 Level of Service		C			
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			68.9				Sum of lost time (s)		15.0			
Intersection Capacity Utilization			77.0%				ICU Level of Service		D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
143: US-97 NB Ramps & SE Airport Way

2040 Peak Hour
12/08/2017

						
Lane Group	EBL	EBT	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	126	297	766	220	412	261
v/c Ratio	0.58	0.31	1.01	0.32	0.71	0.38
Control Delay	24.4	11.9	61.3	11.2	27.4	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	11.9	61.3	11.2	27.4	4.1
Queue Length 50th (ft)	25	66	~368	33	153	0
Queue Length 95th (ft)	#88	149	#687	99	241	42
Internal Link Dist (ft)		488	979			520
Turn Bay Length (ft)	150			100		
Base Capacity (vph)	216	1011	758	685	881	905
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.29	1.01	0.32	0.47	0.29

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection

Int Delay, s/veh 30

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Vol, veh/h	394	113	9	485	246	19
Future Vol, veh/h	394	113	9	485	246	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	16	0	5	0	8
Mvmt Flow	448	128	10	551	280	22

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	576
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1007
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1007
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	143.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	240	550	-	-	1007	-
HCM Lane V/C Ratio	1.165	0.039	-	-	0.01	-
HCM Control Delay (s)	153.2	11.8	-	-	8.6	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	13	0.1	-	-	0	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh 6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	199	417	413	238	4
Future Vol, veh/h	9	199	417	413	238	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	4	1	0	1	0
Mvmt Flow	10	221	463	459	264	4

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1653	267	269
Stage 1	267	-	-
Stage 2	1386	-	-
Critical Hdwy	6.4	6.24	4.11
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.336	2.209
Pot Cap-1 Maneuver	109	767	1300
Stage 1	782	-	-
Stage 2	234	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	57	767	1300
Mov Cap-2 Maneuver	57	-	-
Stage 1	782	-	-
Stage 2	122	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.3	4.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1300	-	498	-	-
HCM Lane V/C Ratio	0.356	-	0.464	-	-
HCM Control Delay (s)	9.3	0	18.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	1.6	-	2.4	-	-

Appendix F Alternatives Analysis



REDMOND

Transportation System Plan

Date: May 15, 2019

Project #: 17720
ODOT PA #27456

To: Redmond Project Advisory Committee (PAC)
Redmond TSP Project Management Team (PMT)

Subject: Alternatives Analysis (Tech Memo #6)

Per Task 4.2 of the scope for the Redmond Transportation System Plan (TSP) and our work to-date on the project, this technical memorandum presents alternative solutions that address deficiencies and needs identified in the Existing Conditions analyses, Future No Build analyses, and by the Project Management Team (PMT), Project Advisory Committee (PAC), and via comments received at various venues from the public, including an Open House. The enclosed memorandum includes:

- A brief summary of the key needs identified in the Future No Build Analyses;
- Recommended Projects for Inclusion into the TSP, by mode, including:
 - Vehicular Needs
 - Functional Classification system
 - Street Cross-Sections
 - Street improvements
 - Key Intersection Improvement Locations
 - Key Safety Improvements
 - Pedestrian Needs
 - Pathway Improvements for both pedestrians and cyclists
 - Sidewalk Improvements
 - Bike Needs
 - On-Street and Off-Street Improvements
 - Transit System Needs
 - Freight Needs
 - Airport Master Plan

SUMMARY OF FUTURE NEEDS

As documented in *Technical Memorandum #5: Future Needs Analysis*, key transportation system needs within the City of Redmond includes:

- A number of primary street corridors are anticipated to experience increased congestion in the future, such as along OR 126 within the Urban Growth Boundary (UGB), Maple Avenue between US 97 and Northwest Way, Yew Avenue between Airport Way and S 27th Street and US 97 south of SW Glacier Avenue.
 - Multimodal circulation and capacity improvements are needed to support continued economic growth and vitality within the city and to offer a variety of route and mode choices to help alleviate this congestion.
 - The City and ODOT are currently engaged in the South US 97 corridor planning efforts to address long-term transportation and land use needs along US 97 to the south of Glacier Avenue. At this point, a preferred alternative for this corridor is under review.
- Approximately 50 arterial and collector intersections are anticipated to need geometric and/or traffic control modifications in the next twenty years to maintain a desired quality of service for future users.
- A number of streets within the City lack sidewalks. The City should consider prioritization of new sidewalks and pathways that connect neighborhoods to schools, commercial areas, and other key destinations – particularly in the poorer areas of the community.
- “Lower stress” bike facilities are needed to support commuting, recreational, and personal travel.
- The bicycle trail system should be expanded to encourage greater access, including inter agency coordination.
- Increased transit options are needed to facilitate travel throughout the city.

CONSIDERATION OF IMPROVEMENTS

As outlined in the *Goals and Evaluation Approach* memo (January 2018), a preliminary list of potential multimodal improvements was screened by the PMT relative to construction feasibility, financial feasibility, and the ability of an improvement to address a documented transportation need. A refined set of improvement options were forwarded on for evaluation relative to key performance criteria. Appendix A provides the rating of the refined improvement categories versus the evaluation criteria. Based on this evaluation, the PMT identified a recommended set of multimodal projects for inclusion into the TSP. A discussion of these improvements, by mode, is provided below.



VEHICULAR NEEDS

The preliminary screening evaluation identified arterial and collector streets that experience or are projected to experience traffic congestion and delay and/or are lacking pedestrian and bicycle facilities that comfortably serve a broad range of users. To meet the identified street system needs, the TSP focuses strategies that improve connections between existing neighborhoods, employment, and commercial areas; provide connections to newly developed areas; improve safety for all travelers; and increase the efficiency of the existing system.

Functional Classification of Streets

The City's street functional classification system organizes the roadway network as a balanced hierarchy of mobility and access to, through, and between different types of land uses. Some factors that are considered in setting a roadway's functional classification are average daily traffic (ADT) volumes, street connectivity, spacing of streets, and the mix and amounts of different travel modes on a typical segment (e.g., bikes and cars). As the community continues to grow and mature, the City will revisit functional classifications periodically to ensure that particular street classifications are still appropriate.

The PMT evaluated the City's previously adopted functional classification system and simplified and combined some of the categories that have seldomly been applied. The new simplified system of streets will provide more certainty for both private development investment expectations as well as for City construction process. Per the PMT discussions, the functional classification system will categorize streets in the city as:

- Standard Local Residential
- Industrial Street
- Minor Collector
- Major Collector
- Minor Arterial

In addition to recommending changes to the functional classification system, the PMT also identified a number of streets that needed a change in designation is desired to reflect the intended function and form of the roadway, respond to land use patterns and economic growth opportunities, and provide further guidance to the operation and construction of all streets and roads within the City's UGB.

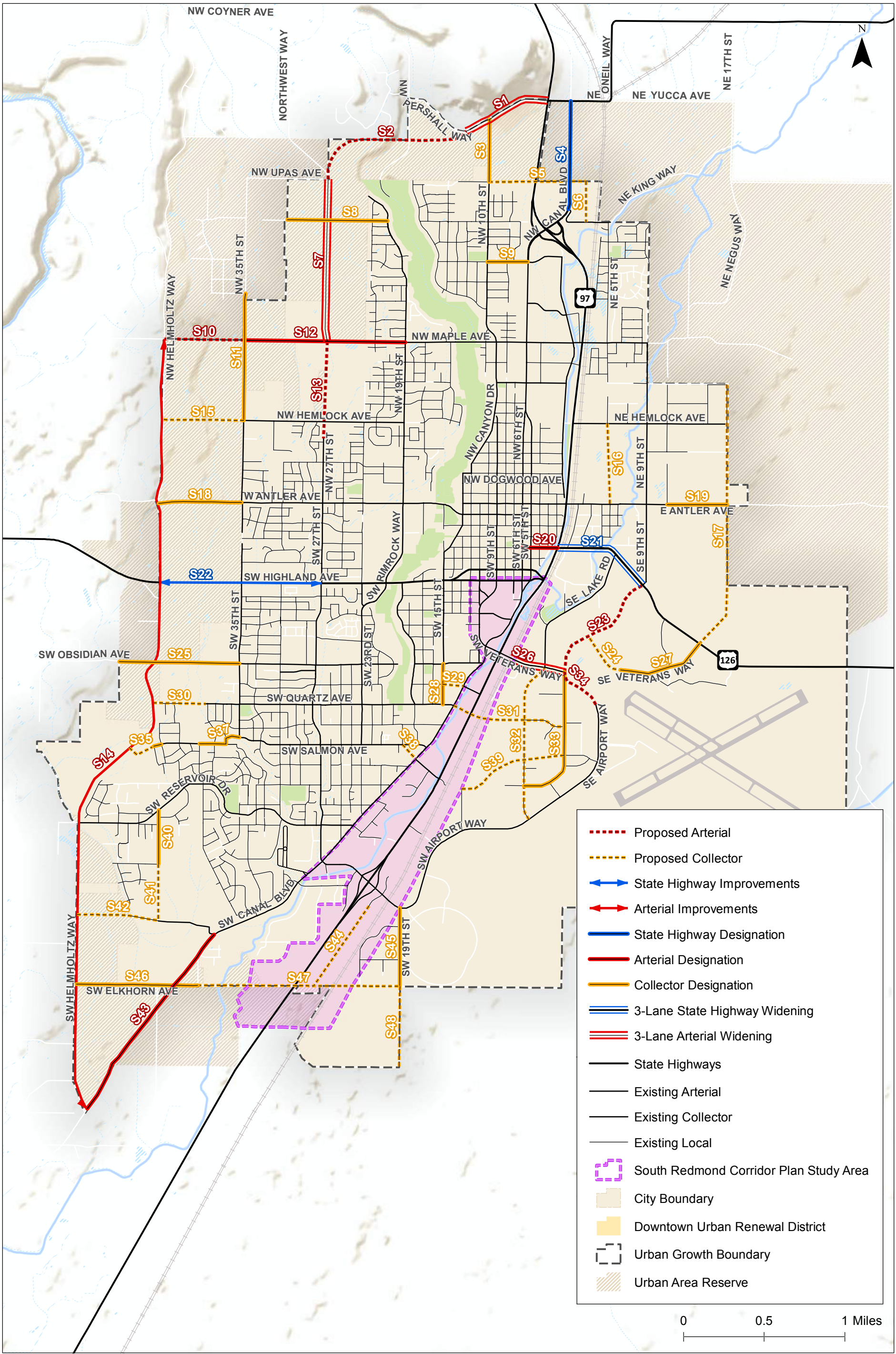
Based on this review, the PMT identified twenty corridors in need of modification of functional classification. These corridors are summarized in Table 1 below and shown in Figure 1.



Table 1: Identified Street Classification Modifications

Map ID	Corridor	S-W Limit	E-N Limit	Proposed Designation
S3	NW 10th St	NW Upas Way	NW Pershall Way	Collector Designation
S4	NW Canal Blvd	NE King Way	NE Oneil Way	State Highway Designation
S8	NW Spruce Ave	NW 33rd	NW 22 nd	Collector Designation
S9	NW Quince Ave	NW 10th St	NW 6th St	Collector Designation
S11	NW 35th St	NW Hemlock	NW Oak Ave	Collector Designation
S12	NW Maple Ave	NW 35th St	NW 19th St	Arterial Designation
S18	W Antler Ave	SW Helmholtz Way	SW 35th St	Collector Designation
S19	E Antler Ave	11th Street	NE 17th St	Collector Designation
S20	SW Evergreen Ave	SW 6th St	US 97	Arterial Designation
S25	SW Obsidian Ave	UGB	SW 35th St	Collector Designation
S27	SE Veterans Way	east of SE Airport Way	OR 126	Collector Designation
S28	SW 15th St	SW Quartz	SW Obsidian Ave	Collector Designation
S29	SW Pumice Ave	SW 15th St	SW Canal Blvd	Proposed Collector
S33	SE 9th St	SE 6th St	SE Veterans Way	Collector Designation
S35	SW Salmon Ave	SW Forked Horn Butte	SW 43rd St	Collector Designation
S37	SW Salmon Ave	SW 39th St	SW 35th St	Collector Designation
S40	SW 43rd St	SW Yew Ave	SW Reservoir Dr	Collector Designation
S43	SW Canal Blvd	SW Helmholtz Way	SW Badger Ave	Arterial Designation
S45	SW 19th St	SW Elkhorn Ave	SW Airport Way	Collector Designation
S46	SW Elkhorn Ave	SW Helmholtz Way	SW 39th St	Collector Designation





**Future Corridor Alternatives
Redmond, Oregon**

**Figure
1**



Street Design Standards

Street design standards provide information on how streets within each of the functional classifications “look and feel.” The City’s Street Design Standards identify how existing streets can be modified and new streets can be constructed to accommodate the needs of people with disabilities, riding bicycles, using transit, walking, driving automobiles, and moving freight. In the past, most street design standards were primarily oriented toward moving vehicular traffic, providing rudimentary bike lanes and sidewalks for pedestrians. The PMT has recommended a number of modifications to the design standards to ensure streets provide comprehensive and integrated transportation networks that serve all modes of transportation and create quality facilities that invite people of all ages and abilities to pursue active transportation.

Redmond Engineering Standards maintain more specific design elements for each of these sections, including applicable variances and pavement design requirements. The typical sections identified by the PMT and presented herein are intended to provide general guidance on right-of-way width requirements, number and type of lanes, pedestrian facilities and bicycle facilities by functional classification type. In some cases, additional features may be added on a case-by-case basis and per the direction of the City Engineer, such as wider sidewalks, multi-use paths, protected bicycle facilities, protected parking bays, or medians.

The typical sections are illustrated in Figure 2 through Figure 6.

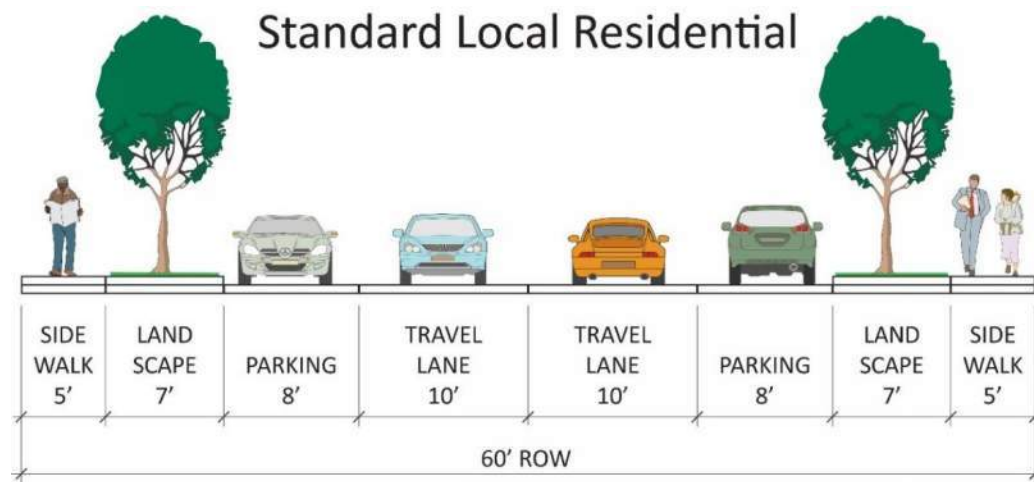
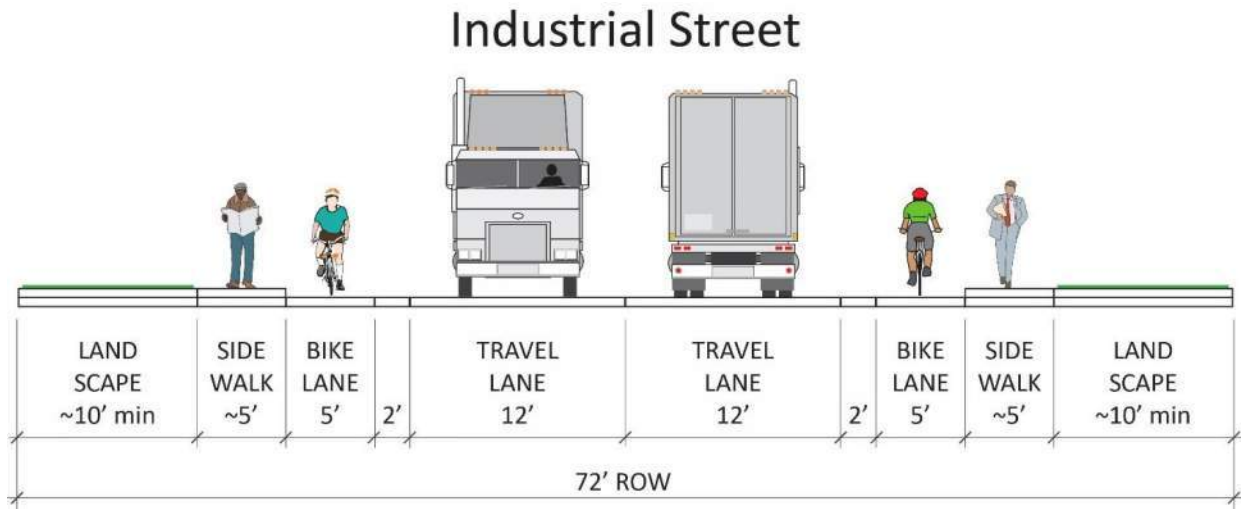


Figure 2: Standard Local Residential Typical Section



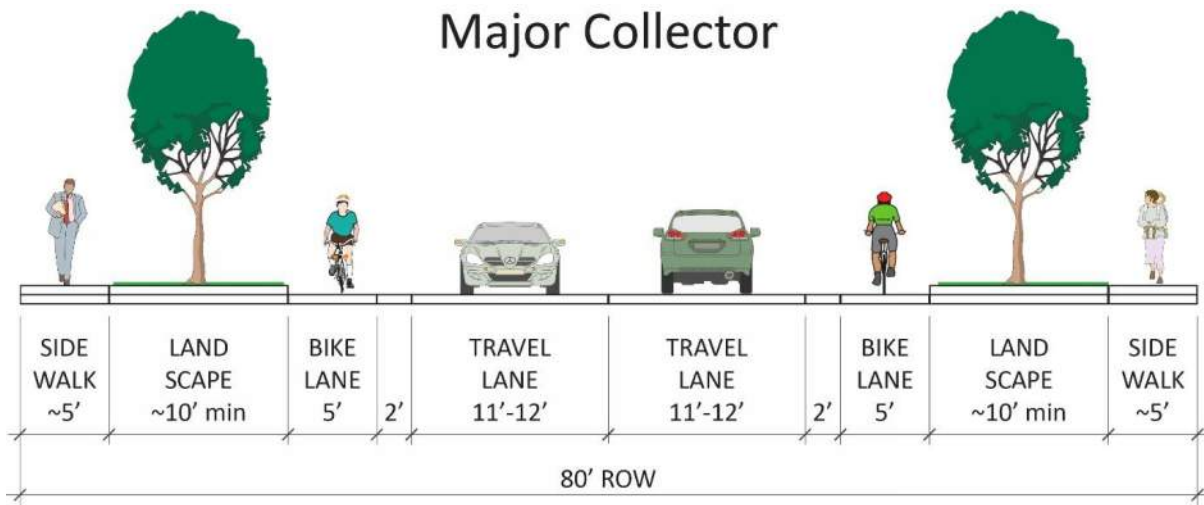


Note: Landscape & sidewalk width can be varied

Figure 3: Industrial Street Typical Section

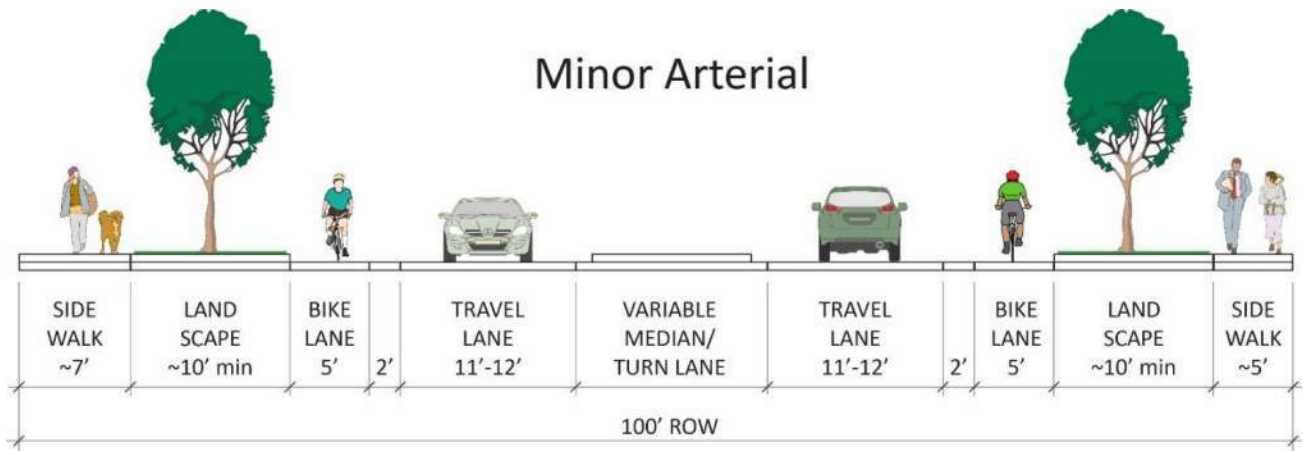


Figure 4: Minor Collector Typical Section



Note: Landscape & sidewalk width can be varied

Figure 5: Major Collector Typical Section



Note: Landscape & sidewalk width can be varied

Figure 6: Minor Arterial Typical Section

Street Capacity Improvements

The TSP analysis conducted to-date as well as other ongoing City planning projects identified arterial and collector streets that experience or are projected to experience traffic congestion and delay, lack pedestrian and bicycle facilities that comfortably serve a broad range of users, and/or could hinder implementation of the provision of future reliable transit services in a cost effective manner. To address these issues in a prioritized way, Table 2 reflects the six corridors identified by the PMT as areas of strategic focus for corridor capacity improvements. These corridors are also shown in Figure 1.



Table 2: Identified Strategic Street Capacity Investment Corridors

Map ID	Corridor	S-W Limit	E-N Limit	Improvement
S1	Pershall Way	New Pershall Arterial	US 97	Widen to 3-Lane Arterial
S7	Northwest Way	Maple Ave	NW Upas Ave	Widen to 3 Lanes
S14	SW/NW Helmholtz Way	SW Canal Boulevard	NW Maple Avenue	Widen roadway to add center turn lane
S21	OR 126	US 97	SE 9th St	Widen to 3 Lanes
S22	OR 126	SW Helmholtz Way	SW 27th St	Upgrade roadway as necessary
S26	SW Veterans	Railroad	SE 1st St	Widen to 3 Lanes (turn lanes where needed)

Roadway widening and similar improvements to these key corridors can help accommodate growth and economic development in the region and continue to shape the urban context for the City. Such improvements can improve mobility and connectivity as well as create opportunities to incorporate bicycle, pedestrian, and transit facilities where they do not exist.

New Planned Streets

To meet the identified street system needs, the PMT also identified a number of new streets to improve connectivity between and within existing neighborhoods, employment, and commercial areas; provide connections to newly developed/developing areas; and to provide alternative travel routes for all modes to existing streets. As part of this review, twenty-three streets were identified for extension and/or providing new connections. These projects are summarized in Table 3 and shown in Figure 1.

Table 3: New Planned Streets

Map ID	Corridor	S-W Limit	E-N Limit	Improvement
S2	NW Pershall Way	NW Upas Way	NW Pershall Way	Proposed 3-Lane Arterial
S5	NW Upas Ave	NW 10th St	East of NW Canal Blvd	Proposed Collector & Overcrossing
S6	NE 3rd	King Way	UGB	Proposed Collector
S10	NW Maple Ave	SW Helmholtz Way	NW 35th St	Proposed 3-Lane Arterial
S13	NW 27th St	NW Hemlock Ave	NW Maple Ave	Proposed Arterial
S15	NW Hemlock Ave	NW Helmholtz Way	NW 35th St	Proposed Collector
S16	NE 5th St	E Antler Ave	NE Hemlock Ave	Proposed Collector
S17	NE 17th St	OR 126	NE Kingwood	Proposed Collector
S23	SE 9th St	Veterans Way	OR 126	Proposed Arterial
S24	Veterans Way	SE 1st St	Veterans Way	Proposed Collector
S29	SW Pumice Ave	SW 15th St	SW Canal Blvd	Proposed Collector
S30	SW Quartz Ave	SW Helmholtz Way	SW 37th St	Proposed Collector
S31	SW Quartz Ave	SW Canal Blvd	Airport Way	Proposed Collector
S32	6th St	Airport Way	Veterans Way	Proposed Collector
S34	SE Airport Way	SE Airport Way	SW Veterans Way	Proposed Arterial
S35	SW 45th St	SW Salmon Ave	SW Helmholtz Way	Proposed Collector
S38	SW Odem Medo	SW Canal Blvd	SW 19th St	Proposed Collector
S39	SE Salmon Drive	13 th Street	S 1st St	Proposed Collector



Map ID	Corridor	S-W Limit	E-N Limit	Improvement
S41	SW 43rd St	SW Badger Ave	SW Yew Ave	Proposed Collector
S42	SW Badger Ave	SW Helmholtz Way	SW 43rd St	Proposed Collector
S44	SW 21st St	SW Elkhorn Ave	south of SW Airport Ave	Proposed Collector
S47	SW Elkhorn Ave	SW Canal Blvd.	SW 19th St	Proposed Collector and Overcrossing
S48	SW 19th St	UGB	SW Elkhorn Ave	Proposed Collector

Intersection Capacity Improvements

Intersection capacity improvements are typically related to modifications that are lower in cost than a typical street corridor project and are ones that generally do not often require significant right-of-way acquisition. The TSP is not inclusive of all of the intersection projects that the City will pursue over the next twenty years. Rather, the projects highlighted by the PMT are those that the City can pursue to strategically improve the operational efficiency of specific intersections and important roadways. These projects can enhance system operations and can be completed as opportunities arise. Table 4 through Table 6 and Figure 7 summarize the strategic intersection capacity improvement locations identified by the PMT. In some cases, preferred intersection improvement options are identified. In all cases, the City will review the appropriate intersection control options at the time of project development and delivery. Operational results for the identified capacity improvements are provided in Appendix B.

Table 4: Identified Intersection Control Additions

Map ID	N-S Street	E-W Street	Improvement	Description
I3	NW Canal Blvd	NE King Way	Consider traffic signal or roundabout	Signal Preferred
I4	NW Helmholtz Way	NW Maple Ave	Consider traffic signal or roundabout	-
I5	NW 35th St	NW Maple Ave	Consider traffic signal or roundabout	Signal Preferred
I6	NW 27th St	NW Maple Ave	Consider traffic signal or roundabout	Roundabout Preferred
I7	NW 19th St	NW Maple Ave	Consider traffic signal or roundabout	Signal Preferred
I8	NW 9th St	NW Maple Ave	Consider traffic signal or roundabout	Signal Preferred
I10	NE 5th St	NE Maple Ave	Consider traffic signal or roundabout	-
I11	NE 9th St	NE Maple Ave	Consider traffic signal or roundabout	-
I13	NW 6th St	NW Kingwood Ave	Consider traffic signal or roundabout	Signal Preferred
I14	NW 27th St	NW Hemlock Ave	Consider traffic signal or roundabout	Signal Preferred
I15	NE 9th St	NE Hemlock Ave	Consider traffic signal or roundabout	Signal Preferred
I16	NW 27th St	W Antler Ave	Consider traffic signal or roundabout	Signal Preferred
I17	NE 9th St	E Antler Ave	Consider traffic signal or roundabout	Signal Preferred
I22	SW Helmholtz Way	OR 126	Consider traffic signal or roundabout	Roundabout Preferred
I23	SW 35th St	OR 126	Consider traffic signal or roundabout	Signal Preferred
I25	SW 15th St	OR 126	Consider traffic signal modification or roundabout	-
I29	SE 9th St	OR 126	Consider traffic signal or roundabout	Roundabout Preferred
I30	SW Helmholtz Way	SW Obsidian Ave	Consider traffic signal or roundabout	-
I31	SW 27th St	SW Obsidian Ave	Consider traffic signal or roundabout	Signal Preferred
I34	SE 9th St	SW Veterans Way	Consider traffic signal or roundabout	Roundabout Preferred



Map ID	N-S Street	E-W Street	Improvement	Description
I36	SE Veterans Way	OR 126	Consider traffic signal or roundabout	Signal Preferred
I37	SW Canal Blvd	SW Pumice	Consider traffic signal or roundabout	Disconnect SW Obsidian Ave
I38	SW Canal Blvd	SW Quartz Ave	Consider traffic signal or roundabout	Signal Preferred
I39	SW Helmholtz Way	SW Salmon Ave	Consider traffic signal or roundabout	
I40	SW 27th St	SW Salmon Ave	Consider traffic signal or roundabout	Signal Preferred
I41	SW Helmholtz Way	SW Wickiup Ave	Consider traffic signal or roundabout	Signal Preferred
I42	SW 27th St	SW Wickiup Ave	Consider traffic signal or roundabout	Roundabout Preferred
I45	SW 19th St	SW Airport Way	Consider traffic signal or roundabout	Roundabout Preferred
I46	SW Canal Blvd	SW Badger Ave	Consider traffic signal or roundabout	-
I47	SW Helmholtz Way	SW Elkhorn Ave	Consider traffic signal or roundabout	-
I48	SW Canal Blvd	SW Elkhorn Ave	Consider traffic signal or roundabout	-
I49	SW Helmholtz Way	SW Canal Blvd	Consider traffic signal or roundabout	Roundabout Preferred

Note: ODOT intersections will require traffic control evaluations

Table 5: Identified Intersection Capacity Improvements

Map ID	N-S Street	E-W Street	Improvement	Description
I2	NW 10th St	NW Pershall Way	Consider Additional Lanes	Add Eastbound Right-Turn
I19	SE Lake Rd	OR 126	Consider Access Management	Create Right-In/Right-Out in Conjunction with 9th Street Project
I24	SW Rimrock Way	OR 126	Consider Additional Lanes	Carry Westbound Lane through Intersection; Add Southbound and Westbound Right-Turns
I32	US 97	Veterans Way	Improvement to be identified by South Corridor Project	
I33	SW Lake Rd	SW Veterans Way	Consider Access Management	Create Right-In/Right-Out in Conjunction with 9th Street Project
I35	SE 10th St	SE Veterans Way	Consider Intersection Control Change	Remove Stop Signs on Veterans in Conjunction with 9th Street Project

Grade-Separated Intersection Improvements

Three intersections were identified for grade separation to eliminate conflict points and improve traffic flows. One intersection was identified for future evaluation. These are identified in Table 6 and shown in Figure 7. A brief description of each is included below:

- **US 97/O'Neil Highway:** The Interchange Area Management Plan (IAMP) for this location identified the need to provide a grade-separated overcrossing of US 97 that would connect O'Neil Highway to Pershall Way. An interim option is to restrict the US 97/O'Neil Highway intersection to right-in, right-out.
- **Airport Way Rail Crossing:** Airport Way connects US 97 to the Redmond Airport. US 97 and the Redmond Airport are both critical statewide infrastructure as identified in the Oregon Resilience Plan. The planned grade-separation would eliminate the at-grade rail crossing between the highway and airport.

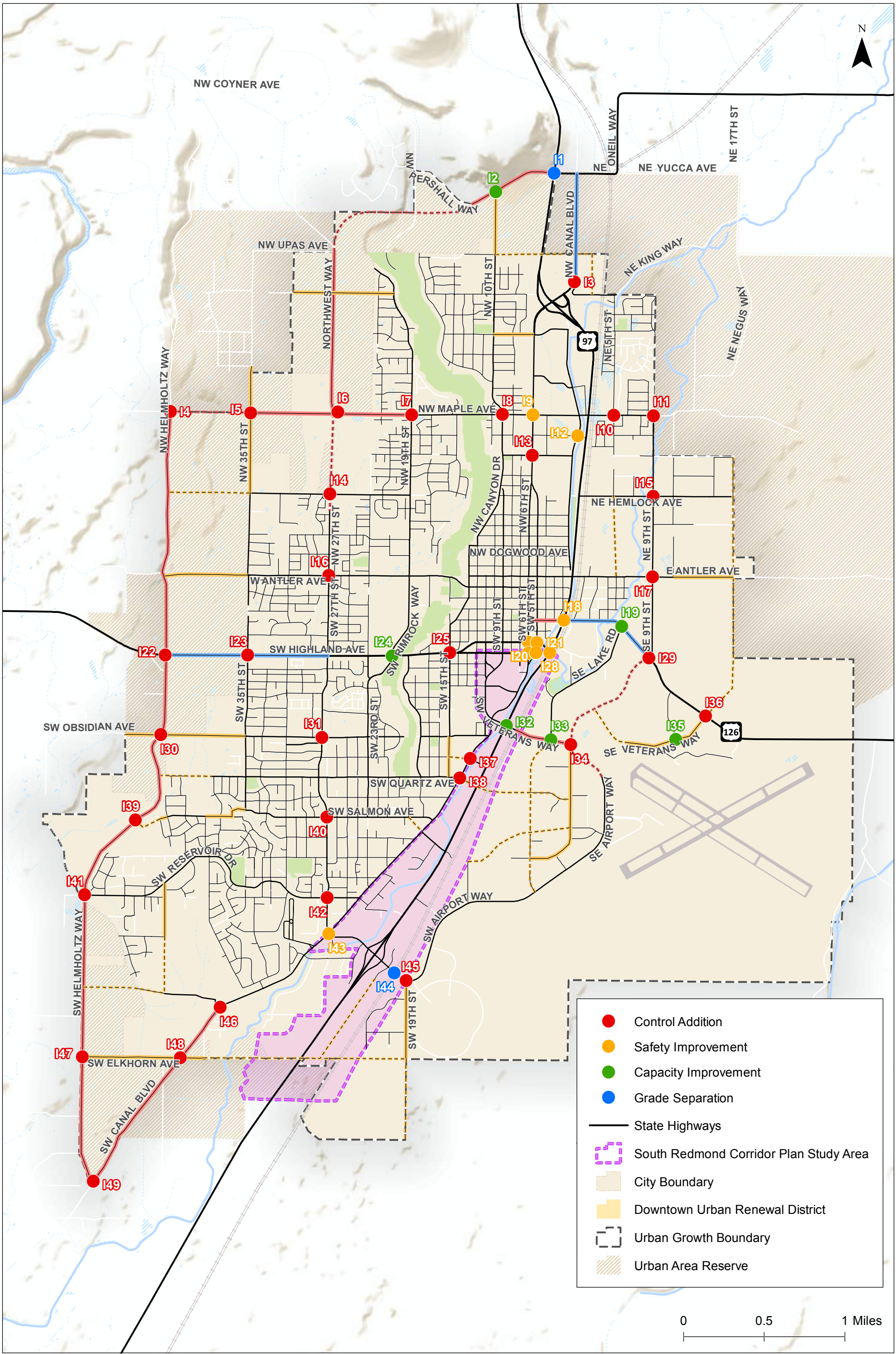


- **US 97/Elkhorn Avenue:** Construct overcrossing of US 97 as part of the Elkhorn Avenue extension from Canal Boulevard to SW 19th Street.
- **US 97/Hemlock Avenue:** Conduct a study to evaluate a possible grade-separated crossing of US 97.

Table 6: Identified Grade Separation Projects

Map ID	N-S Street	E-W Street	Improvement	Description
I1	US 97	O'Neil Hwy	North Interchange IAMP Project	Interim project would modify US 97/O'Neil Hwy intersection to Right-In/Right-Out; eventual project would result in grade-separation
I44	Railroad	SW Airport Way	Grade Separated Crossing	Remove Existing At-Grade Rail Crossing
S47	US 97	Elkhorn Avenue	Grade Separated Crossing	Construct US 97 overcrossing at part of roadway extension.





**Future Intersection Alternatives
Redmond, Oregon**

**Figure
7**



H:\1717720 - Redmond Transportation System Plan\GIS\Future Alternatives2.mxd - nbarus - 11:08 AM 4/23/2019

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl

Key Multi-Use Pathways

Multi-use pathways are paved, separated from streets and are designed for both walking and bicycling. Where space allows, corridors with high usage may be developed with redundant paths to separate people walking from people biking. The paths for people walking or running may be unpaved depending on intended use. The multiuse pathway system improves continuity for bicyclists and pedestrians to move freely throughout the transportation network and helps to eliminate barriers to east-west access, particularly through the Dry Canyon and across US 97. Twenty-one new multi-use pathways have been identified for inclusion into the TSP. These projects are summarized in Table 7 and shown in Figure 8.

Table 7: Identified Key Multi-Use Pathways

Map ID	Corridor	S-W Limit	E-N Limit
B1	SW/NW Helmholz Way	SW Umatilla Ave	NW Canal Blvd
B2	NW Pershall Way	Dry Canyon Trail	B1
B5	NW Spruce Ave	NW Helmholtz Way	NW 19th St
B11	NW Maple Ave	NW Helmholtz Way	west of NW 22nd St
B12	NW 35th St	NW Dogwood Ave	NW Upas Way
B13	NW 27th St	NW Greenwood Ave	NW Upas Way
B17	SW 39th St	SW Quartz Ave	NW Maple Ave
B18	NW Hemlock Ave	NW Helmholtz Way	NW 19th St
B19	NW 29th St	NW Hemlock Ave	UGB
B28	Lateral E Pilot Butte Canal	OR 126	NE Kingwood Ave
B46	OR 126	SE Jackson St	UGB
B47	SW 35th St	SW Quartz Ave	W Antler Ave
B52	SW Quartz Ave	SW Helmholtz Way	SW 35th St
B55	SW Quartz Ave	SW Canal Blvd	SE Airport Way
B56	SE Airport Way/SE 9th St	Railroad	OR 126
B61	SW 19th St	SW Canal Blvd	SW Reindeer Ave
B62	SW Canal Blvd/Pilot Butte Canal	SW 27th St	NE King Way
B67	SW Helmholtz Way	SW Canal Blvd	SW Reservoir Dr
B69	Pilot Butte Canal	SW Elkhorn Ave	SW Canal Blvd
B71	SW Canal Blvd	SW Helmholtz Way	SW Elkhorn Ave

Key Bicycle Corridors

In addition to the multiuse pathways, new bike boulevards, bike lanes, quiet streets and protected bike lanes will serve the cyclists of Redmond in the future. A brief description of each is provided below.

- A quiet street is a bike route on a low-volume, low-speed street that has been optimized for bicycle travel. These boulevards contain different features depending on adjacent land uses, however they are all intended to contain wayfinding signs, pavement markings, and



intersection treatments. Some may also feature diversion to reduce automobile volumes and traffic calming to slow motor vehicle speeds.

- A bike lane is a marked space along a length of roadway that is designated for use by people bicycling. Wheelchair users and some motorized scooters are allowed in bike lanes.
- Buffered bike lanes feature a buffer strip to provide space between the bike lane and the auto lane or parked cars.
- A protected bike lane, sometimes called a “cycle track”, is an exclusive bicycle facility adjacent to, but separated from, the roadway. Separation is generally achieved using planters, parked cars, curbs, or posts to separate people biking from people driving. They are best on roads with few cross streets and driveways, particularly on roadways with high auto volumes and speeds. A protected bike lane provides a logical extension of a shared use path because it provides the sensation of riding on a path due to the separation from motorized traffic.

Fifty-two bicycle corridors were identified for inclusion into the TSP. These projects are summarized in Table 8 and shown in Figure 8.

Crossing improvements, though not specifically identified in the TSP, may be provided when bicycle facilities are constructed that cross major roads. The need for and type of crossing treatment will be evaluated at the time of project development and design.

The City of Redmond will consider upgrades to existing bicycle facilities (such as including a marked buffer) on a case-by-case basis. Such upgrades typically occur in conjunction with scheduled maintenance operations.

Table 8: Identified Key Bicycle Corridors

Map ID	Corridor	S-W Limit	E-N Limit	Improvement
B3	NW 10th St	NW Maple Ave	NW Pershall Way	Bike Lanes
B4	NW Canal Blvd	NE King Way	NE Yucca Ave	Bike Lanes
B6	NW Canyon Dr/NW Spruce Ave	NW 10th St	US 97	Quiet Street
B7	NE King Way	NW Canal Blvd	NE 5th St	Bike Lanes
B8	NW Quince Ave	UGB	NW 19th St	Quiet Street
B9	NW Quince Ave	NW Canyon Dr	NW 6th St	Bike Lanes
B10	NE 5th St	NE Negus Way	NE King Way	Bike Lanes
B14	NW Maple Ave	west of NW 22nd St	NW 19th St	Bike Lanes
B15	NW 10th St/NW Larch/NW Rockcrest Ct	Dry Canyon Trail	NW 9th St	Quiet Street
B16	NE 5th St	NE Hemlock Ave	NE Maple Ave	Quiet Street
B20	NW 19th St	NW Maple Ave.	Northwest Way	Bike Lanes
B21	NW Ivy Ave	NW 19th St	NW Rimrock Ct	Quiet Street
B22	NW 17th St/NW Rimrock Ct	W Antler Ave	NW Maple Ave	Quiet Street
B23	NW Canyon Dr	SW Deschutes Ave	NW Maple Ave	Quiet Street
B24	NW Dogwood Ave	NW Canyon Dr	NW Canal Blvd	Quiet Street
B25	SW 8th St	SW Evergreen Ave	NW Kingwood Ave	Quiet Street



Map ID	Corridor	S-W Limit	E-N Limit	Improvement
B26	NW Kingwood Ave	NW Canyon Dr	NW Canal Blvd	Quiet Street
B27	NE Hemlock Ave	NW Canal Blvd	NE 9th St	Bike Lanes/Crossing
B29	NE Hemlock Ave	west of NE 15th St	NE 17th St	Bike Lanes
B30	SE 17th St	OR 126	NE Kingwood Ave	Bike Lanes
B31	W Antler Ave	SW Helmholtz Way	SW 35th St	Bike Lanes
B32	W Antler Ave	NW 32nd Ct	SW 31st St	Bike Lanes
B33	W Antler Ave	NW 29th St	SW 27th St	Bike Lanes
B35	E Antler Ave	SW 7th St	NE 17th St	Bike Lanes/Crossing
B36	SE Jackson St	OR 126	E Antler Ave	Quiet Street
B37	SE 9th St	OR 126	NE Hemlock Ave	Bike Lanes
B38	E Antler Ave	SE 9th St	NE 17th St	Bike Lanes
B39	SW 23rd St	SW Highland Ave	W Antler Ave	Bike Lanes
B40	SW 15th St	SW Highland Ave	SW Deschutes Ave	Quiet Street
B42	SW Highland Ave	SW Helmholtz Way	SW 35th St	Bike Lanes
B44	SW Lake Rd	SW Veterans Way	OR 126	Quiet Street
B45	SW Juniper Ave	Dry Canyon Trail	SW 15th St	Quiet Street
B48	SW 31st St	SW Canal Blvd	SW Highland Ave	Quiet Street
B49	SW Obsidian Ave	SW Helmholtz Way	SW Canal Blvd	Bike Lanes
B50	SW Canyon Dr	SW Quartz Ave	SW Highland Ave	Quiet Street
B51	SW 15th St	SW Obsidian Ave	SW Highland Ave	Bike Lanes
B53	SW Quartz Ave	SW 35th St	SW Canal Blvd	Bike Lanes
B54	SW Canal Blvd	SW Salmon Ave	SW Obsidian Ave	Bike Lanes
B57	SW Salmon Ave/SW Valleyview Dr/SW 32nd Ct	SW Helmholtz Way	SW 31st St	Quiet Street
B58	SW 35th St/SW Salmon Ave	SW Quartz Ave	SW 27th St	Quiet Street
B59	SW 25th St/SW Reindeer Ave	SW Canal Blvd	Dry Canyon Trail/SW 19th St	Quiet Street
B60	SW 23rd St	SW Canal Blvd	SW Salmon Ave	Bike Lanes
B63	SW Reservoir Dr	SW Helmholtz Way	SW 39th St	Bike Lanes
B64	Volcano Avenue	27th Street	SW Canal Boulevard	Bike Lanes
B65	SW 43rd St/SW Badger Ave	SW Canal Blvd	SW Reservoir Dr	Bike Lanes
B66	SW Cascade Vista Dr/SW Antelope Ave	SW Canal Blvd	SW Quartz Ave	Quiet Street
B68	SW Elkhorn Ave	SW Helmholtz Way	Lateral B Canal	Bike Lanes
B70	SW Elkhorn Ave	SW Canal Blvd	SW 19th St	Bike Lanes
B72	SW 19th St	UGB	SW Elkhorn Ave	Bike Lanes
B73	SW 4th St/SW Forest/SW 5th	SW Highland	SW Dogwood Ave	Quiet Street





Figure 8

Key Pedestrian Improvements

Sidewalks are paved walkways adjacent to streets. Sidewalks are particularly important for providing basic mobility for people with disabilities. Setback sidewalks (featuring a planted barrier between the sidewalk and travel way) can create more comfort and safety for people walking. All streets within the City are anticipated to have sidewalks over time. Key priority sidewalk investment areas, as identified by the PMT, are reflected in Figure 9 and listed in Table 9 and Table 10. Sidewalks gaps are shown in Figure 10. The identified improvements are intended to prioritize sidewalk facilities along ADA routes, as defined by the City of Redmond.

Crossing improvements, though not specifically identified, may be provided when pedestrian facilities are constructed that cross major roads. The need for and type of crossing treatment will be evaluated at the time of project development and design.

Table 9: Identified Priority Pedestrian Improvements – Sidewalk and Ramp Additions

Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note
P4	NW 10th St	NW 9th St	NW Quince Ave	West	Add Sidewalk or Ramps
P5	NE 5th St	NE Negus Way	NE Oak Ave	West	Add Sidewalk or Ramps
P6	NW Maple Ave	NW 22nd St	NW 19th St	Both	Add Sidewalk or Ramps
P8	NW 9th St	NW Hemlock Ave	NW Maple Ave	Both	Add Sidewalk or Ramps
P9	NW 6th St	North of NW Larch Ave	NW Maple Ave	Both	Add Sidewalk or Ramps
P11	NW 6th St	NW Jackpine Ave	NW Larch Ave	East	Add Sidewalk or Ramps
P12	NW 6th St	South of NW Kingwood Ave	South of Larch Ave	West	Add Sidewalk or Ramps
P13	NW Larch Ave	NW 6th St	NW 4th St	Both	Add Sidewalk or Ramps
P14	NW Larch Ave	NW 4th St	West of NW Canal Blvd	South	Add Sidewalk or Ramps
P16	NW Kingwood Ave	NW 6th St	NW Canal Blvd	Both	Add Sidewalk or Ramps
P18	NW 6th St	North of NW Jackpine Ave	South of NW Kingwood Ave	West	Add Sidewalk or Ramps
P19	NW 6th St	NW Jackpine Ave	NW Kingwood Ave	East	Add Sidewalk or Ramps
P20	NW Canal Blvd	NW Elm Ave	NW Larch Ave	West	Add Sidewalk or Ramps
P21	NW Hemlock Ave	NW Canyon Dr	NW 9th St	Both	Add Sidewalk or Ramps
P23	NW 9th St	W Antler Ave	NW Greenwood Ave	Both	Add Sidewalk or Ramps
P24	NW Dogwood Ave	NW Canyon Dr	NW 10th St	South	Add Sidewalk or Ramps
P29	W Antler Ave	NW 32nd Ct	NW 27th St	Both	Add Sidewalk or Ramps
P34	SW 23rd St	SW Glacier Pl	SW Glacier Ave	East	Add Sidewalk or Ramps
P35	SW Highland Ave	SW 31st St	SW 24th Ct	North	Add Sidewalk or Ramps
P37	SW Highland Ave	SW Indian Cir	SW 27th St	South	Add Sidewalk or Ramps
P40	SW 15th St	SW Metolius Ave	SW Indian Ave	Both	Add Sidewalk or Ramps
P44	SW Obsidian Ave	SW 33rd St	SW 31st St	South	Add Sidewalk or Ramps
P46	SW Obsidian Ave	SW 23rd St	SW 21st Pl	South	Add Sidewalk or Ramps
P48	SW Obsidian Ave	SW Canyon Dr	SW 17th St	North	Add Sidewalk or Ramps
P50	SW Obsidian Ave	SW Canyon Dr	East of SW 15th St	South	Add Sidewalk or Ramps
P52	SW Veterans Way/SE Airport Way	US 97	SE Salmon Dr	Both	Add Sidewalk or Ramps



Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note
P57	SW Canal Blvd	North of SW Salmon Ave	South of SW Obsidian Ave	West	Add Sidewalk or Ramps
P59	SW Salmon Ave	SW 31st St	SW 29th St	South	Add Sidewalk or Ramps
P66	SW Xero Ln	West of SW 34th St	SW 31st St	Both	Add Sidewalk or Ramps
P67	SW 31st St	SW 33rd St	SW Savannah Ct	West	Add Sidewalk or Ramps
P69	SW 31st St	SW Timber Ct	SW 33rd St	East	Add Sidewalk or Ramps
P70	SW 31st St	SW Xero Ln	SW Volcano Way	Both	Add Sidewalk or Ramps
P71	SW Canal Blvd	SW 27th St	SW Timber Ave	East	Add Sidewalk or Ramps
P72	SE Airport Way	Railroad Line	South of Fairgrounds north entrance	Both	Add Sidewalk or Ramps

Table 10: Identified Priority Pedestrian Improvements – Sidewalk and Ramp ADA Upgrades

Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note
P1	NW 10th St	NW Redwood Ave	NW Teak Ave	West	Upgrade Sidewalk or Ramps
P2	NW 10th St	NW Oak Pl	NW Teak Ave	East	Upgrade Sidewalk or Ramps
P3	NE 5th St	NE Cheyenne Dr	NE Quince Ln	East	Upgrade Sidewalk or Ramps
P7	NE Negus Way	NE 5th St	NE 7th St	Both	Upgrade Sidewalk or Ramps
P10	NW 6th St	North of NW Kingwood Ave	North of NW Larch Ave	West	Upgrade Sidewalk or Ramps
P15	NE 5th St	NE Larch Ave	NE Negus Way	Both	Upgrade Sidewalk or Ramps
P17	NW 6th St	NW Jackpine Ave	NW Kingwood Ave	West	Upgrade Sidewalk or Ramps
P22	NW 9th St	NW Fir Ave	NW Hemlock Ave	Both	Upgrade Sidewalk or Ramps
P25	NW Dogwood Ave	NW Canyon Dr	NW 10th St	North	Upgrade Sidewalk or Ramps
P26	NW Dogwood Ave	NW 10th St	NW 6th St	Both	Upgrade Sidewalk or Ramps
P27	NW Elm Ave	NW 27th St	NW 25th St	Both	Upgrade Sidewalk or Ramps
P28	NW 27th St	NW Cedar Ave	NW Elm Ave	Both	Upgrade Sidewalk or Ramps
P30	W Antler Ave	SW 27th St	SW Rimrock Way	Both	Upgrade Sidewalk or Ramps
P31	SW 23rd St	SW Highland Ave	W Antler Ave	Both	Upgrade Sidewalk or Ramps
P32	W Evergreen Ave	SW Canyon Dr	SW 8th St	Both	Upgrade Sidewalk or Ramps
P33	SW 7th St	SW Indian Ave	SW Black Butte Blvd	Both	Upgrade Sidewalk or Ramps
P36	SW Highland Ave	SW 31st St	SW Indian Cir	South	Upgrade Sidewalk or Ramps
P38	SW 31st St	SW Savanna Ct	SW Highland Ave	Both	Upgrade Sidewalk or Ramps
P39	SW 27th St	SW Metolius Ave	SW Highland Ave	East	Upgrade Sidewalk or Ramps
P41	SW Veterans Way	SW Canal Blvd	SW Indian Ave	Both	Upgrade Sidewalk or Ramps
P42	SW Obsidian Ave	SW 35th St	Dry Canyon	North	Upgrade Sidewalk or Ramps
P43	SW Obsidian Ave	SW 35th St	SW 33rd St	South	Upgrade Sidewalk or Ramps
P45	SW Obsidian Ave	SW 31st St	SW 23rd St	South	Upgrade Sidewalk or Ramps
P47	SW Obsidian Ave	SW 21st Pl	SW Rimrock Way	South	Upgrade Sidewalk or Ramps
P49	SW Obsidian Ave	SW 17th St	SW 15th St	North	Upgrade Sidewalk or Ramps
P51	SW Obsidian Ave	East of SW 15th St	SW Canal Blvd	Both	Upgrade Sidewalk or Ramps
P53	S 1st St	SE Salmon Dr	SW Veterans Way	Both	Upgrade Sidewalk or Ramps
P54	SE Salmon Dr	S 1st St	West of Timber Ave	Both	Upgrade Sidewalk or Ramps
P55	SW Quartz Ave	SW 35th St	SW Canal Blvd	Both	Upgrade Sidewalk or Ramps
P56	SW 23rd St	SW Salmon Ave	SW Quartz Ave	Both	Upgrade Sidewalk or Ramps
P58	SW Salmon Ave	SW 31st St	SW Canal Blvd	North	Upgrade Sidewalk or Ramps



Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note
P60	SW Salmon Ave	SW 29th St	SW Canal Blvd	South	Upgrade Sidewalk or Ramps
P61	SW 39th St	SW 35th St	SW Salmon Ave	Both	Upgrade Sidewalk or Ramps
P62	SW Reservoir Dr	SW 39th St	SW 36th St	Both	Upgrade Sidewalk or Ramps
P63	SW 36th St	SW 35th St	SW Reservoir Dr	Both	Upgrade Sidewalk or Ramps
P64	SW 35th St	SW Cascade Vista Dr	SW 36th St	Both	Upgrade Sidewalk or Ramps
P65	SW Xero Ln	SW 35th St	West of SW 34th St	Both	Upgrade Sidewalk or Ramps

Key Transit Corridors

The provision of high-quality, available, and reliable transit service fundamentally supports the environment, economic development, and equity for all travelers. The TSP includes both key north-south and east-west transit within all quadrants of the City's UGB between the downtown urban core, residential neighborhoods, existing and planned pedestrian and bicycle corridors, jobs, health care, schools and places of interest. These corridors correlate with the planned Redmond Transit Hub located at the corner of SW Kalama Avenue and SW Canal Blvd. Multimodal infrastructure along these corridors will be pursued by the City to enhance the accessibility of future transit service.

The City and Cascades East Transit will continue to work to refine these transit corridors and identify a program to implement more robust transit service within Redmond. Specifically, the City intends to explore various service options in partnership with Cascades East Transit (CET) to better serve the community. Initial recommendations from the Regional Transit Master Plan (COIC, 2013) suggest implementing fixed-route service. That document also included short-, mid-, and long-term service concepts that should be considered.

As documented within the Regional Transit Master Plan, the suggested transit routes would serve approximately 50-80 percent of the City's population and employment with transit access when implemented.

The key transit corridors identified by the PMT are shown in Figure 10.

Key Freight Routes

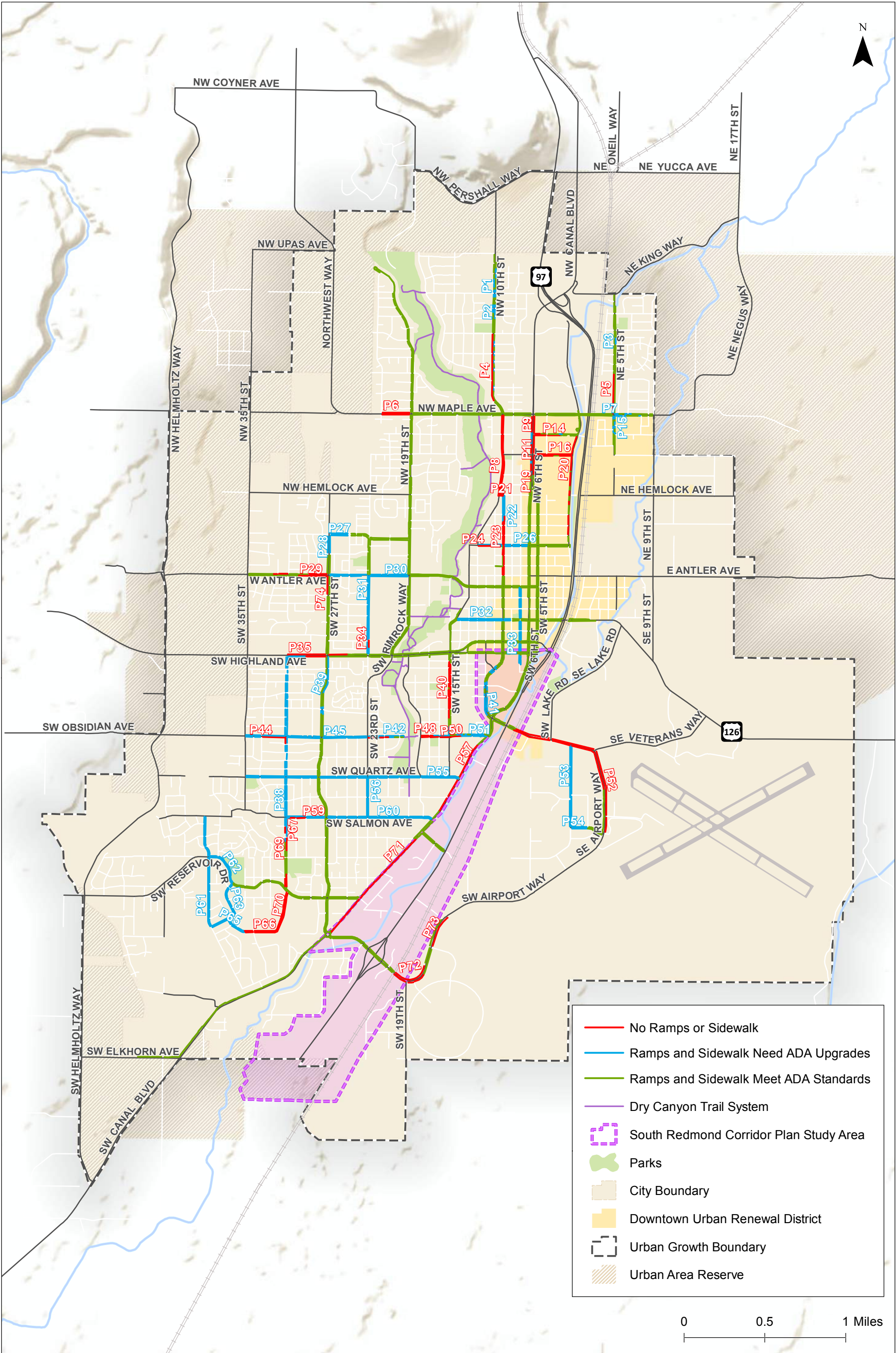
Both the TSP and the many state policies and plans recognize the important role that an efficient and reliable transportation system plays in supporting the region's economy, growth, and quality of life. Within the City, highways, city streets, airports, pipelines, and railways provide freight mobility. Trucks, rail, and air service must function together to ensure the efficient and timely movement of freight to, within, and through the community.

As part of the needs analysis, changes to the existing freight and truck routes were identified to ensure consistency with state and federal designations and guidance and in reflection of ongoing planning



efforts. In particular, the PMT identified potential freight routes that provide alternative access points to the industrial lands east of US 97 both to the north and south of OR 126. As shown in Figure 11, these routes utilize SW Airport Way, SE 9th Street, and NE Hemlock Avenue.





**Priority (ADA) Pedestrian Routes
Redmond, Oregon**

**Figure
9**





Figure 10



Figure
11

Airport Master Plan Recommendations

Key recommendations for the ongoing Airport Master Plan will be incorporated into the TSP prior to adoption.

VEHICULAR SYSTEM PERFORMANCE

The City uses motor vehicle level of service (LOS) standards to evaluate acceptable vehicular performance on the local, collector, and arterial streets. LOS standards are presented as grades A (free flow traffic conditions) to F (congested traffic conditions). ODOT uses mobility targets based on volume to capacity (V/C) ratios to evaluate acceptable vehicular performance on state facilities. As V/C ratios approach 1.0, traffic congestion increases.

In some cases, it may not be possible or desirable to meet the designated mobility target or LOS standard. In those cases, an alternative mix of strategies such as land use, transportation demand management, safety improvements or increased use of active modes may be applied.

To understand the effectiveness of the identified TSP projects in addressing the needs previously identified, anticipated year 2040 intersection performance were assessed at several key locations throughout the City. The results from this analysis are shown in Table 10 and Table 11 and Figure 12.

Locations not meeting identified performance standards are highlighted in red. These locations will be discussed by the PMT for possible alternative performance criteria and/or other mitigation measures.

Table 11: Future Year 2040 Study Intersection Performance

	Study Intersection	Existing Control	Without Improvements		Proposed Control	With Improvements	
			v/c	LOS		v/c	LOS
1	NW Canal Blvd/ US 97 NB Ramps	Signal	0.51	A	No change	0.74	A
2	NW Canal Blvd/ US 97 SB Ramps	Signal	0.47	A	No change	0.67	A
3	NW Maple Ave/ NW 19th St	AWSC	1.25	F	Signal	0.77	C
4	NW Maple Ave/ NW 6th St	Signal	0.78	C	No change	0.81	C
5	NW Larch Ave/ NW Canal Blvd	TWSC	0.31	B	No change	0.28	B
6	NE Hemlock Ave/ NE 9th St	AWSC	0.51	B	Signal	0.45	B
7	W Antler Ave/ SW Helmholtz Way	TWSC	0.54	C	TWSC	0.24	C
8	W Antler Ave/ SW 27th St	AWSC	0.43	B	Signal	0.62	B
9	W Antler Ave/ SW Rimrock Way	Signal	0.67	C	No change	0.68	C
10	SW Black Butte Blvd/ SW 6th St	Signal	0.50	A	No change	0.50	A
11	SW Black Butte Blvd/ SW 5th St	Signal	0.56	A	No change	0.52	A
12	E Antler Ave/ NE 9th St	TWSC	0.07	B	Signal	0.30	A
13	SW Evergreen Ave/ SW 6th St	Signal	0.53	A	No change	0.65	B
14	SW Evergreen Ave/ SW 5th St	Signal	0.70	B	No change	0.66	B



Study Intersection	Existing Control	Without Improvements		Proposed Control	With Improvements	
		v/c	LOS		v/c	LOS
15 SW Evergreen Ave/ US 97	Signal	1.11	F	No change	1.23	F
16 OR 126 (SW Glacier Ave)/ SW 11th St	Signal	0.57	A	No change	0.61	A
17 OR 126 (SW Glacier Ave)/ SW 9th St	Signal	0.55	A	No change	0.58	B
21 OR 126 (SW Highland Ave) / SW Helmholtz Way	TWSC	>1.0	F	Roundabout	0.92	D
22 OR 126 (SW Highland Ave)/ SW 27th St	Signal	>1.0	F	No change	>1.0	F
23 OR 126 (SW Highland Ave)/ SW Rimrock Way	Signal	>1.0	E	Lane Additions	1.0	C
24 OR 126 (SW Highland Ave)/ SW 15th St	Signal	0.88	C	No change	0.97	D
25 OR 126 (SW Highland Ave)/ SW 11th St	Signal	0.51	A	No change	0.54	A
26 OR 126 (SW Highland Ave)/ SW 9th St	Signal	0.54	B	No change	0.57	B
29 OR 126/ SE 9th St	TWSC	0.97	F	Roundabout	0.62	B
30 SW Obsidian Ave/ SW 27th St	AWSC	0.76	C	No change	0.49	B
31 SW Obsidian Ave/ SW 23rd St	TWSC	0.29	C	No change	0.18	C
34 SW Veterans Way/ SE Airport Way*	AWSC	0.80	C	-	-	-
35 SW Veterans Way/ OR 126	TWSC	0.92	F	Signal	0.84	C
36 SW Salmon Ave/ SW 27th St	AWSC	>1.0	E	Signal	0.67	C
39 SW Wickiup Ave/ SW Helmholtz Way	TWSC	0.29	C	Signal	0.49	B
40 SW Wickiup Ave / SW 27th St	AWSC	>1.0	E	Roundabout	0.67	B
44 SE Airport Way/ SW 19th St	TWSC	>1.0	F	Roundabout	0.54	B
45 S Canal Blvd / SW Helmholtz Way	TWSC	0.46	C	Roundabout	0.64	B

Note: Fluctuations in travel demand model runs result in some variations between “existing control” and “proposed control” where no improvements are proposed.

*Removed with corridor improvements

Table 12: Future Year 2040 Study Segment Performance

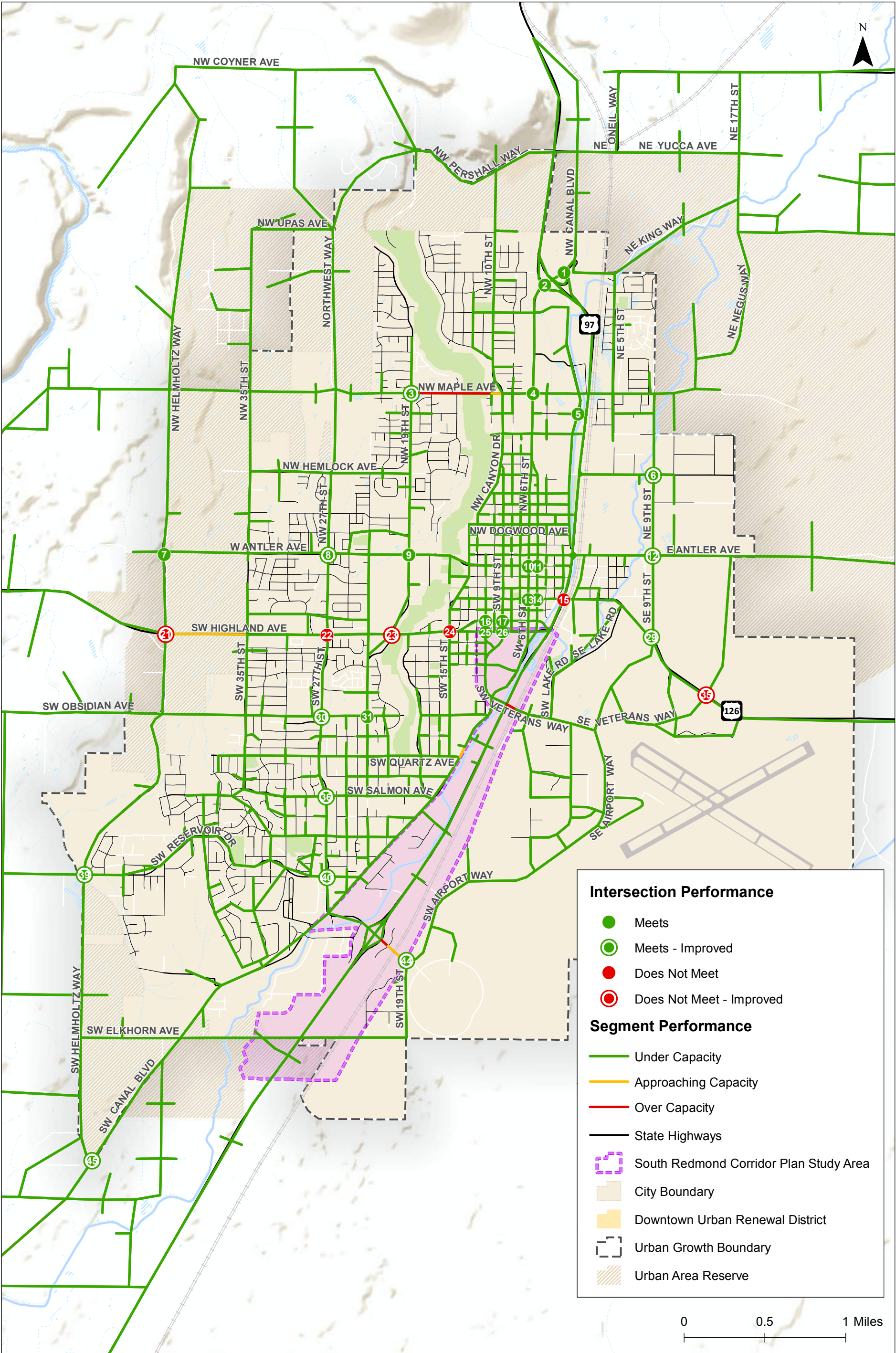
Segment	Travel Direction	v/c (without improvements)	v/c (with improvements)
Canal Blvd (near Badger Ave)	Northbound	0.99	0.84
	Southbound	0.93	0.76
OR 126 (near SW 35th St)	Eastbound	0.57	0.54
	Westbound	0.65	0.63
OR 126 (near SW Veterans Way)	Eastbound	0.27	0.27
	Westbound	0.28	0.28
US 97 (near SW Glacier Ave)	Northbound	1.14	1.21
	Southbound	1.01	1.00
US 97 (near NW Canal Blvd)	Northbound	0.99	1.10
	Southbound	0.83	0.87



NEXT STEPS

The Alternatives identified herein will be presented to the PAC and at an Open House at a forthcoming date. Based on the feedback, the list of multimodal projects will be refined and planning-level cost estimates will be developed to enable the city to consider the ability of the projected revenue stream to meet future demands.





Future (2040) Intersection and Segment Performance with Improvements
Redmond, Oregon

Figure
12

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Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl

Appendix A Project Category Evaluation

Project Category	Project Ratings						
	Balances impacts to developable parcels with system and community needs;	Minimizes impacts to Goal 5 resources	Supports or enhances the ability to implement the Oregon Resiliency Plan and/or other key state or regional projects	Leverages future transportation investments to reduce access, economic, safety and health disparities between neighborhoods, particularly those with greater populations of low income, minority, youth and/or elderly population than the City as a whole.	Addresses key connectivity needs on the collector and arterial street system	Addresses known safety issues	Supports enhanced multimodal access to major activity centers and/or economic development priority areas within the City as well as the region
Strategic Street Capacity Investment Corridors	●	●	▼	●	●	▼	●
New Planned Streets	●	●	▼	●	●	▼	●
Intersection Control Additions	●	●	○	▼	●	▼	●
Intersection Capacity Improvements	●	●	○	▼	●	▼	●
Grade Separation Projects	●	●	●	▼	●	●	●
Multi-use Pathways	●	●	○	●	▼	●	●
Bicycle Corridors	●	●	○	●	▼	●	●
Pedestrian Improvements	●	●	○	●	▼	●	●

Project Category	Provides pedestrian and bicycle connectivity to key transit corridors	Provides pedestrian and bicycle connectivity to key routes to school	Addresses key gaps in the bicycle system	Addresses key gaps in the pedestrian system	Improves freight mobility on designated freight, truck, rail and air routes	Improves mobility for through traffic on state highways; and	Leverages public and private investments
Strategic Street Capacity Investment Corridors	●	●	●	●	●	▼	▼
New Planned Streets	●	●	●	●	●	▼	▼
Intersection Control Additions	▼	▼	▼	▼	●	▼	▼
Intersection Capacity Improvements	▼	▼	▼	▼	●	▼	▼
Grade Separation Projects	▼	▼	●	●	●	●	▼
Multi-use Pathways	●	●	●	●	○	○	▼
Bicycle Corridors	●	●	●	○	○	○	▼
Pedestrian Improvements	●	●	○	●	○	○	▼

Appendix B Future Intersection Operational Analyses with Improvements

HCM Signalized Intersection Capacity Analysis

101: US-97 NB Ramps & SW Canal Blvd

07/05/2018

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Volume (vph)	197	464	8	359	522	78
Future Volume (vph)	197	464	8	359	522	78
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1733	1458	1421	1716	1630	1458
Flt Permitted	1.00	1.00	0.45	1.00	0.95	1.00
Satd. Flow (perm)	1733	1458	673	1716	1630	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	504	9	390	567	85
RTOR Reduction (vph)	0	365	0	0	0	36
Lane Group Flow (vph)	214	139	9	390	567	49
Heavy Vehicles (%)	1%	2%	17%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	6		5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	17.0	17.0	22.6	22.6	29.9	29.9
Effective Green, g (s)	17.0	17.0	22.6	22.6	29.9	29.9
Actuated g/C Ratio	0.28	0.28	0.37	0.37	0.49	0.49
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	479	403	260	630	792	708
v/s Ratio Prot	0.12		0.00	c0.23	c0.35	
v/s Ratio Perm		0.10	0.01			0.03
v/c Ratio	0.45	0.35	0.03	0.62	0.72	0.07
Uniform Delay, d1	18.4	17.8	12.7	15.9	12.5	8.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.5	0.1	1.8	3.1	0.0
Delay (s)	19.0	18.3	12.7	17.7	15.6	8.4
Level of Service	B	B	B	B	B	A
Approach Delay (s)	18.5			17.6	14.6	
Approach LOS	B			B	B	
Intersection Summary						
HCM 2000 Control Delay			16.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			61.5		Sum of lost time (s)	13.5
Intersection Capacity Utilization			59.4%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

101: US-97 NB Ramps & SW Canal Blvd

07/05/2018

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	214	504	9	390	567	85
v/c Ratio	0.42	0.64	0.03	0.70	0.67	0.11
Control Delay	19.9	6.4	12.0	23.8	18.2	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	6.4	12.0	23.8	18.2	4.4
Queue Length 50th (ft)	55	0	2	114	124	2
Queue Length 95th (ft)	131	68	9	188	#387	27
Internal Link Dist (ft)	689			452	761	
Turn Bay Length (ft)			200			175
Base Capacity (vph)	1230	1181	304	1568	842	788
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.43	0.03	0.25	0.67	0.11

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

102: US-97 SB Ramps & NW Canal Blvd

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	646	127	214	667	0	0	0	0	16	0	188
Future Volume (vph)	0	646	127	214	667	0	0	0	0	16	0	188
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5		4.5	4.5						4.5	4.5
Lane Util. Factor		0.95		1.00	1.00						1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Frt		0.98		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		3205		1662	1716						1662	1458
Flt Permitted		1.00		0.20	1.00						0.95	1.00
Satd. Flow (perm)		3205		352	1716						1662	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	702	138	233	725	0	0	0	0	17	0	204
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	0	124
Lane Group Flow (vph)	0	821	0	233	725	0	0	0	0	0	17	80
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	0%	0%	0%	0%	0%	2%
Turn Type		NA		pm+pt	NA					Perm	NA	Perm
Protected Phases		6		5	2						8	
Permitted Phases				2						8		8
Actuated Green, G (s)		18.6		29.8	29.8						8.3	8.3
Effective Green, g (s)		18.6		29.8	29.8						8.3	8.3
Actuated g/C Ratio		0.39		0.63	0.63						0.18	0.18
Clearance Time (s)		4.5		4.5	4.5						4.5	4.5
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1265		409	1085						292	256
v/s Ratio Prot		0.26		0.08	c0.42							
v/s Ratio Perm				0.28							0.01	c0.06
v/c Ratio		0.65		0.57	0.67						0.06	0.31
Uniform Delay, d1		11.6		5.2	5.5						16.1	16.9
Progression Factor		1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2		1.2		1.8	1.6						0.1	0.7
Delay (s)		12.8		7.0	7.1						16.2	17.6
Level of Service		B		A	A						B	B
Approach Delay (s)		12.8			7.1			0.0			17.5	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			10.6			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			47.1			Sum of lost time (s)				13.5		
Intersection Capacity Utilization			58.3%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

Queues

102: US-97 SB Ramps & NW Canal Blvd

07/05/2018

	→	↘	←	↓	↙
Lane Group	EBT	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	840	233	725	17	204
v/c Ratio	0.66	0.58	0.67	0.06	0.54
Control Delay	14.3	11.3	9.9	18.4	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	11.3	9.9	18.4	12.8
Queue Length 50th (ft)	85	20	93	4	12
Queue Length 95th (ft)	158	#65	247	19	67
Internal Link Dist (ft)	3583		689	648	
Turn Bay Length (ft)		250			275
Base Capacity (vph)	1924	405	1433	1172	1072
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.44	0.58	0.51	0.01	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

103: NW 19th St & NW Maple Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	250	109	332	409	104	151	69	261	55	45	14
Future Volume (vph)	14	250	109	332	409	104	151	69	261	55	45	14
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0			4.5	4.5		4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.95		1.00	0.97			1.00	0.85		0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.98	
Satd. Flow (prot)	1662	1623		1645	1689			1692	1473		1680	
Flt Permitted	0.33	1.00		0.24	1.00			0.74	1.00		0.79	
Satd. Flow (perm)	581	1623		424	1689			1294	1473		1359	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	266	116	353	435	111	161	73	278	59	48	15
RTOR Reduction (vph)	0	17	0	0	9	0	0	0	161	0	3	0
Lane Group Flow (vph)	15	365	0	353	537	0	0	234	117	0	119	0
Confl. Peds. (#/hr)			3	3								
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	3%	0%	1%	0%	0%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4			6		5	2	
Permitted Phases	8			4			6		6			
Actuated Green, G (s)	28.1	26.9		43.0	37.8			37.7	37.7		37.7	
Effective Green, g (s)	28.1	26.9		43.0	37.8			37.7	37.7		37.7	
Actuated g/C Ratio	0.32	0.30		0.48	0.42			0.42	0.42		0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.5	4.5		4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	197	489		370	715			546	622		574	
v/s Ratio Prot	0.00	0.22		c0.13	0.32							
v/s Ratio Perm	0.02			c0.33				c0.18	0.08		0.09	
v/c Ratio	0.08	0.75		0.95	0.75			0.43	0.19		0.21	
Uniform Delay, d1	21.4	28.1		18.4	21.7			18.2	16.2		16.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.2	6.1		34.7	4.4			0.5	0.1		0.2	
Delay (s)	21.6	34.2		53.1	26.2			18.7	16.3		16.5	
Level of Service	C	C		D	C			B	B		B	
Approach Delay (s)		33.7			36.7			17.4			16.5	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			29.7			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			89.2			Sum of lost time (s)			16.5			
Intersection Capacity Utilization			71.1%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

103: NW 19th St & NW Maple Ave

07/05/2018

							
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	15	382	353	546	234	278	122
v/c Ratio	0.05	0.82	0.96	0.73	0.41	0.35	20.33
Control Delay	12.6	42.2	58.4	26.6	21.0	3.7	9007.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.6	42.2	58.4	26.6	21.0	3.7	9007.6
Queue Length 50th (ft)	4	180	125	217	84	0	~132
Queue Length 95th (ft)	14	284	#288	#450	172	48	#259
Internal Link Dist (ft)		906		3891	5211		1243
Turn Bay Length (ft)	100		75			100	
Base Capacity (vph)	296	640	367	791	566	801	8
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.60	0.96	0.69	0.41	0.35	15.25

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

104: NW 6th St & NW Maple Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	201	186	190	263	29	266	403	250	48	349	193
Future Volume (vph)	113	201	186	190	263	29	266	403	250	48	349	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1598	1733	1454	1646	1691		1646	3115		1539	3090	
Flt Permitted	0.42	1.00	1.00	0.46	1.00		0.25	1.00		0.32	1.00	
Satd. Flow (perm)	699	1733	1454	805	1691		426	3115		511	3090	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	124	221	204	209	289	32	292	443	275	53	384	212
RTOR Reduction (vph)	0	0	150	0	4	0	0	99	0	0	83	0
Lane Group Flow (vph)	124	221	54	209	317	0	292	619	0	53	513	0
Confl. Peds. (#/hr)	2		1	1		2	2					2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	1%	1%	1%	2%	0%	1%	1%	0%	8%	1%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6			2		
Actuated Green, G (s)	24.4	19.0	19.0	28.2	20.9		32.6	24.8		24.1	20.3	
Effective Green, g (s)	24.4	19.0	19.0	28.2	20.9		32.6	24.8		24.1	20.3	
Actuated g/C Ratio	0.34	0.27	0.27	0.39	0.29		0.46	0.35		0.34	0.28	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	306	461	386	403	494		336	1081		227	878	
v/s Ratio Prot	0.03	0.13		c0.05	c0.19		c0.10	0.20		0.01	0.17	
v/s Ratio Perm	0.11		0.04	0.15			c0.30			0.07		
v/c Ratio	0.41	0.48	0.14	0.52	0.64		0.87	0.57		0.23	0.58	
Uniform Delay, d1	17.0	22.0	20.0	15.2	22.0		14.1	19.0		16.3	21.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.8	0.2	1.1	2.8		20.5	0.7		0.5	1.0	
Delay (s)	17.9	22.8	20.1	16.3	24.8		34.6	19.7		16.8	22.9	
Level of Service	B	C	C	B	C		C	B		B	C	
Approach Delay (s)		20.7			21.5			24.0			22.4	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.5			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			71.4			Sum of lost time (s)			16.5			
Intersection Capacity Utilization			71.9%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

104: NW 6th St & NW Maple Ave

07/05/2018

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	124	221	204	209	321	292	718	53	596
v/c Ratio	0.36	0.49	0.39	0.53	0.62	0.88	0.59	0.18	0.66
Control Delay	16.8	26.2	5.9	20.3	28.4	47.6	18.3	13.8	22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	26.2	5.9	20.3	28.4	47.6	18.3	13.8	22.1
Queue Length 50th (ft)	30	77	0	54	118	77	110	12	91
Queue Length 95th (ft)	77	161	47	123	235	#264	201	37	169
Internal Link Dist (ft)		3891			719		1235		3583
Turn Bay Length (ft)	200		200	100		100		100	
Base Capacity (vph)	350	864	827	395	846	330	1563	302	1487
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.26	0.25	0.53	0.38	0.88	0.46	0.18	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection												
Int Delay, s/veh	6.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	141	23	11	27	3	14	35	41	99	23	25
Future Vol, veh/h	17	141	23	11	27	3	14	35	41	99	23	25
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	0	0	20	0	0	0	0	0	0	0	11	0
Mvmt Flow	20	166	27	13	32	4	16	41	48	116	27	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	35	0	0	195	0	0	309	282	183	325	294	34
Stage 1	-	-	-	-	-	-	221	221	-	59	59	-
Stage 2	-	-	-	-	-	-	88	61	-	266	235	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.61	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.61	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.61	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.099	3.3
Pot Cap-1 Maneuver	1589	-	-	1390	-	-	647	630	865	632	602	1045
Stage 1	-	-	-	-	-	-	786	724	-	958	828	-
Stage 2	-	-	-	-	-	-	925	848	-	744	694	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1589	-	-	1387	-	-	595	614	862	555	587	1045
Mov Cap-2 Maneuver	-	-	-	-	-	-	595	614	-	555	587	-
Stage 1	-	-	-	-	-	-	774	713	-	945	820	-
Stage 2	-	-	-	-	-	-	861	840	-	651	683	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	2	11	13.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	703	1589	-	-	1387	-	-	609
HCM Lane V/C Ratio	0.151	0.013	-	-	0.009	-	-	0.284
HCM Control Delay (s)	11	7.3	0	-	7.6	0	-	13.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	1.2

HCM Signalized Intersection Capacity Analysis

106: NE 9th St & NE Hemlock Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	17	149	36	17	33	69	229	11	5	81	15
Future Volume (vph)	50	17	149	36	17	33	69	229	11	5	81	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5			4.5		4.5	4.5			4.5	4.5
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	1.00
Frt		0.91			0.95		1.00	0.99			1.00	0.85
Flt Protected		0.99			0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1494			1600		1352	1721			1697	918
Flt Permitted		0.90			0.80		0.95	1.00			1.00	1.00
Satd. Flow (perm)		1357			1308		1352	1721			1697	918
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	57	19	169	41	19	38	78	260	12	6	92	17
RTOR Reduction (vph)	0	97	0	0	27	0	0	2	0	0	0	13
Lane Group Flow (vph)	0	148	0	0	71	0	78	271	0	0	98	4
Heavy Vehicles (%)	0%	11%	6%	0%	8%	0%	23%	1%	0%	0%	3%	62%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	Perm
Protected Phases		4			8		2	2		6	6	
Permitted Phases	4			8								6
Actuated Green, G (s)		10.8			10.8		13.9	13.9			10.8	10.8
Effective Green, g (s)		10.8			10.8		13.9	13.9			10.8	10.8
Actuated g/C Ratio		0.22			0.22		0.28	0.28			0.22	0.22
Clearance Time (s)		4.5			4.5		4.5	4.5			4.5	4.5
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		299			288		383	488			374	202
v/s Ratio Prot							0.06	c0.16			c0.06	
v/s Ratio Perm		c0.11			0.05							0.00
v/c Ratio		0.50			0.25		0.20	0.56			0.26	0.02
Uniform Delay, d1		16.7			15.7		13.3	14.9			15.8	15.0
Progression Factor		1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		1.3			0.4		0.3	1.4			0.4	0.0
Delay (s)		18.0			16.2		13.6	16.3			16.2	15.0
Level of Service		B			B		B	B			B	B
Approach Delay (s)		18.0			16.2			15.7			16.0	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			16.5				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			49.0				Sum of lost time (s)			13.5		
Intersection Capacity Utilization			38.7%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

106: NE 9th St & NE Hemlock Ave

07/05/2018

	→	←	↖	↑	↓	↙
Lane Group	EBT	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	245	98	78	273	98	17
v/c Ratio	0.62	0.31	0.21	0.56	0.26	0.07
Control Delay	17.3	15.0	16.3	21.0	21.5	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.3	15.0	16.3	21.0	21.5	0.5
Queue Length 50th (ft)	28	14	16	61	22	0
Queue Length 95th (ft)	99	52	51	150	73	0
Internal Link Dist (ft)	782	827		2579	629	
Turn Bay Length (ft)			100			
Base Capacity (vph)	783	715	807	1028	799	471
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.14	0.10	0.27	0.12	0.04
Intersection Summary						

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	0	0	0	42	0	53	0	334	92	46	150	0
Future Vol, veh/h	0	0	0	42	0	53	0	334	92	46	150	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	0	0	0	0	0	1	0	8	0
Mvmt Flow	0	0	0	48	0	60	0	380	105	52	170	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	737	759	170	707	707	432	170	0	0	484	0	0
Stage 1	275	275	-	432	432	-	-	-	-	-	-	-
Stage 2	462	484	-	275	275	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	337	338	879	353	363	628	1420	-	-	1089	-	-
Stage 1	736	686	-	606	586	-	-	-	-	-	-	-
Stage 2	584	555	-	736	686	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	292	320	879	339	344	628	1420	-	-	1089	-	-
Mov Cap-2 Maneuver	292	320	-	339	344	-	-	-	-	-	-	-
Stage 1	736	650	-	606	586	-	-	-	-	-	-	-
Stage 2	528	555	-	697	650	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	15.3	0	2
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1420	-	-	-	456	1089	-
HCM Lane V/C Ratio	-	-	-	-	0.237	0.048	-
HCM Control Delay (s)	0	-	-	0	15.3	8.5	0
HCM Lane LOS	A	-	-	A	C	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.9	0.2	-

HCM Signalized Intersection Capacity Analysis

108: SW 27th St & W Antler Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	87	111	133	114	40	118	268	137	19	148	7
Future Volume (vph)	6	87	111	133	114	40	118	268	137	19	148	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.96		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	1544		1644	1682		1660	1644		1662	1736	
Flt Permitted	0.65	1.00		0.43	1.00		0.56	1.00		0.33	1.00	
Satd. Flow (perm)	1132	1544		739	1682		971	1644		572	1736	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	7	99	126	151	130	45	134	305	156	22	168	8
RTOR Reduction (vph)	0	58	0	0	14	0	0	19	0	0	2	0
Lane Group Flow (vph)	7	167	0	151	161	0	134	442	0	22	174	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Heavy Vehicles (%)	0%	3%	2%	1%	0%	0%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	17.2	16.3		25.2	20.3		27.4	22.6		21.6	19.7	
Effective Green, g (s)	17.2	16.3		25.2	20.3		27.4	22.6		21.6	19.7	
Actuated g/C Ratio	0.27	0.26		0.40	0.32		0.43	0.35		0.34	0.31	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	3.5		2.0	3.5		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	313	395		361	536		469	583		226	536	
v/s Ratio Prot	0.00	0.11		c0.03	0.10		c0.02	c0.27		0.00	0.10	
v/s Ratio Perm	0.01			c0.13			0.10			0.03		
v/c Ratio	0.02	0.42		0.42	0.30		0.29	0.76		0.10	0.32	
Uniform Delay, d1	17.0	19.8		13.2	16.3		11.3	18.1		14.5	16.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.9		0.3	0.4		0.1	5.6		0.1	0.4	
Delay (s)	17.1	20.6		13.5	16.7		11.5	23.8		14.5	17.2	
Level of Service	B	C		B	B		B	C		B	B	
Approach Delay (s)		20.5			15.2			21.0			16.9	
Approach LOS		C			B			C			B	
Intersection Summary												
HCM 2000 Control Delay			18.9				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			63.7				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			65.6%				ICU Level of Service			C		
Analysis Period (min)			15									

c Critical Lane Group

Queues

108: SW 27th St & W Antler Ave

07/05/2018

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	225	151	175	134	461	22	176
v/c Ratio	0.02	0.53	0.40	0.29	0.27	0.70	0.06	0.33
Control Delay	14.3	20.6	17.9	16.7	11.9	23.4	10.3	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	20.6	17.9	16.7	11.9	23.4	10.3	19.6
Queue Length 50th (ft)	1	40	28	29	26	105	4	49
Queue Length 95th (ft)	10	122	86	113	63	#317	16	104
Internal Link Dist (ft)		5288		2545		2548		1288
Turn Bay Length (ft)	50		100		75		100	
Base Capacity (vph)	428	957	384	1019	499	875	358	912
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.24	0.39	0.17	0.27	0.53	0.06	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

109: NW 19th St & W Antler Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	122	38	83	222	231	80	457	83	76	333	96
Future Volume (vph)	78	122	38	83	222	231	80	457	83	76	333	96
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1622	1665		1628	1733	1445	1662	1683		1662	1683	
Flt Permitted	0.43	1.00		0.57	1.00	1.00	0.36	1.00		0.19	1.00	
Satd. Flow (perm)	733	1665		980	1733	1445	626	1683		339	1683	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	84	131	41	89	239	248	86	491	89	82	358	103
RTOR Reduction (vph)	0	14	0	0	0	175	0	6	0	0	10	0
Lane Group Flow (vph)	84	158	0	89	239	73	86	574	0	82	451	0
Confl. Peds. (#/hr)	12		2	2		12	1		4	4		1
Heavy Vehicles (%)	2%	1%	0%	2%	1%	0%	0%	1%	2%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	21.0	16.2		21.0	16.2	22.6	36.2	31.5		39.6	33.2	
Effective Green, g (s)	21.0	16.2		21.0	16.2	22.6	36.2	31.5		39.6	33.2	
Actuated g/C Ratio	0.27	0.21		0.27	0.21	0.29	0.47	0.41		0.51	0.43	
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	3.5		2.0	3.5	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	255	350		308	365	509	358	689		284	726	
v/s Ratio Prot	c0.02	0.09		0.02	c0.14	0.01	0.01	c0.34		c0.02	0.27	
v/s Ratio Perm	0.07			0.06		0.04	0.10			0.12		
v/c Ratio	0.33	0.45		0.29	0.65	0.14	0.24	0.83		0.29	0.62	
Uniform Delay, d1	21.6	26.5		21.5	27.8	20.0	11.9	20.3		12.1	17.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	1.1		0.2	4.4	0.0	0.1	8.5		0.2	1.7	
Delay (s)	21.9	27.6		21.7	32.2	20.1	12.0	28.8		12.3	18.6	
Level of Service	C	C		C	C	C	B	C		B	B	
Approach Delay (s)		25.7			25.3			26.7			17.7	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			23.8				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			76.9				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			71.5%				ICU Level of Service			C		
Analysis Period (min)			15									

c Critical Lane Group

Queues

109: NW 19th St & W Antler Ave

07/05/2018

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	84	172	89	239	248	86	580	82	461
v/c Ratio	0.30	0.46	0.27	0.64	0.41	0.22	0.85	0.29	0.61
Control Delay	20.3	28.1	19.6	36.1	4.7	11.7	35.7	13.0	23.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.3	28.1	19.6	36.1	4.7	11.7	35.7	13.0	23.2
Queue Length 50th (ft)	28	67	30	109	0	19	248	18	174
Queue Length 95th (ft)	58	123	60	181	44	48	#499	46	319
Internal Link Dist (ft)		2545		3983			2700		5211
Turn Bay Length (ft)	125		150		225	175		225	
Base Capacity (vph)	284	639	332	653	612	400	733	290	755
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.27	0.27	0.37	0.41	0.21	0.79	0.28	0.61

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

110: SW 6th St & SW Black Butte Blvd

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											  	
Traffic Volume (vph)	0	82	89	22	136	0	0	0	0	16	681	151
Future Volume (vph)	0	82	89	22	136	0	0	0	0	16	681	151
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0						5.0	
Lane Util. Factor		1.00			1.00						0.95	
Frpb, ped/bikes		1.00			1.00						1.00	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		0.93			1.00						0.97	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1627			1738						3184	
Flt Permitted		1.00			0.93						1.00	
Satd. Flow (perm)		1627			1631						3184	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	86	94	23	143	0	0	0	0	17	717	159
RTOR Reduction (vph)	0	65	0	0	0	0	0	0	0	0	26	0
Lane Group Flow (vph)	0	115	0	0	166	0	0	0	0	0	867	0
Confl. Peds. (#/hr)	1					1	1		1	1		1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		8			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		10.0			10.0						20.1	
Effective Green, g (s)		10.0			10.0						20.1	
Actuated g/C Ratio		0.25			0.25						0.50	
Clearance Time (s)		5.0			5.0						5.0	
Vehicle Extension (s)		3.0			3.0						3.0	
Lane Grp Cap (vph)		405			406						1595	
v/s Ratio Prot		0.07										
v/s Ratio Perm					c0.10						0.27	
v/c Ratio		0.28			0.41						0.54	
Uniform Delay, d1		12.2			12.6						6.9	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.4			0.7						0.4	
Delay (s)		12.5			13.3						7.2	
Level of Service		B			B						A	
Approach Delay (s)		12.5			13.3			0.0			7.2	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			8.8			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			40.1			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			61.9%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

110: SW 6th St & SW Black Butte Blvd

07/05/2018

	→	←	↓
Lane Group	EBT	WBT	SBT
Lane Group Flow (vph)	180	166	893
v/c Ratio	0.39	0.41	0.56
Control Delay	11.3	18.2	8.2
Queue Delay	0.0	0.0	0.0
Total Delay	11.3	18.2	8.2
Queue Length 50th (ft)	16	31	56
Queue Length 95th (ft)	68	92	120
Internal Link Dist (ft)	3983	187	3118
Turn Bay Length (ft)			
Base Capacity (vph)	1088	1061	2728
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.17	0.16	0.33
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

111: SW 5th St & SW Black Butte Blvd

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	27	0	0	48	13	128	790	8	0	0	0
Future Volume (vph)	72	27	0	0	48	13	128	790	8	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			1.00			1.00				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.97			1.00				
Flt Protected		0.96			1.00			0.99				
Satd. Flow (prot)		1689			1648			3263				
Flt Permitted		0.74			1.00			0.99				
Satd. Flow (perm)		1297			1648			3263				
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	82	31	0	0	55	15	145	898	9	0	0	0
RTOR Reduction (vph)	0	0	0	0	12	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	113	0	0	58	0	0	1051	0	0	0	0
Confl. Peds. (#/hr)							2		1	1		2
Heavy Vehicles (%)	0%	0%	0%	0%	4%	0%	0%	1%	17%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		8			4			6				
Permitted Phases	8						6					
Actuated Green, G (s)		8.0			8.0			28.0				
Effective Green, g (s)		8.0			8.0			28.0				
Actuated g/C Ratio		0.17			0.17			0.61				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		225			286			1986				
v/s Ratio Prot					0.03							
v/s Ratio Perm		0.09						0.32				
v/c Ratio		0.50			0.20			0.53				
Uniform Delay, d1		17.2			16.3			5.2				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		1.8			0.3			0.3				
Delay (s)		19.0			16.6			5.5				
Level of Service		B			B			A				
Approach Delay (s)		19.0			16.6			5.5			0.0	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay		7.3			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.52										
Actuated Cycle Length (s)		46.0			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		52.2%			ICU Level of Service			A				
Analysis Period (min)		15										

c Critical Lane Group

Queues

111: SW 5th St & SW Black Butte Blvd

07/05/2018

	→	←	↑
Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	113	70	1052
v/c Ratio	0.41	0.19	0.49
Control Delay	21.7	14.8	7.1
Queue Delay	0.0	0.0	0.0
Total Delay	21.7	14.8	7.1
Queue Length 50th (ft)	22	10	74
Queue Length 95th (ft)	72	42	148
Internal Link Dist (ft)	187	470	1008
Turn Bay Length (ft)			
Base Capacity (vph)	635	814	2800
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.18	0.09	0.38
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

112: NE 9th St & E Antler Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	4	7	12	3	8	6	146	2	4	230	24
Future Volume (vph)	23	4	7	12	3	8	6	146	2	4	230	24
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0			4.0		4.0	4.5		4.0	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.97			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1604			1495		1108	1680		1108	1600	
Flt Permitted		1.00			1.00		0.58	1.00		0.65	1.00	
Satd. Flow (perm)		1657			1535		681	1680		759	1600	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	26	5	8	14	3	9	7	166	2	5	261	27
RTOR Reduction (vph)	0	8	0	0	9	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	31	0	0	17	0	7	168	0	5	284	0
Confl. Bikes (#/hr)												2
Heavy Vehicles (%)	4%	0%	0%	0%	0%	25%	50%	4%	0%	50%	8%	4%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)		1.2			1.2		23.8	22.9		23.8	22.9	
Effective Green, g (s)		1.2			1.2		23.8	22.9		23.8	22.9	
Actuated g/C Ratio		0.03			0.03		0.63	0.61		0.63	0.61	
Clearance Time (s)		4.0			4.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		53			49		442	1025		490	977	
v/s Ratio Prot							c0.00	0.10		0.00	c0.18	
v/s Ratio Perm		c0.02			0.01		0.01			0.01		
v/c Ratio		0.59			0.35		0.02	0.16		0.01	0.29	
Uniform Delay, d1		17.9			17.8		2.5	3.2		2.5	3.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		15.7			4.3		0.0	0.1		0.0	0.2	
Delay (s)		33.6			22.1		2.5	3.2		2.5	3.6	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		33.6			22.1			3.2			3.6	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		6.6										
HCM 2000 Volume to Capacity ratio		0.30										
Actuated Cycle Length (s)		37.5								12.5		
Intersection Capacity Utilization		26.0%								A		
Analysis Period (min)		15										

c Critical Lane Group

Queues

112: NE 9th St & E Antler Ave

07/05/2018

	→	←	↖	↑	↘	↓
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	39	26	7	168	5	288
v/c Ratio	0.11	0.08	0.01	0.11	0.01	0.21
Control Delay	10.2	9.9	2.2	4.0	2.0	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	9.9	2.2	4.0	2.0	4.2
Queue Length 50th (ft)	4	2	0	0	0	0
Queue Length 95th (ft)	24	18	3	56	3	95
Internal Link Dist (ft)	792	663		2596		2579
Turn Bay Length (ft)			100		100	
Base Capacity (vph)	1243	1153	677	1680	716	1600
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.02	0.01	0.10	0.01	0.18
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

113: SW 6th St & SW Evergreen Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	72	15	96	61	0	0	0	0	152	967	30
Future Volume (vph)	0	72	15	96	61	0	0	0	0	152	967	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0						5.0	
Lane Util. Factor		1.00			1.00						0.95	
Frpb, ped/bikes		0.99			1.00						1.00	
Flpb, ped/bikes		1.00			0.99						0.99	
Frt		0.98			1.00						1.00	
Flt Protected		1.00			0.97						0.99	
Satd. Flow (prot)		1672			1680						3234	
Flt Permitted		1.00			0.76						0.99	
Satd. Flow (perm)		1672			1311						3234	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	80	17	107	68	0	0	0	0	169	1074	33
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	84	0	0	175	0	0	0	0	0	1274	0
Confl. Peds. (#/hr)	21		19	19		21	16		26	26		16
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	1%	1%	3%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		8			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		12.6			12.6						30.4	
Effective Green, g (s)		12.6			12.6						30.4	
Actuated g/C Ratio		0.24			0.24						0.57	
Clearance Time (s)		5.0			5.0						5.0	
Vehicle Extension (s)		3.0			3.0						3.0	
Lane Grp Cap (vph)		397			311						1854	
v/s Ratio Prot		0.05										
v/s Ratio Perm					c0.13						0.39	
v/c Ratio		0.21			0.56						0.69	
Uniform Delay, d1		16.2			17.8						8.0	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.3			2.3						1.1	
Delay (s)		16.5			20.1						9.0	
Level of Service		B			C						A	
Approach Delay (s)		16.5			20.1			0.0			9.0	
Approach LOS		B			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			10.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			53.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			62.5%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

113: SW 6th St & SW Evergreen Ave

07/05/2018

	→	←	↓
Lane Group	EBT	WBT	SBT
Lane Group Flow (vph)	97	175	1276
v/c Ratio	0.24	0.57	0.69
Control Delay	16.6	27.2	11.1
Queue Delay	0.0	0.0	0.0
Total Delay	16.6	27.2	11.1
Queue Length 50th (ft)	23	55	127
Queue Length 95th (ft)	54	107	249
Internal Link Dist (ft)	369	175	1004
Turn Bay Length (ft)			
Base Capacity (vph)	822	636	2203
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.12	0.28	0.58
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

114: SW 5th St & SW Evergreen Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	174	0	0	130	375	27	571	34	0	0	0
Future Volume (vph)	41	174	0	0	130	375	27	571	34	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.99			1.00				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.90			0.99				
Flt Protected		0.99			1.00			1.00				
Satd. Flow (prot)		1709			1516			3287				
Flt Permitted		0.77			1.00			1.00				
Satd. Flow (perm)		1334			1516			3287				
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	46	193	0	0	144	417	30	634	38	0	0	0
RTOR Reduction (vph)	0	0	0	0	84	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	239	0	0	477	0	0	696	0	0	0	0
Confl. Peds. (#/hr)	2		3	3		2	1		1	1		1
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	3%	1%	0%	0%	2%	3%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		8			4			6				
Permitted Phases	8						6					
Actuated Green, G (s)		20.7			20.7			18.3				
Effective Green, g (s)		20.7			20.7			18.3				
Actuated g/C Ratio		0.42			0.42			0.37				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		563			640			1227				
v/s Ratio Prot					c0.31							
v/s Ratio Perm		0.18						0.21				
v/c Ratio		0.42			0.75			0.57				
Uniform Delay, d1		10.0			11.9			12.2				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		0.5			4.7			0.6				
Delay (s)		10.5			16.7			12.8				
Level of Service		B			B			B				
Approach Delay (s)		10.5			16.7			12.8			0.0	
Approach LOS		B			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			13.9			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			49.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			79.1%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

114: SW 5th St & SW Evergreen Ave

07/05/2018

	→	←	↑
Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	239	561	702
v/c Ratio	0.43	0.79	0.58
Control Delay	13.8	18.9	15.4
Queue Delay	0.1	0.0	0.0
Total Delay	13.9	18.9	15.4
Queue Length 50th (ft)	44	89	79
Queue Length 95th (ft)	118	260	160
Internal Link Dist (ft)	175	838	646
Turn Bay Length (ft)			
Base Capacity (vph)	898	1068	2080
Starvation Cap Reductn	83	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.29	0.53	0.34
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

115: US-97 & SW Evergreen Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	138	96	366	291	159	290	1510	299	140	1227	33
Future Volume (vph)	68	138	96	366	291	159	290	1510	299	140	1227	33
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.94		1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1630	1617		1614	1602		1630	3107	1417	1646	3107	1488
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1630	1617		1614	1602		1630	3107	1417	1646	3107	1488
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	72	145	101	385	306	167	305	1589	315	147	1292	35
RTOR Reduction (vph)	0	17	0	0	14	0	0	0	187	0	0	24
Lane Group Flow (vph)	72	229	0	385	459	0	305	1589	128	147	1292	11
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	2%	1%	1%	3%	1%	8%	2%	7%	5%	1%	7%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Prot	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6	6	5	2	
Permitted Phases												2
Actuated Green, G (s)	9.1	29.1		24.6	44.6		22.6	57.3	57.3	10.5	45.2	45.2
Effective Green, g (s)	9.1	29.1		24.6	44.6		22.6	57.3	57.3	10.5	45.2	45.2
Actuated g/C Ratio	0.06	0.21		0.17	0.32		0.16	0.40	0.40	0.07	0.32	0.32
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	104	332		280	504		260	1258	573	122	992	475
v/s Ratio Prot	0.04	0.14		c0.24	c0.29		c0.19	c0.51	0.09	0.09	0.42	
v/s Ratio Perm												0.01
v/c Ratio	0.69	0.69		1.38	0.91		1.17	1.26	0.22	1.20	1.30	0.02
Uniform Delay, d1	64.8	52.0		58.4	46.5		59.5	42.1	27.5	65.5	48.1	33.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.1	5.8		189.7	20.7		110.9	124.9	0.2	146.7	143.5	0.0
Delay (s)	82.9	57.8		248.2	67.2		170.3	167.0	27.7	212.2	191.6	33.0
Level of Service	F	E		F	E		F	F	C	F	F	C
Approach Delay (s)		63.5			148.4			147.6			189.9	
Approach LOS		E			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			155.1				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			1.23									
Actuated Cycle Length (s)			141.5				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			107.8%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

115: US-97 & SW Evergreen Ave

07/05/2018

										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	72	246	385	473	305	1589	315	147	1292	35
v/c Ratio	0.69	0.70	1.38	0.91	1.17	1.27	0.41	1.20	1.30	0.06
Control Delay	98.4	58.3	232.4	67.6	161.7	161.8	4.8	199.3	182.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.4	58.3	232.4	67.6	161.7	161.8	4.8	199.3	182.4	0.2
Queue Length 50th (ft)	67	193	~479	405	~343	~990	0	~168	~820	0
Queue Length 95th (ft)	#151	290	#725	#565	#565	#1205	64	#331	#1022	0
Internal Link Dist (ft)		838		3278		1074			1019	
Turn Bay Length (ft)	150		450		275		575	350		100
Base Capacity (vph)	109	451	280	614	260	1256	760	122	992	573
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.55	1.38	0.77	1.17	1.27	0.41	1.20	1.30	0.06

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

116: SW 11th St & SW Glacier Ave

07/05/2018

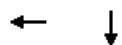
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					 						 	
Traffic Volume (vph)	0	0	0	63	1505	0	0	0	0	0	32	24
Future Volume (vph)	0	0	0	63	1505	0	0	0	0	0	32	24
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5						4.5	
Lane Util. Factor					0.95						0.95	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					1.00						1.00	
Frt					1.00						0.94	
Flt Protected					1.00						1.00	
Satd. Flow (prot)					3256						3091	
Flt Permitted					1.00						1.00	
Satd. Flow (perm)					3256						3091	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	68	1636	0	0	0	0	0	35	26
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	0	0	0	1701	0	0	0	0	0	37	0
Confl. Peds. (#/hr)	3		1	1		3	3		2	2		3
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA						NA	
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					59.8						5.1	
Effective Green, g (s)					59.8						5.1	
Actuated g/C Ratio					0.81						0.07	
Clearance Time (s)					4.5						4.5	
Vehicle Extension (s)					3.0						3.0	
Lane Grp Cap (vph)					2634						213	
v/s Ratio Prot											c0.01	
v/s Ratio Perm					0.52							
v/c Ratio					0.65						0.17	
Uniform Delay, d1					2.8						32.4	
Progression Factor					1.00						1.00	
Incremental Delay, d2					0.6						0.4	
Delay (s)					3.4						32.8	
Level of Service					A						C	
Approach Delay (s)		0.0			3.4			0.0			32.8	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			4.4									
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			73.9								9.0	
Intersection Capacity Utilization			63.9%								B	
Analysis Period (min)			15									

c Critical Lane Group

Queues

116: SW 11th St & SW Glacier Ave

07/05/2018

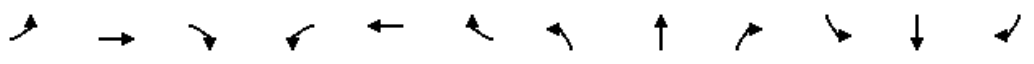


Lane Group	WBT	SBT
Lane Group Flow (vph)	1704	61
v/c Ratio	0.62	0.19
Control Delay	4.1	25.6
Queue Delay	0.2	0.0
Total Delay	4.3	25.6
Queue Length 50th (ft)	121	8
Queue Length 95th (ft)	187	30
Internal Link Dist (ft)	472	448
Turn Bay Length (ft)		
Base Capacity (vph)	3014	860
Starvation Cap Reductn	444	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.66	0.07
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

117: SW 9th St & SW Glacier Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑		↑	↑↑				
Traffic Volume (vph)	0	0	0	0	1096	20	409	143	0	0	0	0
Future Volume (vph)	0	0	0	0	1096	20	409	143	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5		4.5	4.5				
Lane Util. Factor					0.95		0.91	0.91				
Frpb, ped/bikes					1.00		1.00	1.00				
Flpb, ped/bikes					1.00		1.00	1.00				
Frt					1.00		1.00	1.00				
Flt Protected					1.00		0.95	0.97				
Satd. Flow (prot)					3251		1482	3056				
Flt Permitted					1.00		0.95	0.97				
Satd. Flow (perm)					3251		1482	3056				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1191	22	445	155	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	0	51	51	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1212	0	171	327	0	0	0	0
Confl. Peds. (#/hr)	3					3	1					1
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					6			8				
Permitted Phases							8					
Actuated Green, G (s)					32.1		14.5	14.5				
Effective Green, g (s)					32.1		14.5	14.5				
Actuated g/C Ratio					0.58		0.26	0.26				
Clearance Time (s)					4.5		4.5	4.5				
Vehicle Extension (s)					3.0		3.0	3.0				
Lane Grp Cap (vph)					1876		386	796				
v/s Ratio Prot					c0.37							
v/s Ratio Perm							c0.12	0.11				
v/c Ratio					0.65		0.44	0.41				
Uniform Delay, d1					7.9		17.2	17.0				
Progression Factor					1.00		1.00	1.00				
Incremental Delay, d2					0.8		0.8	0.3				
Delay (s)					8.7		18.0	17.4				
Level of Service					A		B	B				
Approach Delay (s)		0.0			8.7			17.6			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			11.6		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			55.6		Sum of lost time (s)					9.0		
Intersection Capacity Utilization			87.3%		ICU Level of Service					E		
Analysis Period (min)			15									

c Critical Lane Group

Queues

117: SW 9th St & SW Glacier Ave

07/05/2018



Lane Group	WBT	NBL	NBT
Lane Group Flow (vph)	1213	222	378
v/c Ratio	0.66	0.51	0.45
Control Delay	10.7	18.7	17.3
Queue Delay	0.0	0.0	0.0
Total Delay	10.7	18.7	17.3
Queue Length 50th (ft)	119	43	43
Queue Length 95th (ft)	264	141	110
Internal Link Dist (ft)	765		275
Turn Bay Length (ft)			
Base Capacity (vph)	2980	983	2002
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.41	0.23	0.19
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

118: SW 6th St & SW Glacier Ave

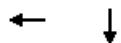
07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					 						 	
Traffic Volume (vph)	0	0	0	121	653	0	0	0	0	0	660	361
Future Volume (vph)	0	0	0	121	653	0	0	0	0	0	660	361
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5						4.5	
Lane Util. Factor					0.95						0.95	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					1.00						1.00	
Frt					1.00						0.95	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					3217						3112	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					3217						3112	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	130	702	0	0	0	0	0	710	388
RTOR Reduction (vph)	0	0	0	0	15	0	0	0	0	0	41	0
Lane Group Flow (vph)	0	0	0	0	817	0	0	0	0	0	1057	0
Confl. Peds. (#/hr)			2	2			2		2	2		2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Perm	NA						NA	
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.2						36.7	
Effective Green, g (s)					26.2						36.7	
Actuated g/C Ratio					0.36						0.51	
Clearance Time (s)					4.5						4.5	
Vehicle Extension (s)					3.0						3.0	
Lane Grp Cap (vph)					1172						1588	
v/s Ratio Prot											c0.34	
v/s Ratio Perm					0.25							
v/c Ratio					0.70						0.67	
Uniform Delay, d1					19.5						13.0	
Progression Factor					1.00						1.00	
Incremental Delay, d2					1.8						1.1	
Delay (s)					21.3						14.1	
Level of Service					C						B	
Approach Delay (s)		0.0			21.3			0.0			14.1	
Approach LOS		A			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			17.2		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			71.9		Sum of lost time (s)					9.0		
Intersection Capacity Utilization			63.3%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

118: SW 6th St & SW Glacier Ave

07/05/2018

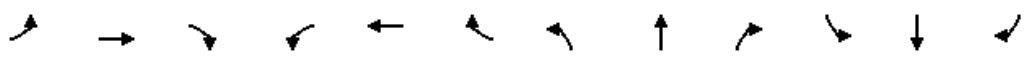


Lane Group	WBT	SBT
Lane Group Flow (vph)	832	1098
v/c Ratio	0.71	0.68
Control Delay	24.3	15.1
Queue Delay	0.3	0.0
Total Delay	24.7	15.1
Queue Length 50th (ft)	155	165
Queue Length 95th (ft)	298	291
Internal Link Dist (ft)	179	644
Turn Bay Length (ft)		
Base Capacity (vph)	1745	2423
Starvation Cap Reductn	386	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.61	0.45
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

119: SW 5th St & SW Glacier Ave

07/05/2018

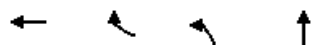
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑	↑	↑	↑↑				
Traffic Volume (vph)	0	0	0	0	650	192	108	645	0	0	0	0
Future Volume (vph)	0	0	0	0	650	192	108	645	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5	4.5	4.5	4.5				
Lane Util. Factor					0.95	1.00	0.91	0.91				
Frpb, ped/bikes					1.00	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	1.00	1.00				
Frt					1.00	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	1.00				
Satd. Flow (prot)					3228	1440	1513	3182				
Flt Permitted					1.00	1.00	0.95	1.00				
Satd. Flow (perm)					3228	1440	1513	3182				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	707	209	117	701	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	100	47	9	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	707	109	58	704	0	0	0	0
Confl. Peds. (#/hr)	1					1			1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	3%	2%	0%	0%	0%	0%	0%	0%
Turn Type					NA	Perm	Perm	NA				
Protected Phases					4			6				
Permitted Phases						4	6					
Actuated Green, G (s)					20.5	20.5	20.4	20.4				
Effective Green, g (s)					20.5	20.5	20.4	20.4				
Actuated g/C Ratio					0.41	0.41	0.41	0.41				
Clearance Time (s)					4.5	4.5	4.5	4.5				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1326	591	618	1300				
v/s Ratio Prot					c0.22							
v/s Ratio Perm						0.08	0.04	0.22				
v/c Ratio					0.53	0.19	0.09	0.54				
Uniform Delay, d1					11.1	9.4	9.1	11.2				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					0.4	0.2	0.1	0.5				
Delay (s)					11.5	9.5	9.1	11.7				
Level of Service					B	A	A	B				
Approach Delay (s)		0.0			11.1			11.3			0.0	
Approach LOS		A			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			11.2		HCM 2000 Level of Service						B	
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			49.9		Sum of lost time (s)						9.0	
Intersection Capacity Utilization			71.2%		ICU Level of Service						C	
Analysis Period (min)			15									

c Critical Lane Group

Queues

119: SW 5th St & SW Glacier Ave

07/05/2018



Lane Group	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	707	209	105	713
v/c Ratio	0.54	0.31	0.16	0.55
Control Delay	13.8	4.9	5.3	13.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.8	4.9	5.3	13.7
Queue Length 50th (ft)	73	6	4	75
Queue Length 95th (ft)	164	47	35	169
Internal Link Dist (ft)	478			255
Turn Bay Length (ft)		125	75	
Base Capacity (vph)	2685	1225	1379	2885
Starvation Cap Reductn	0	0	0	99
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.26	0.17	0.08	0.26

Intersection Summary

HCM Signalized Intersection Capacity Analysis

120: US97 & Glacier Highland Ave

07/05/2018

										
Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER	
Lane Configurations										
Traffic Volume (vph)	542	166	374	1556	1253	436	0	0	0	
Future Volume (vph)	542	166	374	1556	1253	436	0	0	0	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.5	4.5	4.5	5.5	5.5					
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95					
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99					
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00					
Frt	1.00	0.85	1.00	1.00	0.96					
Flt Protected	0.95	1.00	0.95	1.00	1.00					
Satd. Flow (prot)	3131	1473	3162	3167	3021					
Flt Permitted	0.95	1.00	0.95	1.00	1.00					
Satd. Flow (perm)	3131	1473	3162	3167	3021					
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	
Adj. Flow (vph)	571	175	394	1638	1319	459	0	0	0	
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	0	
Lane Group Flow (vph)	571	42	394	1638	1778	0	0	0	0	
Confl. Bikes (#/hr)						1				
Heavy Vehicles (%)	3%	1%	2%	5%	6%	3%	2%	2%	2%	
Turn Type	Prot	Perm	Prot	NA	NA		Perm			
Protected Phases	8		1	6	2					
Permitted Phases		3					2			
Actuated Green, G (s)	28.8	28.8	21.8	93.2	66.9					
Effective Green, g (s)	28.8	28.8	21.8	93.2	66.9					
Actuated g/C Ratio	0.22	0.22	0.17	0.71	0.51					
Clearance Time (s)	4.5	4.5	4.5	5.5	5.5					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0					
Lane Grp Cap (vph)	683	321	522	2236	1531					
v/s Ratio Prot	c0.18		0.12	c0.52	c0.59					
v/s Ratio Perm		0.03								
v/c Ratio	0.84	0.13	0.75	0.73	1.16					
Uniform Delay, d1	49.3	41.5	52.6	11.8	32.5					
Progression Factor	1.00	1.00	1.00	1.00	1.00					
Incremental Delay, d2	8.7	0.2	6.1	1.3	80.3					
Delay (s)	58.1	41.7	58.7	13.1	112.8					
Level of Service	E	D	E	B	F					
Approach Delay (s)	54.2			21.9	112.8			0.0		
Approach LOS	D			C	F			A		
Intersection Summary										
HCM 2000 Control Delay			62.7		HCM 2000 Level of Service				E	
HCM 2000 Volume to Capacity ratio			1.01							
Actuated Cycle Length (s)			132.0		Sum of lost time (s)				14.5	
Intersection Capacity Utilization			93.2%		ICU Level of Service				F	
Analysis Period (min)			15							
c Critical Lane Group										

Queues

120: US97 & Glacier Highland Ave

07/05/2018

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	571	175	394	1638	1778
v/c Ratio	0.84	0.39	0.76	0.73	1.16
Control Delay	61.5	9.2	62.9	15.0	112.1
Queue Delay	0.1	0.0	0.0	0.0	0.0
Total Delay	61.5	9.2	62.9	15.0	112.1
Queue Length 50th (ft)	242	3	168	410	~951
Queue Length 95th (ft)	328	66	237	595	#1276
Internal Link Dist (ft)	383			2738	1074
Turn Bay Length (ft)		200	325		
Base Capacity (vph)	870	532	783	2497	1529
Starvation Cap Reductn	11	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.66	0.33	0.50	0.66	1.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

MOVEMENT SUMMARY

 Site: [21 - SW Helmholtz @ OR 126]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SW Helmholtz Way											
3	L2	36	0.0	0.550	15.1	LOS C	2.9	73.3	0.75	0.84	30.5
8	T1	315	0.0	0.550	15.1	LOS C	2.9	73.3	0.75	0.84	30.4
18	R2	128	1.0	0.228	9.4	LOS A	0.8	21.0	0.65	0.65	31.9
Approach		479	0.3	0.550	13.6	LOS B	2.9	73.3	0.73	0.79	30.8
East: OR 126											
1	L2	173	3.0	0.917	34.8	LOS D	14.8	379.2	1.00	1.37	24.0
6	T1	645	3.0	0.917	34.8	LOS D	14.8	379.2	1.00	1.37	23.9
16	R2	103	0.0	0.123	5.5	LOS A	0.5	11.7	0.50	0.44	33.8
Approach		921	2.7	0.917	31.5	LOS D	14.8	379.2	0.94	1.27	24.7
North: SW Helmholtz Way											
7	L2	38	0.0	0.226	8.4	LOS A	0.8	20.6	0.62	0.62	33.0
4	T1	105	8.0	0.226	8.4	LOS A	0.8	20.6	0.62	0.62	32.7
14	R2	96	0.0	0.159	7.9	LOS A	0.6	14.4	0.62	0.62	32.6
Approach		239	3.5	0.226	8.2	LOS A	0.8	20.6	0.62	0.62	32.7
West: OR 126											
5	L2	162	0.0	0.841	23.0	LOS C	11.4	294.1	0.92	0.99	27.4
2	T1	705	5.0	0.841	23.0	LOS C	11.4	294.1	0.92	0.99	27.3
12	R2	68	5.0	0.072	4.4	LOS A	0.3	6.7	0.40	0.28	34.2
Approach		936	4.1	0.841	21.6	LOS C	11.4	294.1	0.88	0.94	27.7
All Vehicles		2575	2.8	0.917	22.4	LOS C	14.8	379.2	0.85	1.00	27.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: H:\17\17720 - Redmond Transportation System Plan\Task 5- Alternatives\ops\Future Alternative Conditions (Updated Model).sip7

HCM Signalized Intersection Capacity Analysis

122: SW 27th St & OR-126

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	162	732	48	236	869	233	70	328	132	214	285	70
Future Volume (vph)	162	732	48	236	869	233	70	328	132	214	285	70
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.7	5.0		4.7	5.0		4.7	5.0		4.7	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.97		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1662	1671		1662	1647		1583	1636		1630	1733	1410
Flt Permitted	0.10	1.00		0.09	1.00		0.36	1.00		0.16	1.00	1.00
Satd. Flow (perm)	179	1671		160	1647		606	1636		272	1733	1410
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	171	771	51	248	915	245	74	345	139	225	300	74
RTOR Reduction (vph)	0	2	0	0	10	0	0	14	0	0	0	56
Lane Group Flow (vph)	171	820	0	248	1150	0	74	470	0	225	300	18
Confl. Peds. (#/hr)	1						1	1		1	1	1
Confl. Bikes (#/hr)							1					1
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	5%	2%	1%	2%	1%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	45.4	39.1		56.0	45.0		28.9	23.9		31.5	25.2	25.2
Effective Green, g (s)	45.4	39.1		56.0	45.0		28.9	23.9		31.5	25.2	25.2
Actuated g/C Ratio	0.45	0.39		0.56	0.45		0.29	0.24		0.31	0.25	0.25
Clearance Time (s)	4.7	5.0		4.7	5.0		4.7	5.0		4.7	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	173	647		270	734		221	387		169	432	352
v/s Ratio Prot	0.06	0.49		c0.11	c0.70		0.02	0.29		c0.08	0.17	
v/s Ratio Perm	0.38			0.40			0.08			c0.33		0.01
v/c Ratio	0.99	1.27		0.92	1.57		0.33	1.21		1.33	0.69	0.05
Uniform Delay, d1	24.0	30.9		29.0	28.0		27.4	38.5		32.6	34.4	28.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	64.4	132.0		33.6	261.7		0.9	117.5		183.8	4.8	0.1
Delay (s)	88.4	162.9		62.6	289.6		28.3	156.0		216.4	39.2	28.8
Level of Service	F	F		E	F		C	F		F	D	C
Approach Delay (s)		150.1			249.6			139.1			104.5	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			180.1				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			1.47									
Actuated Cycle Length (s)			100.9				Sum of lost time (s)			19.4		
Intersection Capacity Utilization			131.3%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

122: SW 27th St & OR-126

07/05/2018



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	171	822	248	1160	74	484	225	300	74
v/c Ratio	0.98	1.25	0.91	1.54	0.31	1.24	1.33	0.69	0.15
Control Delay	88.0	156.0	60.7	276.6	26.5	162.0	212.5	44.5	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	88.0	156.0	60.7	276.6	26.5	162.0	212.5	44.5	0.7
Queue Length 50th (ft)	60	~663	108	~1051	32	~377	~144	179	0
Queue Length 95th (ft)	#198	#898	#255	#1304	65	#577	#298	#300	0
Internal Link Dist (ft)		5185		1541		2675		2548	
Turn Bay Length (ft)	225		275		125		150		150
Base Capacity (vph)	174	655	274	751	240	390	169	436	486
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	1.25	0.91	1.54	0.31	1.24	1.33	0.69	0.15

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

123: SW Rimrock Dr & OR-126

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	848	9	294	1133	386	21	219	196	258	180	107
Future Volume (vph)	146	848	9	294	1133	386	21	219	196	258	180	107
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1583	3223		1662	3292	1414	1662	1733	1468	1662	1733	1467
Flt Permitted	0.13	1.00		0.12	1.00	1.00	0.64	1.00	1.00	0.36	1.00	1.00
Satd. Flow (perm)	224	3223		212	3292	1414	1115	1733	1468	635	1733	1467
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	155	902	10	313	1205	411	22	233	209	274	191	114
RTOR Reduction (vph)	0	1	0	0	0	188	0	0	162	0	0	83
Lane Group Flow (vph)	155	911	0	313	1205	223	22	233	47	274	191	31
Confl. Peds. (#/hr)	3		2	2		3	1		1	1		1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	5%	3%	0%	0%	1%	3%	0%	1%	0%	0%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	36.2	29.7		47.8	36.8	43.3	22.0	19.6	19.6	30.2	23.7	23.7
Effective Green, g (s)	36.2	29.7		47.8	36.8	43.3	22.0	19.6	19.6	30.2	23.7	23.7
Actuated g/C Ratio	0.41	0.34		0.55	0.42	0.50	0.25	0.22	0.22	0.35	0.27	0.27
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	193	1095		341	1386	773	295	388	329	295	469	397
v/s Ratio Prot	0.06	0.28		c0.14	0.37	0.02	0.00	0.13		c0.07	0.11	
v/s Ratio Perm	0.27			c0.36		0.14	0.02		0.03	c0.25		0.02
v/c Ratio	0.80	0.83		0.92	0.87	0.29	0.07	0.60	0.14	0.93	0.41	0.08
Uniform Delay, d1	18.8	26.6		22.3	23.1	13.0	24.8	30.4	27.2	27.2	26.1	23.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.9	5.5		28.5	6.1	0.2	0.1	2.6	0.2	33.8	0.6	0.1
Delay (s)	39.7	32.1		50.9	29.2	13.2	24.9	33.0	27.4	61.0	26.7	23.8
Level of Service	D	C		D	C	B	C	C	C	E	C	C
Approach Delay (s)		33.2			29.3			30.1			42.4	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			32.3									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			87.4							18.0		
Intersection Capacity Utilization			86.9%									ICU Level of Service E
Analysis Period (min)			15									
c Critical Lane Group												

Queues

123: SW Rimrock Dr & OR-126

07/05/2018

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	155	912	313	1205	411	22	233	209	274	191	114
v/c Ratio	0.78	0.81	0.89	0.84	0.46	0.06	0.68	0.46	1.00	0.39	0.22
Control Delay	43.4	32.6	49.1	29.3	3.7	19.2	41.7	7.6	82.9	28.9	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.4	32.6	49.1	29.3	3.7	19.2	41.7	7.6	82.9	28.9	2.5
Queue Length 50th (ft)	36	224	111	287	8	8	116	0	116	76	0
Queue Length 95th (ft)	#155	#372	#302	#482	57	23	190	53	#274	156	17
Internal Link Dist (ft)		394		1820			1014			2700	
Turn Bay Length (ft)	225		200		200	200		175	250		250
Base Capacity (vph)	200	1146	351	1444	903	349	657	686	275	657	658
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.80	0.89	0.83	0.46	0.06	0.35	0.30	1.00	0.29	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

124: SW 15th St & OR-126

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	1065	59	47	1384	48	278	86	82	37	36	90
Future Volume (vph)	48	1065	59	47	1384	48	278	86	82	37	36	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.98			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1662	3204		1662	3243			1625			1559	
Flt Permitted	0.08	1.00		0.12	1.00			0.69			0.86	
Satd. Flow (perm)	143	3204		208	3243			1161			1353	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	1158	64	51	1504	52	302	93	89	40	39	98
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	9	0
Lane Group Flow (vph)	52	1222	0	51	1553	0	0	484	0	0	168	0
Confl. Peds. (#/hr)	1		8	8		1	6		1	1		6
Heavy Vehicles (%)	0%	3%	0%	0%	2%	0%	1%	3%	0%	0%	0%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	49.0	49.0		49.0	49.0			41.8			41.8	
Effective Green, g (s)	49.0	49.0		49.0	49.0			41.8			41.8	
Actuated g/C Ratio	0.50	0.50		0.50	0.50			0.42			0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	70	1589		103	1608			491			572	
v/s Ratio Prot		0.38			c0.48							
v/s Ratio Perm	0.36			0.25				c0.42			0.12	
v/c Ratio	0.74	0.77		0.50	0.97			0.99			0.29	
Uniform Delay, d1	19.9	20.3		16.6	24.1			28.2			18.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	34.2	2.3		3.7	15.0			36.6			0.3	
Delay (s)	54.1	22.6		20.3	39.1			64.8			19.1	
Level of Service	D	C		C	D			E			B	
Approach Delay (s)		23.9			38.5			64.8			19.1	
Approach LOS		C			D			E			B	
Intersection Summary												
HCM 2000 Control Delay			35.9			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			98.8			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			93.8%			ICU Level of Service			F			
Analysis Period (min)			15									

c Critical Lane Group

Queues

124: SW 15th St & OR-126

07/05/2018

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	52	1222	51	1556	484	177
v/c Ratio	0.73	0.77	0.50	0.97	0.99	0.30
Control Delay	78.5	24.7	38.1	41.0	67.1	18.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.5	24.7	38.1	41.0	67.1	18.7
Queue Length 50th (ft)	25	325	21	490	294	65
Queue Length 95th (ft)	#101	414	#77	#672	#509	116
Internal Link Dist (ft)		1820		1191	423	675
Turn Bay Length (ft)	125		125			
Base Capacity (vph)	71	1588	102	1610	505	597
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.77	0.50	0.97	0.96	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

125: SW 11th St & SW Highland Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 									 	
Traffic Volume (vph)	0	855	384	0	0	0	0	0	0	14	86	0
Future Volume (vph)	0	855	384	0	0	0	0	0	0	14	86	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5									4.0	
Lane Util. Factor		0.95									0.95	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.95									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		3096									3302	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		3096									3302	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	929	417	0	0	0	0	0	0	15	93	0
RTOR Reduction (vph)	0	46	0	0	0	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	1300	0	0	0	0	0	0	0	0	94	0
Confl. Peds. (#/hr)								3				3
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA								Perm	NA	
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		37.7									5.6	
Effective Green, g (s)		37.7									5.6	
Actuated g/C Ratio		0.73									0.11	
Clearance Time (s)		4.5									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2253									356	
v/s Ratio Prot		c0.42										
v/s Ratio Perm											0.03	
v/c Ratio		0.58									0.26	
Uniform Delay, d1		3.3									21.2	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.4									0.4	
Delay (s)		3.7									21.6	
Level of Service		A									C	
Approach Delay (s)		3.7			0.0			0.0			21.6	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			5.0									
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			51.8							8.5		
Intersection Capacity Utilization			52.0%							A		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

125: SW 11th St & SW Highland Way

07/05/2018

	→	↓
Lane Group	EBT	SBT
Lane Group Flow (vph)	1346	108
v/c Ratio	0.56	0.22
Control Delay	4.3	20.1
Queue Delay	0.0	0.0
Total Delay	4.3	20.1
Queue Length 50th (ft)	66	13
Queue Length 95th (ft)	123	36
Internal Link Dist (ft)	1097	269
Turn Bay Length (ft)		
Base Capacity (vph)	3098	1491
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.43	0.07
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

126: SW 9th St & SW Highland Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 				
Traffic Volume (vph)	38	866	0	0	0	0	0	508	144	0	0	0
Future Volume (vph)	38	866	0	0	0	0	0	508	144	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5						4.5	4.5			
Lane Util. Factor		0.95						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		3250						3260	1488			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		3250						3260	1488			
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	41	931	0	0	0	0	0	546	155	0	0	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	70	0	0	0
Lane Group Flow (vph)	0	964	0	0	0	0	0	546	85	0	0	0
Confl. Peds. (#/hr)								2				2
Heavy Vehicles (%)	4%	2%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
Turn Type	Perm	NA						NA	Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		24.6						16.3	16.3			
Effective Green, g (s)		24.6						16.3	16.3			
Actuated g/C Ratio		0.49						0.33	0.33			
Clearance Time (s)		4.5						4.5	4.5			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		1602						1064	486			
v/s Ratio Prot								c0.17				
v/s Ratio Perm		0.30							0.06			
v/c Ratio		0.60						0.51	0.17			
Uniform Delay, d1		9.1						13.6	12.0			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.6						0.4	0.2			
Delay (s)		9.8						14.0	12.2			
Level of Service		A						B	B			
Approach Delay (s)		9.8			0.0			13.6			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			11.4					HCM 2000 Level of Service		B		
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			49.9					Sum of lost time (s)		9.0		
Intersection Capacity Utilization			52.6%					ICU Level of Service		A		
Analysis Period (min)			15									

c Critical Lane Group

Queues

126: SW 9th St & SW Highland Ave

07/05/2018



Lane Group	EBT	NBT	NBR
Lane Group Flow (vph)	972	546	155
v/c Ratio	0.61	0.52	0.28
Control Delay	11.5	16.7	7.8
Queue Delay	0.0	0.0	0.0
Total Delay	11.5	16.7	7.8
Queue Length 50th (ft)	94	64	10
Queue Length 95th (ft)	194	141	53
Internal Link Dist (ft)	460	568	
Turn Bay Length (ft)			175
Base Capacity (vph)	3043	2567	1193
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.32	0.21	0.13

Intersection Summary

HCM Signalized Intersection Capacity Analysis

127: SW 6th St & SW Highland Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑							↑	↑↑	
Traffic Volume (vph)	0	884	69	0	0	0	0	0	0	168	589	0
Future Volume (vph)	0	884	69	0	0	0	0	0	0	168	589	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0	4.0							4.0	4.0	
Lane Util. Factor		0.95	1.00							1.00	0.95	
Frpb, ped/bikes		1.00	0.99							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	1.00	
Satd. Flow (prot)		3260	1469							1657	3292	
Flt Permitted		1.00	1.00							0.95	1.00	
Satd. Flow (perm)		3260	1469							1657	3292	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	931	73	0	0	0	0	0	0	177	620	0
RTOR Reduction (vph)	0	0	30	0	0	0	0	0	0	67	0	0
Lane Group Flow (vph)	0	931	43	0	0	0	0	0	0	110	620	0
Confl. Peds. (#/hr)										4	4	
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type		NA	Perm								Perm	NA
Protected Phases		2									4	
Permitted Phases			2									4
Actuated Green, G (s)		25.7	25.7							19.9	19.9	
Effective Green, g (s)		25.7	25.7							19.9	19.9	
Actuated g/C Ratio		0.48	0.48							0.37	0.37	
Clearance Time (s)		4.0	4.0							4.0	4.0	
Vehicle Extension (s)		3.0	3.0							3.0	3.0	
Lane Grp Cap (vph)		1563	704							615	1222	
v/s Ratio Prot		c0.29									c0.19	
v/s Ratio Perm			0.03							0.07		
v/c Ratio		0.60	0.06							0.18	0.51	
Uniform Delay, d1		10.2	7.5							11.3	13.1	
Progression Factor		1.00	1.00							1.00	1.00	
Incremental Delay, d2		0.6	0.0							0.1	0.3	
Delay (s)		10.8	7.5							11.5	13.4	
Level of Service		B	A							B	B	
Approach Delay (s)		10.5			0.0			0.0			13.0	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			11.6									
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			53.6							8.0		
Intersection Capacity Utilization			63.3%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

127: SW 6th St & SW Highland Ave

07/05/2018

	→	↘	↙	↓
Lane Group	EBT	EBR	SBL	SBT
Lane Group Flow (vph)	931	73	177	620
v/c Ratio	0.60	0.10	0.26	0.51
Control Delay	13.0	4.4	7.6	16.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.0	4.4	7.6	16.0
Queue Length 50th (ft)	99	2	13	73
Queue Length 95th (ft)	217	24	62	166
Internal Link Dist (ft)	782			261
Turn Bay Length (ft)		100	150	
Base Capacity (vph)	2939	1330	1269	2474
Starvation Cap Reductn	0	0	0	102
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.32	0.05	0.14	0.26
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

128: SW 5th St & SW Highland Ave

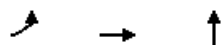
07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	407	658	0	0	0	0	0	324	51	0	0	0
Future Volume (vph)	407	658	0	0	0	0	0	324	51	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5						4.5				
Lane Util. Factor	0.91	0.91						0.95				
Flt	1.00	1.00						0.98				
Flt Protected	0.95	1.00						1.00				
Satd. Flow (prot)	1513	3114						3257				
Flt Permitted	0.95	1.00						1.00				
Satd. Flow (perm)	1513	3114						3257				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	438	708	0	0	0	0	0	348	55	0	0	0
RTOR Reduction (vph)	153	8	0	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	219	766	0	0	0	0	0	388	0	0	0	0
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA						NA				
Protected Phases		8						6				
Permitted Phases	8											
Actuated Green, G (s)	21.7	21.7						11.5				
Effective Green, g (s)	21.7	21.7						11.5				
Actuated g/C Ratio	0.51	0.51						0.27				
Clearance Time (s)	4.5	4.5						4.5				
Vehicle Extension (s)	3.0	3.0						3.0				
Lane Grp Cap (vph)	778	1601						887				
v/s Ratio Prot								c0.12				
v/s Ratio Perm	0.15	0.25										
v/c Ratio	0.28	0.48						0.44				
Uniform Delay, d1	5.8	6.6						12.7				
Progression Factor	1.00	1.00						1.00				
Incremental Delay, d2	0.2	0.2						0.3				
Delay (s)	6.0	6.8						13.0				
Level of Service	A	A						B				
Approach Delay (s)		6.6			0.0			13.0			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		8.2			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.46										
Actuated Cycle Length (s)		42.2			Sum of lost time (s)			9.0				
Intersection Capacity Utilization		42.3%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

128: SW 5th St & SW Highland Ave

07/05/2018



Lane Group	EBL	EBT	NBT
Lane Group Flow (vph)	372	774	403
v/c Ratio	0.40	0.49	0.45
Control Delay	2.9	7.9	15.3
Queue Delay	0.1	0.0	0.0
Total Delay	3.0	7.9	15.3
Queue Length 50th (ft)	6	52	37
Queue Length 95th (ft)	43	114	94
Internal Link Dist (ft)		156	664
Turn Bay Length (ft)	75		
Base Capacity (vph)	1480	3030	2867
Starvation Cap Reductn	225	495	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.30	0.31	0.14

Intersection Summary

MOVEMENT SUMMARY

 Site: [29 - SE 9th St @ OR 126]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SE 9th St											
3	L2	36	1.0	0.191	8.6	LOS A	0.8	19.1	0.66	0.66	32.6
8	T1	33	1.0	0.191	8.6	LOS A	0.8	19.1	0.66	0.66	32.5
18	R2	43	1.0	0.191	8.6	LOS A	0.8	19.1	0.66	0.66	31.6
Approach		112	1.0	0.191	8.6	LOS A	0.8	19.1	0.66	0.66	32.2
East: OR 126											
1	L2	30	1.0	0.535	9.5	LOS A	3.7	96.9	0.49	0.32	32.9
6	T1	415	4.0	0.535	9.5	LOS A	3.7	96.9	0.49	0.32	32.8
16	R2	160	6.0	0.535	9.5	LOS A	3.7	96.9	0.49	0.32	31.8
Approach		605	4.4	0.535	9.5	LOS A	3.7	96.9	0.49	0.32	32.5
North: SE 9th St											
7	L2	180	6.0	0.433	10.1	LOS B	2.3	59.3	0.66	0.68	31.2
4	T1	24	1.0	0.433	10.1	LOS B	2.3	59.3	0.66	0.68	31.3
14	R2	138	4.0	0.433	10.1	LOS B	2.3	59.3	0.66	0.68	30.4
Approach		342	4.8	0.433	10.1	LOS B	2.3	59.3	0.66	0.68	30.9
West: OR 126											
5	L2	82	2.0	0.621	12.0	LOS B	5.2	131.8	0.67	0.56	31.5
2	T1	540	3.0	0.621	12.0	LOS B	5.2	131.8	0.67	0.56	31.5
12	R2	27	1.0	0.621	12.0	LOS B	5.2	131.8	0.67	0.56	30.7
Approach		649	2.8	0.621	12.0	LOS B	5.2	131.8	0.67	0.56	31.5
All Vehicles		1709	3.6	0.621	10.5	LOS B	5.2	131.8	0.61	0.51	31.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: H:\17\17720 - Redmond Transportation System Plan\Task 5- Alternatives\ops\Future Alternative Conditions (Updated Model).sip7

HCM Signalized Intersection Capacity Analysis

130: SW 27th St & SW Obsidian Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	31	57	22	30	1	117	396	18	4	248	80
Future Volume (vph)	35	31	57	22	30	1	117	396	18	4	248	80
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0			4.0		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.94			1.00		1.00	0.99		1.00	0.96	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1559			1709		1614	1722		1662	1665	
Flt Permitted		0.90			0.85		0.38	1.00		0.50	1.00	
Satd. Flow (perm)		1419			1479		650	1722		872	1665	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	39	34	63	24	33	1	130	440	20	4	276	89
RTOR Reduction (vph)	0	39	0	0	1	0	0	2	0	0	15	0
Lane Group Flow (vph)	0	97	0	0	57	0	130	458	0	4	350	0
Confl. Peds. (#/hr)	1		1	1		1						
Confl. Bikes (#/hr)						1						1
Heavy Vehicles (%)	3%	0%	4%	0%	0%	0%	3%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		8.9			8.9		28.1	22.9		19.3	18.5	
Effective Green, g (s)		8.9			8.9		28.1	22.9		19.3	18.5	
Actuated g/C Ratio		0.20			0.20		0.62	0.50		0.42	0.41	
Clearance Time (s)		4.0			4.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		276			288		510	864		382	675	
v/s Ratio Prot							c0.03	c0.27		0.00	0.21	
v/s Ratio Perm		c0.07			0.04		0.13			0.00		
v/c Ratio		0.35			0.20		0.25	0.53		0.01	0.52	
Uniform Delay, d1		15.9			15.4		4.2	7.7		7.6	10.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.3		0.3	0.6		0.0	0.7	
Delay (s)		16.6			15.7		4.5	8.3		7.6	10.9	
Level of Service		B			B		A	A		A	B	
Approach Delay (s)		16.6			15.7			7.5			10.8	
Approach LOS		B			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			10.1				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			45.6				Sum of lost time (s)			13.0		
Intersection Capacity Utilization			48.7%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

130: SW 27th St & SW Obsidian Ave

07/05/2018

	→	←	↖	↑	↘	↓
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	58	130	460	4	365
v/c Ratio	0.41	0.19	0.24	0.50	0.01	0.58
Control Delay	16.4	18.4	5.3	9.4	4.2	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	18.4	5.3	9.4	4.2	15.2
Queue Length 50th (ft)	18	12	11	46	0	66
Queue Length 95th (ft)	70	44	33	197	3	152
Internal Link Dist (ft)	1098	1419		1239		2675
Turn Bay Length (ft)			75		125	
Base Capacity (vph)	946	969	552	1604	555	1540
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.06	0.24	0.29	0.01	0.24
Intersection Summary						

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	41	2	18	0	2	13	11	370	11	14	257	47
Future Vol, veh/h	41	2	18	0	2	13	11	370	11	14	257	47
Conflicting Peds, #/hr	4	0	0	0	0	4	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	0	0
Mvmt Flow	44	2	19	0	2	14	12	394	12	15	273	50

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	765	759	300	762	778	403	325	0	0	405	0	0
Stage 1	330	330	-	423	423	-	-	-	-	-	-	-
Stage 2	435	429	-	339	355	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	323	338	744	324	330	652	1246	-	-	1165	-	-
Stage 1	687	649	-	613	591	-	-	-	-	-	-	-
Stage 2	604	587	-	680	633	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	306	328	743	307	320	650	1246	-	-	1161	-	-
Mov Cap-2 Maneuver	306	328	-	307	320	-	-	-	-	-	-	-
Stage 1	677	637	-	606	584	-	-	-	-	-	-	-
Stage 2	580	580	-	650	622	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.7	11.5	0.2	0.4
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1246	-	-	371 571	1161	-	-
HCM Lane V/C Ratio	0.009	-	-	0.175 0.028	0.013	-	-
HCM Control Delay (s)	7.9	0	-	16.7 11.5	8.1	0	-
HCM Lane LOS	A	A	-	C B	A A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.6 0.1	0	-	-

HCM Signalized Intersection Capacity Analysis

132: SW Canal Blvd & SW Veterans Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	219	129	139	385	212	131	268	89	185	356	10
Future Volume (vph)	9	219	129	139	385	212	131	268	89	185	356	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1661	1699	1473	1646	3228	1438	1646	1733	1444	3193	1726	1726
Flt Permitted	0.52	1.00	1.00	0.40	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	902	1699	1473	699	3228	1438	1646	1733	1444	3193	1726	1726
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	228	134	145	401	221	136	279	93	193	371	10
RTOR Reduction (vph)	0	0	80	0	0	146	0	0	55	0	1	0
Lane Group Flow (vph)	9	228	54	145	401	75	136	279	38	193	380	0
Confl. Peds. (#/hr)	3					3	3		1	1		3
Heavy Vehicles (%)	0%	3%	1%	1%	3%	1%	1%	1%	2%	1%	1%	0%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	NA
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)	20.2	19.2	30.3	30.4	25.4	25.4	11.1	23.4	30.6	8.7	21.0	
Effective Green, g (s)	20.2	19.2	30.3	30.4	25.4	25.4	11.1	23.4	30.6	8.7	21.0	
Actuated g/C Ratio	0.27	0.26	0.41	0.41	0.34	0.34	0.15	0.31	0.41	0.12	0.28	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	254	437	678	376	1100	490	245	544	670	372	486	
v/s Ratio Prot	0.00	c0.13	0.01	c0.04	0.12		c0.08	0.16	0.01	0.06	c0.22	
v/s Ratio Perm	0.01		0.03	0.12		0.05			0.02			
v/c Ratio	0.04	0.52	0.08	0.39	0.36	0.15	0.56	0.51	0.06	0.52	0.78	
Uniform Delay, d1	19.9	23.7	13.6	14.8	18.5	17.1	29.4	20.9	13.2	30.9	24.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	1.1	0.1	0.7	0.2	0.1	2.7	0.8	0.0	1.2	8.0	
Delay (s)	20.0	24.8	13.6	15.5	18.7	17.2	32.1	21.7	13.3	32.2	32.7	
Level of Service	B	C	B	B	B	B	C	C	B	C	C	
Approach Delay (s)		20.7			17.7			23.0			32.5	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			23.2				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			74.5				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			63.6%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

132: SW Canal Blvd & SW Veterans Way

07/05/2018

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	9	228	134	145	401	221	136	279	93	193	381
v/c Ratio	0.03	0.61	0.19	0.41	0.35	0.34	0.54	0.49	0.14	0.50	0.75
Control Delay	17.4	34.7	3.6	21.8	20.8	5.4	39.7	22.7	3.2	37.9	33.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.4	34.7	3.6	21.8	20.8	5.4	39.7	22.7	3.2	37.9	33.9
Queue Length 50th (ft)	2	91	0	43	64	0	55	96	0	41	149
Queue Length 95th (ft)	13	189	31	102	150	54	135	182	23	92	284
Internal Link Dist (ft)		693			446			553			1860
Turn Bay Length (ft)	125		200	175		150	225		125	250	
Base Capacity (vph)	366	765	778	354	1455	768	334	932	670	417	803
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.30	0.17	0.41	0.28	0.29	0.41	0.30	0.14	0.46	0.47
Intersection Summary											

HCM Signalized Intersection Capacity Analysis

133: US-97 & SW Veterans Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	108	319	287	307	147	379	1676	134	59	1313	51
Future Volume (vph)	65	108	319	287	307	147	379	1676	134	59	1313	51
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1661	1683	1464	1583	3072		1646	3059		1599	3068	
Flt Permitted	0.25	1.00	1.00	0.50	1.00		0.06	1.00		0.06	1.00	
Satd. Flow (perm)	434	1683	1464	837	3072		102	3059		106	3068	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	70	116	343	309	330	158	408	1802	144	63	1412	55
RTOR Reduction (vph)	0	0	31	0	41	0	0	3	0	0	2	0
Lane Group Flow (vph)	70	116	312	309	447	0	408	1943	0	63	1465	0
Confl. Peds. (#/hr)	7					7			2	2		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	4%	1%	5%	2%	3%	1%	7%	12%	4%	8%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	27.5	22.4	47.0	34.3	25.8		92.5	78.6		72.8	63.4	
Effective Green, g (s)	27.5	22.4	47.0	34.3	25.8		92.5	78.6		72.8	63.4	
Actuated g/C Ratio	0.20	0.16	0.34	0.25	0.19		0.67	0.57		0.53	0.46	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	132	274	548	255	576		345	1749		158	1415	
v/s Ratio Prot	0.02	0.07	0.10	c0.07	0.15		c0.21	0.64		0.03	0.48	
v/s Ratio Perm	0.09		0.11	c0.23			c0.58			0.18		
v/c Ratio	0.53	0.42	0.57	1.21	0.78		1.18	1.11		0.40	1.04	
Uniform Delay, d1	46.3	51.7	36.9	51.3	53.0		47.1	29.4		28.5	37.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.0	1.1	1.4	125.9	6.5		107.9	58.6		1.7	33.6	
Delay (s)	50.4	52.8	38.3	177.2	59.5		155.0	88.0		30.2	70.6	
Level of Service	D	D	D	F	E		F	F		C	E	
Approach Delay (s)		43.1			105.1			99.6			69.0	
Approach LOS		D			F			F			E	
Intersection Summary												
HCM 2000 Control Delay			85.7			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.25									
Actuated Cycle Length (s)			137.4			Sum of lost time (s)			18.5			
Intersection Capacity Utilization			103.8%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

133: US-97 & SW Veterans Way

07/05/2018

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	70	116	343	309	488	408	1946	63	1467
v/c Ratio	0.47	0.44	0.65	1.25	0.78	1.17	1.10	0.33	1.04
Control Delay	49.7	55.9	35.6	181.9	56.1	141.0	81.6	22.1	70.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	55.9	35.6	181.9	56.1	141.0	81.6	22.1	70.4
Queue Length 50th (ft)	48	93	208	~317	199	~387	~1074	18	~743
Queue Length 95th (ft)	89	155	310	#520	263	#652	#1332	60	#977
Internal Link Dist (ft)		446			2921		4483		2738
Turn Bay Length (ft)	175			150		150		175	
Base Capacity (vph)	148	452	528	247	907	349	1777	197	1414
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.26	0.65	1.25	0.54	1.17	1.10	0.32	1.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection

Intersection Delay, s/veh 11.6

Intersection LOS B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↘	
Traffic Vol, veh/h	32	119	149	92	246	64
Future Vol, veh/h	32	119	149	92	246	64
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	3	9	5	9	4	4
Mvmt Flow	35	129	162	100	267	70
Number of Lanes	1	1	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.1	11.7	12.7
HCM LOS	A	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1
Vol Left, %	79%	0%	0%	62%
Vol Thru, %	0%	100%	0%	38%
Vol Right, %	21%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	310	32	119	241
LT Vol	246	0	0	149
Through Vol	0	32	0	92
RT Vol	64	0	119	0
Lane Flow Rate	337	35	129	262
Geometry Grp	2	7	7	5
Degree of Util (X)	0.474	0.055	0.184	0.386
Departure Headway (Hd)	5.059	5.734	5.128	5.302
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	708	618	691	671
Service Time	3.134	3.533	2.927	3.39
HCM Lane V/C Ratio	0.476	0.057	0.187	0.39
HCM Control Delay	12.7	8.9	9.1	11.7
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	2.6	0.2	0.7	1.8

HCM Signalized Intersection Capacity Analysis

135: SE Veterans Way & OR-126

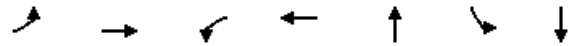
07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	586	3	267	349	37	0	5	92	119	10	37
Future Volume (vph)	13	586	3	267	349	37	0	5	92	119	10	37
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99			0.86		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1630	1695		1630	1647			1457		1630	1514	
Flt Permitted	0.52	1.00		0.12	1.00			1.00		0.43	1.00	
Satd. Flow (perm)	891	1695		204	1647			1457		736	1514	
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.92	0.93	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	14	630	3	287	375	40	0	5	99	129	11	40
RTOR Reduction (vph)	0	0	0	0	2	0	0	90	0	0	31	0
Lane Group Flow (vph)	14	633	0	287	413	0	0	14	0	129	20	0
Heavy Vehicles (%)	2%	3%	40%	2%	5%	2%	0%	2%	3%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	29.8	28.7		49.9	43.8			7.0		15.9	15.9	
Effective Green, g (s)	29.8	28.7		49.9	43.8			7.0		15.9	15.9	
Actuated g/C Ratio	0.40	0.38		0.67	0.59			0.09		0.21	0.21	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	365	650		444	964			136		215	321	
v/s Ratio Prot	0.00	c0.37		c0.14	0.25			0.01		c0.04	0.01	
v/s Ratio Perm	0.01			0.29						c0.09		
v/c Ratio	0.04	0.97		0.65	0.43			0.10		0.60	0.06	
Uniform Delay, d1	13.7	22.7		15.3	8.6			31.0		25.4	23.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	28.6		3.2	0.3			0.3		4.5	0.1	
Delay (s)	13.7	51.3		18.5	8.9			31.4		29.9	23.6	
Level of Service	B	D		B	A			C		C	C	
Approach Delay (s)		50.5			12.8			31.4			28.1	
Approach LOS		D			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			74.8			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			75.2%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

135: SE Veterans Way & OR-126

07/05/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	14	633	287	415	104	129	51
v/c Ratio	0.03	1.07	0.62	0.40	0.44	0.53	0.14
Control Delay	8.0	84.2	18.7	9.8	15.1	32.6	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	84.2	18.7	9.8	15.1	32.6	11.4
Queue Length 50th (ft)	2	~318	67	73	2	47	4
Queue Length 95th (ft)	9	#615	156	213	46	101	31
Internal Link Dist (ft)		2626		631	1973		4566
Turn Bay Length (ft)	150		150			100	
Base Capacity (vph)	814	593	611	1034	564	243	545
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	1.07	0.47	0.40	0.18	0.53	0.09

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

136: SW 27th St & SW Salmon Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	59	30	90	126	89	62	430	74	38	270	5
Future Volume (vph)	15	59	30	90	126	89	62	430	74	38	270	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.94		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1660	1650		1645	1596		1662	1697		1662	1711	
Flt Permitted	0.61	1.00		0.54	1.00		0.49	1.00		0.23	1.00	
Satd. Flow (perm)	1061	1650		930	1596		853	1697		399	1711	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	17	67	34	102	143	101	70	489	84	43	307	6
RTOR Reduction (vph)	0	22	0	0	28	0	0	7	0	0	1	0
Lane Group Flow (vph)	17	79	0	102	216	0	70	566	0	43	312	0
Confl. Peds. (#/hr)	3		1	1		3						
Heavy Vehicles (%)	0%	0%	0%	1%	1%	3%	0%	1%	0%	0%	2%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	14.7	13.9		22.7	17.9		29.3	26.4		28.3	25.9	
Effective Green, g (s)	14.7	13.9		22.7	17.9		29.3	26.4		28.3	25.9	
Actuated g/C Ratio	0.22	0.21		0.35	0.27		0.45	0.40		0.43	0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	245	350		374	436		417	683		218	676	
v/s Ratio Prot	0.00	0.05		c0.02	c0.14		c0.01	c0.33		0.01	0.18	
v/s Ratio Perm	0.01			0.07			0.07			0.08		
v/c Ratio	0.07	0.23		0.27	0.49		0.17	0.83		0.20	0.46	
Uniform Delay, d1	19.9	21.3		15.0	20.0		10.6	17.5		12.2	14.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3		0.4	0.9		0.2	8.2		0.4	0.5	
Delay (s)	20.0	21.7		15.4	20.9		10.8	25.7		12.6	15.1	
Level of Service	C	C		B	C		B	C		B	B	
Approach Delay (s)		21.4			19.3			24.1			14.8	
Approach LOS		C			B			C			B	
Intersection Summary												
HCM 2000 Control Delay			20.5			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			65.5			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			59.1%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

136: SW 27th St & SW Salmon Ave

07/05/2018

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	17	101	102	244	70	573	43	313
v/c Ratio	0.05	0.31	0.27	0.49	0.14	0.77	0.14	0.43
Control Delay	19.2	23.3	20.8	22.7	9.0	25.3	9.4	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	23.3	20.8	22.7	9.0	25.3	9.4	16.8
Queue Length 50th (ft)	5	27	31	67	11	188	7	88
Queue Length 95th (ft)	19	71	71	168	38	#417	26	194
Internal Link Dist (ft)		602		599		2595		1305
Turn Bay Length (ft)	100		100		75		75	
Base Capacity (vph)	335	771	374	820	503	1120	307	1104
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.13	0.27	0.30	0.14	0.51	0.14	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

137: SW Canal Blvd & SW Odem Medo Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	216	0	543	0	339	166	316	340	0
Future Volume (vph)	0	0	0	216	0	543	0	339	166	316	340	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					5.0	5.0		5.0	5.0	5.0	5.0	
Lane Util. Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes					1.00	0.98		1.00	1.00	1.00	1.00	
Flpb, ped/bikes					0.99	1.00		1.00	1.00	1.00	1.00	
Frt					1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected					0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)					1641	1436		1733	1473	1662	1733	
Flt Permitted					0.76	1.00		1.00	1.00	0.31	1.00	
Satd. Flow (perm)					1308	1436		1733	1473	549	1733	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	225	0	566	0	353	173	329	354	0
RTOR Reduction (vph)	0	0	0	0	0	327	0	0	120	0	0	0
Lane Group Flow (vph)	0	0	0	0	225	239	0	353	53	329	354	0
Confl. Peds. (#/hr)	4		10	10		4	3					3
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	1%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)					14.9	14.9		17.0	17.0	30.8	30.8	
Effective Green, g (s)					14.9	14.9		17.0	17.0	30.8	30.8	
Actuated g/C Ratio					0.27	0.27		0.31	0.31	0.55	0.55	
Clearance Time (s)					5.0	5.0		5.0	5.0	5.0	5.0	
Vehicle Extension (s)					2.0	2.0		3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)					349	384		528	449	479	958	
v/s Ratio Prot								0.20		c0.11	0.20	
v/s Ratio Perm					c0.17	0.17			0.04	c0.27		
v/c Ratio					0.64	0.62		0.67	0.12	0.69	0.37	
Uniform Delay, d1					18.1	17.9		16.9	13.9	8.2	7.0	
Progression Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2					3.0	2.2		3.2	0.1	3.3	0.2	
Delay (s)					21.1	20.2		20.1	14.1	11.4	7.2	
Level of Service					C	C		C	B	B	A	
Approach Delay (s)		0.0			20.4			18.1			9.2	
Approach LOS		A			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			16.0				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			55.7				Sum of lost time (s)			15.0		
Intersection Capacity Utilization			70.5%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

137: SW Canal Blvd & SW Odem Medo Way

07/05/2018



Lane Group	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	225	566	353	173	329	354
v/c Ratio	0.65	0.80	0.68	0.31	0.69	0.37
Control Delay	29.0	14.9	25.5	4.8	18.2	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	14.9	25.5	4.8	18.2	9.3
Queue Length 50th (ft)	67	32	101	0	54	58
Queue Length 95th (ft)	146	#162	206	37	#152	134
Internal Link Dist (ft)	931		2881			465
Turn Bay Length (ft)				100	100	
Base Capacity (vph)	533	850	773	752	487	996
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.67	0.46	0.23	0.68	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

138: US-97 & SW Odem Medo Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	282	21	218	15	33	21	409	1903	16	13	1491	319
Future Volume (vph)	282	21	218	15	33	21	409	1903	16	13	1491	319
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	5.0
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1563	1579	1436	1661	1594		1646	3194		1662	3107	1426
Flt Permitted	0.52	0.52	1.00	0.65	1.00		0.06	1.00		0.06	1.00	1.00
Satd. Flow (perm)	853	848	1436	1135	1594		96	3194		104	3107	1426
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	300	22	232	16	35	22	435	2024	17	14	1586	339
RTOR Reduction (vph)	0	0	59	0	17	0	0	0	0	0	0	100
Lane Group Flow (vph)	159	163	173	16	40	0	435	2041	0	14	1586	239
Confl. Peds. (#/hr)	1		1	1		1	2		1	1		2
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	1%	0%	3%	0%	0%	7%	1%	4%	0%	0%	7%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	3	8	1	7	4		1	6		5	2	3
Permitted Phases	8		8	4			6			2		2
Actuated Green, G (s)	27.3	27.3	46.1	15.2	12.9		98.4	90.4		70.3	67.3	76.7
Effective Green, g (s)	27.3	27.3	46.1	15.2	12.9		98.4	90.4		70.3	67.3	76.7
Actuated g/C Ratio	0.20	0.20	0.34	0.11	0.09		0.72	0.66		0.51	0.49	0.56
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	219	219	536	135	150		365	2112		87	1529	800
v/s Ratio Prot	0.05	c0.05	0.06	0.00	0.02		c0.23	0.64		0.00	0.51	0.02
v/s Ratio Perm	0.09	c0.10	0.06	0.01			c0.63			0.08		0.15
v/c Ratio	0.73	0.74	0.32	0.12	0.27		1.19	0.97		0.16	1.04	0.30
Uniform Delay, d1	50.1	51.4	33.7	54.5	57.5		47.2	21.7		22.3	34.7	15.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.3	12.8	0.4	0.4	1.0		110.3	12.5		0.9	33.3	0.2
Delay (s)	61.4	64.2	34.0	54.9	58.4		157.5	34.2		23.2	68.0	16.0
Level of Service	E	E	C	D	E		F	C		C	E	B
Approach Delay (s)		50.8			57.7			55.9			58.6	
Approach LOS		D			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			56.4			HCM 2000 Level of Service		E				
HCM 2000 Volume to Capacity ratio			1.16									
Actuated Cycle Length (s)			136.7			Sum of lost time (s)		21.0				
Intersection Capacity Utilization			98.8%			ICU Level of Service		F				
Analysis Period (min)			15									
c Critical Lane Group												

Queues

138: US-97 & SW Odem Medo Way

07/05/2018

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	159	163	232	16	57	435	2041	14	1586	339
v/c Ratio	0.79	0.81	0.41	0.09	0.35	1.14	0.92	0.09	1.04	0.37
Control Delay	76.3	78.5	19.9	43.3	44.5	130.0	27.8	10.1	66.5	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.3	78.5	19.9	43.3	44.5	130.0	27.8	10.1	66.5	6.0
Queue Length 50th (ft)	129	132	77	11	31	~385	603	3	~758	39
Queue Length 95th (ft)	#207	#215	162	31	74	#670	#1259	12	#1026	110
Internal Link Dist (ft)		931			261		4040		4483	
Turn Bay Length (ft)	150		125	150		100		150		275
Base Capacity (vph)	201	287	564	170	394	380	2213	153	1529	912
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.57	0.41	0.09	0.14	1.14	0.92	0.09	1.04	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

139: SW Helmholtz Way & SW Wickiup Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	13	1	46	10	66	6	380	94	72	194	8
Future Volume (vph)	4	13	1	46	10	66	6	380	94	72	194	8
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.5			3.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.99			0.93		1.00	0.97		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1718			1592		1662	1698		1662	1660	
Flt Permitted		0.94			0.88		0.63	1.00		0.33	1.00	
Satd. Flow (perm)		1632			1435		1098	1698		573	1660	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	4	13	1	47	10	68	6	392	97	74	200	8
RTOR Reduction (vph)	0	1	0	0	55	0	0	11	0	0	1	0
Lane Group Flow (vph)	0	17	0	0	70	0	6	478	0	74	207	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		8.5			8.5		21.3	20.5		27.3	23.5	
Effective Green, g (s)		8.5			8.5		21.3	20.5		27.3	23.5	
Actuated g/C Ratio		0.18			0.18		0.46	0.44		0.59	0.51	
Clearance Time (s)		3.5			3.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		299			263		514	751		427	842	
v/s Ratio Prot							0.00	c0.28		c0.01	c0.12	
v/s Ratio Perm		0.01			c0.05		0.01			0.09		
v/c Ratio		0.06			0.27		0.01	0.64		0.17	0.25	
Uniform Delay, d1		15.6			16.2		6.8	10.0		4.8	6.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.5		0.0	1.8		0.2	0.2	
Delay (s)		15.7			16.8		6.8	11.8		5.0	6.6	
Level of Service		B			B		A	B		A	A	
Approach Delay (s)		15.7			16.8			11.7			6.1	
Approach LOS		B			B			B			A	
Intersection Summary												
HCM 2000 Control Delay		10.8										
HCM 2000 Volume to Capacity ratio		0.49										
Actuated Cycle Length (s)		46.3								13.5		
Intersection Capacity Utilization		57.7%										
Analysis Period (min)		15										
c Critical Lane Group												

Queues

139: SW Helmholtz Way & SW Wickiup Ave

07/05/2018

	→	←	↖	↑	↘	↓
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	125	6	489	74	208
v/c Ratio	0.06	0.37	0.01	0.65	0.14	0.23
Control Delay	19.4	14.7	3.7	15.6	4.1	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.4	14.7	3.7	15.6	4.1	6.4
Queue Length 50th (ft)	4	14	1	102	5	16
Queue Length 95th (ft)	20	61	3	219	19	79
Internal Link Dist (ft)	831	737		9408		839
Turn Bay Length (ft)			250		250	
Base Capacity (vph)	1083	975	641	1504	557	1506
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.13	0.01	0.33	0.13	0.14
Intersection Summary						

MOVEMENT SUMMARY

 Site: [40 - SW 27th @ SW Wickiup]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SW 27th											
3	L2	195	2.0	0.671	12.4	LOS B	6.4	161.6	0.62	0.41	31.1
8	T1	586	1.0	0.671	12.4	LOS B	6.4	161.6	0.62	0.41	31.1
18	R2	12	0.0	0.671	12.4	LOS B	6.4	161.6	0.62	0.41	30.3
Approach		792	1.2	0.671	12.4	LOS B	6.4	161.6	0.62	0.41	31.1
East: SW Wickiup											
1	L2	9	0.0	0.265	9.5	LOS A	1.1	27.6	0.68	0.68	32.9
6	T1	141	0.0	0.265	9.5	LOS A	1.1	27.6	0.68	0.68	32.9
16	R2	8	0.0	0.265	9.5	LOS A	1.1	27.6	0.68	0.68	32.0
Approach		158	0.0	0.265	9.5	LOS A	1.1	27.6	0.68	0.68	32.8
North: SW 27th											
7	L2	4	0.0	0.323	7.2	LOS A	1.6	41.3	0.55	0.46	34.2
4	T1	271	1.0	0.323	7.2	LOS A	1.6	41.3	0.55	0.46	34.1
14	R2	34	3.0	0.323	7.2	LOS A	1.6	41.3	0.55	0.46	33.1
Approach		309	1.2	0.323	7.2	LOS A	1.6	41.3	0.55	0.46	34.0
West: SW Wickiup											
5	L2	34	3.0	0.191	5.3	LOS A	0.9	22.3	0.45	0.34	34.6
2	T1	101	1.0	0.191	5.3	LOS A	0.9	22.3	0.45	0.34	34.6
12	R2	60	0.0	0.191	5.3	LOS A	0.9	22.3	0.45	0.34	33.6
Approach		195	1.0	0.191	5.3	LOS A	0.9	22.3	0.45	0.34	34.3
All Vehicles		1453	1.1	0.671	10.0	LOS B	6.4	161.6	0.59	0.44	32.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: H:\17117720 - Redmond Transportation System Plan\Task 5- Alternatives\ops\Future Alternative Conditions (Updated Model).sip7

MOVEMENT SUMMARY

 Site: 101 [41 - SW 27th @ SW Canal Blvd]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SW Canal Dr											
3	L2	191	5.0	0.594	12.6	LOS B	4.5	115.5	0.73	0.73	30.7
8	T1	221	1.0	0.594	12.6	LOS B	4.5	115.5	0.73	0.73	30.7
18	R2	127	3.0	0.594	12.6	LOS B	4.5	115.5	0.73	0.73	29.9
Approach		538	2.9	0.594	12.6	LOS B	4.5	115.5	0.73	0.73	30.5
East: SW Yew Ave											
1	L2	110	0.0	0.976	46.6	LOS E	25.2	633.0	1.00	1.63	21.3
6	T1	602	1.0	0.976	46.6	LOS E	25.2	633.0	1.00	1.63	21.3
16	R2	141	0.0	0.976	46.6	LOS E	25.2	633.0	1.00	1.63	20.9
Approach		853	0.7	0.976	46.6	LOS E	25.2	633.0	1.00	1.63	21.2
North: SW Canal Blvd											
7	L2	101	0.0	0.722	25.8	LOS D	5.3	132.4	0.87	1.06	26.3
4	T1	210	1.0	0.722	25.8	LOS D	5.3	132.4	0.87	1.06	26.2
14	R2	77	0.0	0.722	25.8	LOS D	5.3	132.4	0.87	1.06	25.7
Approach		388	0.5	0.722	25.8	LOS D	5.3	132.4	0.87	1.06	26.1
West: SW 27th St											
5	L2	17	0.0	0.391	8.5	LOS A	2.1	51.5	0.62	0.57	33.4
2	T1	266	0.0	0.391	8.5	LOS A	2.1	51.5	0.62	0.57	33.3
12	R2	66	0.0	0.391	8.5	LOS A	2.1	51.5	0.62	0.57	32.4
Approach		350	0.0	0.391	8.5	LOS A	2.1	51.5	0.62	0.57	33.1
All Vehicles		2130	1.1	0.976	28.0	LOS D	25.2	633.0	0.85	1.13	25.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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HCM Signalized Intersection Capacity Analysis

142: US-97 SB Ramps & SW Yew Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	256	232	352	741	0	0	0	0	109	0	183
Future Volume (vph)	0	256	232	352	741	0	0	0	0	109	0	183
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1667	1423	1567	1733						1662	1458
Flt Permitted		1.00	1.00	0.47	1.00						0.95	1.00
Satd. Flow (perm)		1667	1423	776	1733						1662	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	278	252	383	805	0	0	0	0	118	0	199
RTOR Reduction (vph)	0	0	144	0	0	0	0	0	0	0	0	91
Lane Group Flow (vph)	0	278	108	383	805	0	0	0	0	0	118	108
Confl. Peds. (#/hr)			4	4								
Heavy Vehicles (%)	0%	5%	2%	6%	1%	0%	0%	0%	0%	0%	0%	2%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		2		1	6						4	
Permitted Phases			2	6						4		4
Actuated Green, G (s)		23.0	23.0	34.0	34.0						9.7	9.7
Effective Green, g (s)		23.0	23.0	34.0	34.0						9.7	9.7
Actuated g/C Ratio		0.43	0.43	0.63	0.63						0.18	0.18
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		713	609	579	1097						300	263
v/s Ratio Prot		0.17		0.07	c0.46							
v/s Ratio Perm			0.08	0.34							0.07	c0.07
v/c Ratio		0.39	0.18	0.66	0.73						0.39	0.41
Uniform Delay, d1		10.5	9.5	5.5	6.7						19.4	19.5
Progression Factor		1.00	1.00	1.00	1.00						1.00	1.00
Incremental Delay, d2		0.4	0.1	2.8	2.6						0.9	1.0
Delay (s)		10.9	9.6	8.3	9.3						20.3	20.5
Level of Service		B	A	A	A						C	C
Approach Delay (s)		10.3			9.0			0.0			20.4	
Approach LOS		B			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			11.1		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			53.7		Sum of lost time (s)					15.0		
Intersection Capacity Utilization			83.1%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

c Critical Lane Group

Queues

142: US-97 SB Ramps & SW Yew Ave

07/05/2018

	→	↘	↙	←	↓	↘
Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	278	252	383	805	118	199
v/c Ratio	0.39	0.34	0.66	0.73	0.39	0.56
Control Delay	13.4	3.3	13.6	13.4	23.6	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	3.3	13.6	13.4	23.6	16.5
Queue Length 50th (ft)	56	0	46	137	35	25
Queue Length 95th (ft)	127	37	#141	#429	72	75
Internal Link Dist (ft)	1380			488	462	
Turn Bay Length (ft)		75	150			200
Base Capacity (vph)	750	777	579	1137	935	868
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.32	0.66	0.71	0.13	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

143: US-97 NB Ramps & SE Airport Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	250	0	0	662	188	430	1	247	0	0	0
Future Volume (vph)	115	250	0	0	662	188	430	1	247	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0			5.0	5.0	5.0	5.0				
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00				
Frpb, ped/bikes	1.00	1.00			1.00	0.98	1.00	1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	0.85				
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00				
Satd. Flow (prot)	1599	1667			1683	1395	1630	1431				
Flt Permitted	0.12	1.00			1.00	1.00	0.95	1.00				
Satd. Flow (perm)	205	1667			1683	1395	1630	1431				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	272	0	0	720	204	467	1	268	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	60	0	173	0	0	0	0
Lane Group Flow (vph)	125	272	0	0	720	144	467	96	0	0	0	0
Confl. Peds. (#/hr)	3		1	1		3						
Heavy Vehicles (%)	4%	5%	0%	0%	4%	4%	2%	0%	4%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8					
Actuated Green, G (s)	37.3	37.3			27.8	27.8	25.8	25.8				
Effective Green, g (s)	37.3	37.3			27.8	27.8	25.8	25.8				
Actuated g/C Ratio	0.51	0.51			0.38	0.38	0.35	0.35				
Clearance Time (s)	5.0	5.0			5.0	5.0	5.0	5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	190	850			640	530	575	505				
v/s Ratio Prot	c0.04	0.16			c0.43			0.07				
v/s Ratio Perm	0.29					0.10	c0.29					
v/c Ratio	0.66	0.32			1.12	0.27	0.81	0.19				
Uniform Delay, d1	15.6	10.5			22.6	15.7	21.5	16.4				
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00				
Incremental Delay, d2	8.0	0.2			75.2	0.3	8.6	0.2				
Delay (s)	23.6	10.7			97.8	15.9	30.0	16.6				
Level of Service	C	B			F	B	C	B				
Approach Delay (s)		14.8			79.8			25.1			0.0	
Approach LOS		B			E			C			A	
Intersection Summary												
HCM 2000 Control Delay			47.7				HCM 2000 Level of Service		D			
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			73.1				Sum of lost time (s)		15.0			
Intersection Capacity Utilization			83.1%				ICU Level of Service		E			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

143: US-97 NB Ramps & SE Airport Way

07/05/2018



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	125	272	720	204	467	269
v/c Ratio	0.66	0.32	1.13	0.35	0.81	0.40
Control Delay	31.9	13.4	103.8	11.9	33.3	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	13.4	103.8	11.9	33.3	4.1
Queue Length 50th (ft)	30	71	~399	33	186	0
Queue Length 95th (ft)	#94	139	#660	91	296	43
Internal Link Dist (ft)		488	979			520
Turn Bay Length (ft)	150			100		
Base Capacity (vph)	190	849	637	588	740	796
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.32	1.13	0.35	0.63	0.34

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

MOVEMENT SUMMARY

 Site: [44 - SW 19th @ SE Airport Way]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SW 19th St											
3	L2	267	0.0	0.329	7.8	LOS A	1.6	40.7	0.60	0.55	31.5
18	R2	21	8.0	0.329	7.8	LOS A	1.6	40.7	0.60	0.55	30.5
Approach		288	0.6	0.329	7.8	LOS A	1.6	40.7	0.60	0.55	31.4
East: SE Airport Way											
1	L2	10	0.0	0.536	10.4	LOS B	3.5	90.7	0.61	0.50	32.7
6	T1	527	5.0	0.536	10.4	LOS B	3.5	90.7	0.61	0.50	32.5
Approach		537	4.9	0.536	10.4	LOS B	3.5	90.7	0.61	0.50	32.5
West: SE Airport Way											
2	T1	428	3.0	0.427	7.0	LOS A	2.8	73.7	0.09	0.02	34.2
12	R2	123	16.0	0.427	7.0	LOS A	2.8	73.7	0.09	0.02	32.9
Approach		551	5.9	0.427	7.0	LOS A	2.8	73.7	0.09	0.02	33.9
All Vehicles		1376	4.4	0.536	8.5	LOS A	3.5	90.7	0.40	0.32	32.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: H:\17\17720 - Redmond Transportation System Plan\Task 5- Alternatives\ops\Future Alternative Conditions (Updated Model).sip7

MOVEMENT SUMMARY

 Site: [45 - SW Helmholtz @ SW Canal]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
NorthEast: SW Canal											
6x	T1	198	1.0	0.240	6.9	LOS A	1.1	27.3	0.58	0.53	34.3
16x	R2	2	0.0	0.240	6.9	LOS A	1.1	27.3	0.58	0.53	33.4
Approach		200	1.0	0.240	6.9	LOS A	1.1	27.3	0.58	0.53	34.3
NorthWest: SW Helmholtz											
7x	L2	7	0.0	0.221	5.4	LOS A	1.0	27.0	0.39	0.26	34.9
14x	R2	233	4.0	0.221	5.4	LOS A	1.0	27.0	0.39	0.26	33.7
Approach		239	3.9	0.221	5.4	LOS A	1.0	27.0	0.39	0.26	33.8
SouthWest: SW Canal											
5x	L2	479	1.0	0.636	10.3	LOS B	7.1	179.4	0.12	0.02	31.3
2x	T1	388	0.0	0.636	10.3	LOS B	7.1	179.4	0.12	0.02	31.3
Approach		867	0.6	0.636	10.3	LOS B	7.1	179.4	0.12	0.02	31.3
All Vehicles		1307	1.2	0.636	8.9	LOS A	7.1	179.4	0.24	0.14	32.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: H:\17\17720 - Redmond Transportation System Plan\Task 5- Alternatives\ops\Future Alternative Conditions (Updated Model).sip7

HCM Signalized Intersection Capacity Analysis

101: US-97 NB Ramps & SW Canal Blvd

07/05/2018

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	197	464	8	359	522	78
Future Volume (vph)	197	464	8	359	522	78
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1733	1458	1421	1716	1630	1458
Flt Permitted	1.00	1.00	0.45	1.00	0.95	1.00
Satd. Flow (perm)	1733	1458	673	1716	1630	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	504	9	390	567	85
RTOR Reduction (vph)	0	365	0	0	0	36
Lane Group Flow (vph)	214	139	9	390	567	49
Heavy Vehicles (%)	1%	2%	17%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	6		5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	17.0	17.0	22.6	22.6	29.9	29.9
Effective Green, g (s)	17.0	17.0	22.6	22.6	29.9	29.9
Actuated g/C Ratio	0.28	0.28	0.37	0.37	0.49	0.49
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	479	403	260	630	792	708
v/s Ratio Prot	0.12		0.00	c0.23	c0.35	
v/s Ratio Perm		0.10	0.01			0.03
v/c Ratio	0.45	0.35	0.03	0.62	0.72	0.07
Uniform Delay, d1	18.4	17.8	12.7	15.9	12.5	8.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.5	0.1	1.8	3.1	0.0
Delay (s)	19.0	18.3	12.7	17.7	15.6	8.4
Level of Service	B	B	B	B	B	A
Approach Delay (s)	18.5			17.6	14.6	
Approach LOS	B			B	B	
Intersection Summary						
HCM 2000 Control Delay			16.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			61.5		Sum of lost time (s)	13.5
Intersection Capacity Utilization			59.4%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

101: US-97 NB Ramps & SW Canal Blvd

07/05/2018

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	214	504	9	390	567	85
v/c Ratio	0.42	0.64	0.03	0.70	0.67	0.11
Control Delay	19.9	6.4	12.0	23.8	18.2	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	6.4	12.0	23.8	18.2	4.4
Queue Length 50th (ft)	55	0	2	114	124	2
Queue Length 95th (ft)	131	68	9	188	#387	27
Internal Link Dist (ft)	689			452	761	
Turn Bay Length (ft)			200			175
Base Capacity (vph)	1230	1181	304	1568	842	788
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.43	0.03	0.25	0.67	0.11

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

102: US-97 SB Ramps & NW Canal Blvd

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	646	127	214	667	0	0	0	0	16	0	188
Future Volume (vph)	0	646	127	214	667	0	0	0	0	16	0	188
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5		4.5	4.5						4.5	4.5
Lane Util. Factor		0.95		1.00	1.00						1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Frt		0.98		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		3205		1662	1716						1662	1458
Flt Permitted		1.00		0.20	1.00						0.95	1.00
Satd. Flow (perm)		3205		352	1716						1662	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	702	138	233	725	0	0	0	0	17	0	204
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	0	124
Lane Group Flow (vph)	0	821	0	233	725	0	0	0	0	0	17	80
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	1%	0%	0%	2%	0%	0%	0%	0%	0%	0%	2%
Turn Type		NA		pm+pt	NA					Perm	NA	Perm
Protected Phases		6		5	2						8	
Permitted Phases				2						8		8
Actuated Green, G (s)		18.6		29.8	29.8						8.3	8.3
Effective Green, g (s)		18.6		29.8	29.8						8.3	8.3
Actuated g/C Ratio		0.39		0.63	0.63						0.18	0.18
Clearance Time (s)		4.5		4.5	4.5						4.5	4.5
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1265		409	1085						292	256
v/s Ratio Prot		0.26		0.08	c0.42							
v/s Ratio Perm				0.28							0.01	c0.06
v/c Ratio		0.65		0.57	0.67						0.06	0.31
Uniform Delay, d1		11.6		5.2	5.5						16.1	16.9
Progression Factor		1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2		1.2		1.8	1.6						0.1	0.7
Delay (s)		12.8		7.0	7.1						16.2	17.6
Level of Service		B		A	A						B	B
Approach Delay (s)		12.8			7.1			0.0			17.5	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			10.6			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			47.1			Sum of lost time (s)				13.5		
Intersection Capacity Utilization			58.3%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

Queues

102: US-97 SB Ramps & NW Canal Blvd

07/05/2018

	→	↘	←	↓	↙
Lane Group	EBT	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	840	233	725	17	204
v/c Ratio	0.66	0.58	0.67	0.06	0.54
Control Delay	14.3	11.3	9.9	18.4	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	11.3	9.9	18.4	12.8
Queue Length 50th (ft)	85	20	93	4	12
Queue Length 95th (ft)	158	#65	247	19	67
Internal Link Dist (ft)	3583		689	648	
Turn Bay Length (ft)		250			275
Base Capacity (vph)	1924	405	1433	1172	1072
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.44	0.58	0.51	0.01	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

103: NW 19th St & NW Maple Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	250	109	332	409	104	151	69	261	55	45	14
Future Volume (vph)	14	250	109	332	409	104	151	69	261	55	45	14
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0			4.5	4.5		4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.95		1.00	0.97			1.00	0.85		0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.98	
Satd. Flow (prot)	1662	1623		1645	1689			1692	1473		1680	
Flt Permitted	0.33	1.00		0.24	1.00			0.74	1.00		0.79	
Satd. Flow (perm)	581	1623		424	1689			1294	1473		1359	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	266	116	353	435	111	161	73	278	59	48	15
RTOR Reduction (vph)	0	17	0	0	9	0	0	0	161	0	3	0
Lane Group Flow (vph)	15	365	0	353	537	0	0	234	117	0	119	0
Confl. Peds. (#/hr)			3	3								
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	3%	0%	1%	0%	0%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4			6		5	2	
Permitted Phases	8			4			6		6			
Actuated Green, G (s)	28.1	26.9		43.0	37.8			37.7	37.7		37.7	
Effective Green, g (s)	28.1	26.9		43.0	37.8			37.7	37.7		37.7	
Actuated g/C Ratio	0.32	0.30		0.48	0.42			0.42	0.42		0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.5	4.5		4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	197	489		370	715			546	622		574	
v/s Ratio Prot	0.00	0.22		c0.13	0.32							
v/s Ratio Perm	0.02			c0.33				c0.18	0.08		0.09	
v/c Ratio	0.08	0.75		0.95	0.75			0.43	0.19		0.21	
Uniform Delay, d1	21.4	28.1		18.4	21.7			18.2	16.2		16.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.2	6.1		34.7	4.4			0.5	0.1		0.2	
Delay (s)	21.6	34.2		53.1	26.2			18.7	16.3		16.5	
Level of Service	C	C		D	C			B	B		B	
Approach Delay (s)		33.7			36.7			17.4			16.5	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			29.7			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			89.2			Sum of lost time (s)			16.5			
Intersection Capacity Utilization			71.1%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

103: NW 19th St & NW Maple Ave

07/05/2018

							
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	15	382	353	546	234	278	122
v/c Ratio	0.05	0.82	0.96	0.73	0.41	0.35	20.33
Control Delay	12.6	42.2	58.4	26.6	21.0	3.7	9007.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.6	42.2	58.4	26.6	21.0	3.7	9007.6
Queue Length 50th (ft)	4	180	125	217	84	0	~132
Queue Length 95th (ft)	14	284	#288	#450	172	48	#259
Internal Link Dist (ft)		906		3891	5211		1243
Turn Bay Length (ft)	100		75			100	
Base Capacity (vph)	296	640	367	791	566	801	8
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.60	0.96	0.69	0.41	0.35	15.25

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

104: NW 6th St & NW Maple Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	201	186	190	263	29	266	403	250	48	349	193
Future Volume (vph)	113	201	186	190	263	29	266	403	250	48	349	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1598	1733	1454	1646	1691		1646	3115		1539	3090	
Flt Permitted	0.42	1.00	1.00	0.46	1.00		0.25	1.00		0.32	1.00	
Satd. Flow (perm)	699	1733	1454	805	1691		426	3115		511	3090	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	124	221	204	209	289	32	292	443	275	53	384	212
RTOR Reduction (vph)	0	0	150	0	4	0	0	99	0	0	83	0
Lane Group Flow (vph)	124	221	54	209	317	0	292	619	0	53	513	0
Confl. Peds. (#/hr)	2		1	1		2	2					2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	1%	1%	1%	2%	0%	1%	1%	0%	8%	1%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6			2		
Actuated Green, G (s)	24.4	19.0	19.0	28.2	20.9		32.6	24.8		24.1	20.3	
Effective Green, g (s)	24.4	19.0	19.0	28.2	20.9		32.6	24.8		24.1	20.3	
Actuated g/C Ratio	0.34	0.27	0.27	0.39	0.29		0.46	0.35		0.34	0.28	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	306	461	386	403	494		336	1081		227	878	
v/s Ratio Prot	0.03	0.13		c0.05	c0.19		c0.10	0.20		0.01	0.17	
v/s Ratio Perm	0.11		0.04	0.15			c0.30			0.07		
v/c Ratio	0.41	0.48	0.14	0.52	0.64		0.87	0.57		0.23	0.58	
Uniform Delay, d1	17.0	22.0	20.0	15.2	22.0		14.1	19.0		16.3	21.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.8	0.2	1.1	2.8		20.5	0.7		0.5	1.0	
Delay (s)	17.9	22.8	20.1	16.3	24.8		34.6	19.7		16.8	22.9	
Level of Service	B	C	C	B	C		C	B		B	C	
Approach Delay (s)		20.7			21.5			24.0			22.4	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.5			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			71.4			Sum of lost time (s)			16.5			
Intersection Capacity Utilization			71.9%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

104: NW 6th St & NW Maple Ave

07/05/2018

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	124	221	204	209	321	292	718	53	596
v/c Ratio	0.36	0.49	0.39	0.53	0.62	0.88	0.59	0.18	0.66
Control Delay	16.8	26.2	5.9	20.3	28.4	47.6	18.3	13.8	22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	26.2	5.9	20.3	28.4	47.6	18.3	13.8	22.1
Queue Length 50th (ft)	30	77	0	54	118	77	110	12	91
Queue Length 95th (ft)	77	161	47	123	235	#264	201	37	169
Internal Link Dist (ft)		3891			719		1235		3583
Turn Bay Length (ft)	200		200	100		100		100	
Base Capacity (vph)	350	864	827	395	846	330	1563	302	1487
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.26	0.25	0.53	0.38	0.88	0.46	0.18	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection												
Int Delay, s/veh	6.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	141	23	11	27	3	14	35	41	99	23	25
Future Vol, veh/h	17	141	23	11	27	3	14	35	41	99	23	25
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	0	0	20	0	0	0	0	0	0	0	11	0
Mvmt Flow	20	166	27	13	32	4	16	41	48	116	27	29
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	35	0	0	195	0	0	309	282	183	325	294	34
Stage 1	-	-	-	-	-	-	221	221	-	59	59	-
Stage 2	-	-	-	-	-	-	88	61	-	266	235	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.61	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.61	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.61	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.099	3.3
Pot Cap-1 Maneuver	1589	-	-	1390	-	-	647	630	865	632	602	1045
Stage 1	-	-	-	-	-	-	786	724	-	958	828	-
Stage 2	-	-	-	-	-	-	925	848	-	744	694	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1589	-	-	1387	-	-	595	614	862	555	587	1045
Mov Cap-2 Maneuver	-	-	-	-	-	-	595	614	-	555	587	-
Stage 1	-	-	-	-	-	-	774	713	-	945	820	-
Stage 2	-	-	-	-	-	-	861	840	-	651	683	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			2			11			13.2		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	703	1589	-	-	1387	-	-	609				
HCM Lane V/C Ratio	0.151	0.013	-	-	0.009	-	-	0.284				
HCM Control Delay (s)	11	7.3	0	-	7.6	0	-	13.2				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	1.2				

HCM Signalized Intersection Capacity Analysis

106: NE 9th St & NE Hemlock Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	17	149	36	17	33	69	229	11	5	81	15
Future Volume (vph)	50	17	149	36	17	33	69	229	11	5	81	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5			4.5		4.5	4.5			4.5	4.5
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	1.00
Frt		0.91			0.95		1.00	0.99			1.00	0.85
Flt Protected		0.99			0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1494			1600		1352	1721			1697	918
Flt Permitted		0.90			0.80		0.95	1.00			1.00	1.00
Satd. Flow (perm)		1357			1308		1352	1721			1697	918
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	57	19	169	41	19	38	78	260	12	6	92	17
RTOR Reduction (vph)	0	97	0	0	27	0	0	2	0	0	0	13
Lane Group Flow (vph)	0	148	0	0	71	0	78	271	0	0	98	4
Heavy Vehicles (%)	0%	11%	6%	0%	8%	0%	23%	1%	0%	0%	3%	62%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	Perm
Protected Phases		4			8		2	2		6	6	
Permitted Phases	4			8								6
Actuated Green, G (s)		10.8			10.8		13.9	13.9			10.8	10.8
Effective Green, g (s)		10.8			10.8		13.9	13.9			10.8	10.8
Actuated g/C Ratio		0.22			0.22		0.28	0.28			0.22	0.22
Clearance Time (s)		4.5			4.5		4.5	4.5			4.5	4.5
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		299			288		383	488			374	202
v/s Ratio Prot							0.06	c0.16			c0.06	
v/s Ratio Perm		c0.11			0.05							0.00
v/c Ratio		0.50			0.25		0.20	0.56			0.26	0.02
Uniform Delay, d1		16.7			15.7		13.3	14.9			15.8	15.0
Progression Factor		1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		1.3			0.4		0.3	1.4			0.4	0.0
Delay (s)		18.0			16.2		13.6	16.3			16.2	15.0
Level of Service		B			B		B	B			B	B
Approach Delay (s)		18.0			16.2			15.7			16.0	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			16.5				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			49.0				Sum of lost time (s)			13.5		
Intersection Capacity Utilization			38.7%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

106: NE 9th St & NE Hemlock Ave

07/05/2018

	→	←	↖	↑	↓	↙
Lane Group	EBT	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	245	98	78	273	98	17
v/c Ratio	0.62	0.31	0.21	0.56	0.26	0.07
Control Delay	17.3	15.0	16.3	21.0	21.5	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.3	15.0	16.3	21.0	21.5	0.5
Queue Length 50th (ft)	28	14	16	61	22	0
Queue Length 95th (ft)	99	52	51	150	73	0
Internal Link Dist (ft)	782	827		2579	629	
Turn Bay Length (ft)			100			
Base Capacity (vph)	783	715	807	1028	799	471
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.14	0.10	0.27	0.12	0.04
Intersection Summary						

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	42	0	53	0	334	92	46	150	0
Future Vol, veh/h	0	0	0	42	0	53	0	334	92	46	150	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	0	0	0	0	0	1	0	8	0
Mvmt Flow	0	0	0	48	0	60	0	380	105	52	170	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	737	759	170	707	707	432	170	0	0	484	0	0
Stage 1	275	275	-	432	432	-	-	-	-	-	-	-
Stage 2	462	484	-	275	275	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	337	338	879	353	363	628	1420	-	-	1089	-	-
Stage 1	736	686	-	606	586	-	-	-	-	-	-	-
Stage 2	584	555	-	736	686	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	292	320	879	339	344	628	1420	-	-	1089	-	-
Mov Cap-2 Maneuver	292	320	-	339	344	-	-	-	-	-	-	-
Stage 1	736	650	-	606	586	-	-	-	-	-	-	-
Stage 2	528	555	-	697	650	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	15.3	0	2
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1420	-	-	-	456	1089	-
HCM Lane V/C Ratio	-	-	-	-	0.237	0.048	-
HCM Control Delay (s)	0	-	-	0	15.3	8.5	0
HCM Lane LOS	A	-	-	A	C	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.9	0.2	-

HCM Signalized Intersection Capacity Analysis

108: SW 27th St & W Antler Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	87	111	133	114	40	118	268	137	19	148	7
Future Volume (vph)	6	87	111	133	114	40	118	268	137	19	148	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.96		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	1544		1644	1682		1660	1644		1662	1736	
Flt Permitted	0.65	1.00		0.43	1.00		0.56	1.00		0.33	1.00	
Satd. Flow (perm)	1132	1544		739	1682		971	1644		572	1736	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	7	99	126	151	130	45	134	305	156	22	168	8
RTOR Reduction (vph)	0	58	0	0	14	0	0	19	0	0	2	0
Lane Group Flow (vph)	7	167	0	151	161	0	134	442	0	22	174	0
Confl. Peds. (#/hr)			3	3			3		1	1		3
Heavy Vehicles (%)	0%	3%	2%	1%	0%	0%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	17.2	16.3		25.2	20.3		27.4	22.6		21.6	19.7	
Effective Green, g (s)	17.2	16.3		25.2	20.3		27.4	22.6		21.6	19.7	
Actuated g/C Ratio	0.27	0.26		0.40	0.32		0.43	0.35		0.34	0.31	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	3.5		2.0	3.5		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	313	395		361	536		469	583		226	536	
v/s Ratio Prot	0.00	0.11		c0.03	0.10		c0.02	c0.27		0.00	0.10	
v/s Ratio Perm	0.01			c0.13			0.10			0.03		
v/c Ratio	0.02	0.42		0.42	0.30		0.29	0.76		0.10	0.32	
Uniform Delay, d1	17.0	19.8		13.2	16.3		11.3	18.1		14.5	16.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.9		0.3	0.4		0.1	5.6		0.1	0.4	
Delay (s)	17.1	20.6		13.5	16.7		11.5	23.8		14.5	17.2	
Level of Service	B	C		B	B		B	C		B	B	
Approach Delay (s)		20.5			15.2			21.0			16.9	
Approach LOS		C			B			C			B	
Intersection Summary												
HCM 2000 Control Delay			18.9				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			63.7				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			65.6%				ICU Level of Service			C		
Analysis Period (min)			15									

c Critical Lane Group

Queues

108: SW 27th St & W Antler Ave

07/05/2018

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	7	225	151	175	134	461	22	176
v/c Ratio	0.02	0.53	0.40	0.29	0.27	0.70	0.06	0.33
Control Delay	14.3	20.6	17.9	16.7	11.9	23.4	10.3	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	20.6	17.9	16.7	11.9	23.4	10.3	19.6
Queue Length 50th (ft)	1	40	28	29	26	105	4	49
Queue Length 95th (ft)	10	122	86	113	63	#317	16	104
Internal Link Dist (ft)		5288		2545		2548		1288
Turn Bay Length (ft)	50		100		75		100	
Base Capacity (vph)	428	957	384	1019	499	875	358	912
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.24	0.39	0.17	0.27	0.53	0.06	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

109: NW 19th St & W Antler Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	122	38	83	222	231	80	457	83	76	333	96
Future Volume (vph)	78	122	38	83	222	231	80	457	83	76	333	96
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1622	1665		1628	1733	1445	1662	1683		1662	1683	
Flt Permitted	0.43	1.00		0.57	1.00	1.00	0.36	1.00		0.19	1.00	
Satd. Flow (perm)	733	1665		980	1733	1445	626	1683		339	1683	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	84	131	41	89	239	248	86	491	89	82	358	103
RTOR Reduction (vph)	0	14	0	0	0	175	0	6	0	0	10	0
Lane Group Flow (vph)	84	158	0	89	239	73	86	574	0	82	451	0
Confl. Peds. (#/hr)	12		2	2		12	1		4	4		1
Heavy Vehicles (%)	2%	1%	0%	2%	1%	0%	0%	1%	2%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	21.0	16.2		21.0	16.2	22.6	36.2	31.5		39.6	33.2	
Effective Green, g (s)	21.0	16.2		21.0	16.2	22.6	36.2	31.5		39.6	33.2	
Actuated g/C Ratio	0.27	0.21		0.27	0.21	0.29	0.47	0.41		0.51	0.43	
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	3.5		2.0	3.5	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	255	350		308	365	509	358	689		284	726	
v/s Ratio Prot	c0.02	0.09		0.02	c0.14	0.01	0.01	c0.34		c0.02	0.27	
v/s Ratio Perm	0.07			0.06		0.04	0.10			0.12		
v/c Ratio	0.33	0.45		0.29	0.65	0.14	0.24	0.83		0.29	0.62	
Uniform Delay, d1	21.6	26.5		21.5	27.8	20.0	11.9	20.3		12.1	17.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	1.1		0.2	4.4	0.0	0.1	8.5		0.2	1.7	
Delay (s)	21.9	27.6		21.7	32.2	20.1	12.0	28.8		12.3	18.6	
Level of Service	C	C		C	C	C	B	C		B	B	
Approach Delay (s)		25.7			25.3			26.7			17.7	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			23.8				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			76.9				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			71.5%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

109: NW 19th St & W Antler Ave

07/05/2018

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	84	172	89	239	248	86	580	82	461
v/c Ratio	0.30	0.46	0.27	0.64	0.41	0.22	0.85	0.29	0.61
Control Delay	20.3	28.1	19.6	36.1	4.7	11.7	35.7	13.0	23.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.3	28.1	19.6	36.1	4.7	11.7	35.7	13.0	23.2
Queue Length 50th (ft)	28	67	30	109	0	19	248	18	174
Queue Length 95th (ft)	58	123	60	181	44	48	#499	46	319
Internal Link Dist (ft)		2545		3983			2700		5211
Turn Bay Length (ft)	125		150		225	175		225	
Base Capacity (vph)	284	639	332	653	612	400	733	290	755
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.27	0.27	0.37	0.41	0.21	0.79	0.28	0.61

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

110: SW 6th St & SW Black Butte Blvd

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											  	
Traffic Volume (vph)	0	82	89	22	136	0	0	0	0	16	681	151
Future Volume (vph)	0	82	89	22	136	0	0	0	0	16	681	151
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0						5.0	
Lane Util. Factor		1.00			1.00						0.95	
Frpb, ped/bikes		1.00			1.00						1.00	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		0.93			1.00						0.97	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1627			1738						3184	
Flt Permitted		1.00			0.93						1.00	
Satd. Flow (perm)		1627			1631						3184	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	86	94	23	143	0	0	0	0	17	717	159
RTOR Reduction (vph)	0	65	0	0	0	0	0	0	0	0	26	0
Lane Group Flow (vph)	0	115	0	0	166	0	0	0	0	0	867	0
Confl. Peds. (#/hr)	1					1	1			1	1	1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		8			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		10.0			10.0						20.1	
Effective Green, g (s)		10.0			10.0						20.1	
Actuated g/C Ratio		0.25			0.25						0.50	
Clearance Time (s)		5.0			5.0						5.0	
Vehicle Extension (s)		3.0			3.0						3.0	
Lane Grp Cap (vph)		405			406						1595	
v/s Ratio Prot		0.07										
v/s Ratio Perm					c0.10						0.27	
v/c Ratio		0.28			0.41						0.54	
Uniform Delay, d1		12.2			12.6						6.9	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.4			0.7						0.4	
Delay (s)		12.5			13.3						7.2	
Level of Service		B			B						A	
Approach Delay (s)		12.5			13.3			0.0			7.2	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			8.8			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			40.1			Sum of lost time (s)				10.0		
Intersection Capacity Utilization			61.9%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

110: SW 6th St & SW Black Butte Blvd

07/05/2018

	→	←	↓
Lane Group	EBT	WBT	SBT
Lane Group Flow (vph)	180	166	893
v/c Ratio	0.39	0.41	0.56
Control Delay	11.3	18.2	8.2
Queue Delay	0.0	0.0	0.0
Total Delay	11.3	18.2	8.2
Queue Length 50th (ft)	16	31	56
Queue Length 95th (ft)	68	92	120
Internal Link Dist (ft)	3983	187	3118
Turn Bay Length (ft)			
Base Capacity (vph)	1088	1061	2728
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.17	0.16	0.33
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

111: SW 5th St & SW Black Butte Blvd

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	27	0	0	48	13	128	790	8	0	0	0
Future Volume (vph)	72	27	0	0	48	13	128	790	8	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			1.00			1.00				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.97			1.00				
Flt Protected		0.96			1.00			0.99				
Satd. Flow (prot)		1689			1648			3263				
Flt Permitted		0.74			1.00			0.99				
Satd. Flow (perm)		1297			1648			3263				
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	82	31	0	0	55	15	145	898	9	0	0	0
RTOR Reduction (vph)	0	0	0	0	12	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	113	0	0	58	0	0	1051	0	0	0	0
Confl. Peds. (#/hr)							2		1	1		2
Heavy Vehicles (%)	0%	0%	0%	0%	4%	0%	0%	1%	17%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		8			4			6				
Permitted Phases	8						6					
Actuated Green, G (s)		8.0			8.0			28.0				
Effective Green, g (s)		8.0			8.0			28.0				
Actuated g/C Ratio		0.17			0.17			0.61				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		225			286			1986				
v/s Ratio Prot					0.03							
v/s Ratio Perm		0.09						0.32				
v/c Ratio		0.50			0.20			0.53				
Uniform Delay, d1		17.2			16.3			5.2				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		1.8			0.3			0.3				
Delay (s)		19.0			16.6			5.5				
Level of Service		B			B			A				
Approach Delay (s)		19.0			16.6			5.5			0.0	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay		7.3			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.52										
Actuated Cycle Length (s)		46.0			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		52.2%			ICU Level of Service			A				
Analysis Period (min)		15										

c Critical Lane Group

Queues

111: SW 5th St & SW Black Butte Blvd

07/05/2018

	→	←	↑
Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	113	70	1052
v/c Ratio	0.41	0.19	0.49
Control Delay	21.7	14.8	7.1
Queue Delay	0.0	0.0	0.0
Total Delay	21.7	14.8	7.1
Queue Length 50th (ft)	22	10	74
Queue Length 95th (ft)	72	42	148
Internal Link Dist (ft)	187	470	1008
Turn Bay Length (ft)			
Base Capacity (vph)	635	814	2800
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.18	0.09	0.38
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

112: NE 9th St & E Antler Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	4	7	12	3	8	6	146	2	4	230	24
Future Volume (vph)	23	4	7	12	3	8	6	146	2	4	230	24
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0			4.0		4.0	4.5		4.0	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.97			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1604			1495		1108	1680		1108	1600	
Flt Permitted		1.00			1.00		0.58	1.00		0.65	1.00	
Satd. Flow (perm)		1657			1535		681	1680		759	1600	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	26	5	8	14	3	9	7	166	2	5	261	27
RTOR Reduction (vph)	0	8	0	0	9	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	31	0	0	17	0	7	168	0	5	284	0
Confl. Bikes (#/hr)												2
Heavy Vehicles (%)	4%	0%	0%	0%	0%	25%	50%	4%	0%	50%	8%	4%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)		1.2			1.2		23.8	22.9		23.8	22.9	
Effective Green, g (s)		1.2			1.2		23.8	22.9		23.8	22.9	
Actuated g/C Ratio		0.03			0.03		0.63	0.61		0.63	0.61	
Clearance Time (s)		4.0			4.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		53			49		442	1025		490	977	
v/s Ratio Prot							c0.00	0.10		0.00	c0.18	
v/s Ratio Perm		c0.02			0.01		0.01			0.01		
v/c Ratio		0.59			0.35		0.02	0.16		0.01	0.29	
Uniform Delay, d1		17.9			17.8		2.5	3.2		2.5	3.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		15.7			4.3		0.0	0.1		0.0	0.2	
Delay (s)		33.6			22.1		2.5	3.2		2.5	3.6	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		33.6			22.1			3.2			3.6	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		6.6										
HCM 2000 Volume to Capacity ratio		0.30										
Actuated Cycle Length (s)		37.5								12.5		
Intersection Capacity Utilization		26.0%								A		
Analysis Period (min)		15										
c Critical Lane Group												

Queues

112: NE 9th St & E Antler Ave

07/05/2018

						
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	39	26	7	168	5	288
v/c Ratio	0.11	0.08	0.01	0.11	0.01	0.21
Control Delay	10.2	9.9	2.2	4.0	2.0	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	9.9	2.2	4.0	2.0	4.2
Queue Length 50th (ft)	4	2	0	0	0	0
Queue Length 95th (ft)	24	18	3	56	3	95
Internal Link Dist (ft)	792	663		2596		2579
Turn Bay Length (ft)			100		100	
Base Capacity (vph)	1243	1153	677	1680	716	1600
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.02	0.01	0.10	0.01	0.18
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

113: SW 6th St & SW Evergreen Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											  	
Traffic Volume (vph)	0	72	15	96	61	0	0	0	0	152	967	30
Future Volume (vph)	0	72	15	96	61	0	0	0	0	152	967	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0						5.0	
Lane Util. Factor		1.00			1.00						0.95	
Frpb, ped/bikes		0.99			1.00						1.00	
Flpb, ped/bikes		1.00			0.99						0.99	
Frt		0.98			1.00						1.00	
Flt Protected		1.00			0.97						0.99	
Satd. Flow (prot)		1672			1680						3234	
Flt Permitted		1.00			0.76						0.99	
Satd. Flow (perm)		1672			1311						3234	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	80	17	107	68	0	0	0	0	169	1074	33
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	84	0	0	175	0	0	0	0	0	1274	0
Confl. Peds. (#/hr)	21		19	19		21	16		26	26		16
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	1%	1%	3%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		8			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		12.6			12.6						30.4	
Effective Green, g (s)		12.6			12.6						30.4	
Actuated g/C Ratio		0.24			0.24						0.57	
Clearance Time (s)		5.0			5.0						5.0	
Vehicle Extension (s)		3.0			3.0						3.0	
Lane Grp Cap (vph)		397			311						1854	
v/s Ratio Prot		0.05										
v/s Ratio Perm					c0.13						0.39	
v/c Ratio		0.21			0.56						0.69	
Uniform Delay, d1		16.2			17.8						8.0	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.3			2.3						1.1	
Delay (s)		16.5			20.1						9.0	
Level of Service		B			C						A	
Approach Delay (s)		16.5			20.1			0.0			9.0	
Approach LOS		B			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			10.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			53.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			62.5%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

113: SW 6th St & SW Evergreen Ave

07/05/2018

	→	←	↓
Lane Group	EBT	WBT	SBT
Lane Group Flow (vph)	97	175	1276
v/c Ratio	0.24	0.57	0.69
Control Delay	16.6	27.2	11.1
Queue Delay	0.0	0.0	0.0
Total Delay	16.6	27.2	11.1
Queue Length 50th (ft)	23	55	127
Queue Length 95th (ft)	54	107	249
Internal Link Dist (ft)	369	175	1004
Turn Bay Length (ft)			
Base Capacity (vph)	822	636	2203
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.12	0.28	0.58
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

114: SW 5th St & SW Evergreen Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	174	0	0	130	375	27	571	34	0	0	0
Future Volume (vph)	41	174	0	0	130	375	27	571	34	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.99			1.00				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.90			0.99				
Flt Protected		0.99			1.00			1.00				
Satd. Flow (prot)		1709			1516			3287				
Flt Permitted		0.77			1.00			1.00				
Satd. Flow (perm)		1334			1516			3287				
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	46	193	0	0	144	417	30	634	38	0	0	0
RTOR Reduction (vph)	0	0	0	0	84	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	239	0	0	477	0	0	696	0	0	0	0
Confl. Peds. (#/hr)	2		3	3		2	1		1	1		1
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	3%	1%	0%	0%	2%	3%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		8			4			6				
Permitted Phases	8						6					
Actuated Green, G (s)		20.7			20.7			18.3				
Effective Green, g (s)		20.7			20.7			18.3				
Actuated g/C Ratio		0.42			0.42			0.37				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		563			640			1227				
v/s Ratio Prot					c0.31							
v/s Ratio Perm		0.18						0.21				
v/c Ratio		0.42			0.75			0.57				
Uniform Delay, d1		10.0			11.9			12.2				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		0.5			4.7			0.6				
Delay (s)		10.5			16.7			12.8				
Level of Service		B			B			B				
Approach Delay (s)		10.5			16.7			12.8			0.0	
Approach LOS		B			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			13.9			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			49.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			79.1%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

114: SW 5th St & SW Evergreen Ave

07/05/2018

	→	←	↑
Lane Group	EBT	WBT	NBT
Lane Group Flow (vph)	239	561	702
v/c Ratio	0.43	0.79	0.58
Control Delay	13.8	18.9	15.4
Queue Delay	0.1	0.0	0.0
Total Delay	13.9	18.9	15.4
Queue Length 50th (ft)	44	89	79
Queue Length 95th (ft)	118	260	160
Internal Link Dist (ft)	175	838	646
Turn Bay Length (ft)			
Base Capacity (vph)	898	1068	2080
Starvation Cap Reductn	83	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.29	0.53	0.34
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

115: US-97 & SW Evergreen Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	138	96	366	291	159	290	1510	299	140	1227	33
Future Volume (vph)	68	138	96	366	291	159	290	1510	299	140	1227	33
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.94		1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1630	1617		1614	1602		1630	3107	1417	1646	3107	1488
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1630	1617		1614	1602		1630	3107	1417	1646	3107	1488
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	72	145	101	385	306	167	305	1589	315	147	1292	35
RTOR Reduction (vph)	0	17	0	0	14	0	0	0	187	0	0	24
Lane Group Flow (vph)	72	229	0	385	459	0	305	1589	128	147	1292	11
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	2%	1%	1%	3%	1%	8%	2%	7%	5%	1%	7%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Prot	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6	6	5	2	
Permitted Phases												2
Actuated Green, G (s)	9.1	29.1		24.6	44.6		22.6	57.3	57.3	10.5	45.2	45.2
Effective Green, g (s)	9.1	29.1		24.6	44.6		22.6	57.3	57.3	10.5	45.2	45.2
Actuated g/C Ratio	0.06	0.21		0.17	0.32		0.16	0.40	0.40	0.07	0.32	0.32
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	104	332		280	504		260	1258	573	122	992	475
v/s Ratio Prot	0.04	0.14		c0.24	c0.29		c0.19	c0.51	0.09	0.09	0.42	
v/s Ratio Perm												0.01
v/c Ratio	0.69	0.69		1.38	0.91		1.17	1.26	0.22	1.20	1.30	0.02
Uniform Delay, d1	64.8	52.0		58.4	46.5		59.5	42.1	27.5	65.5	48.1	33.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.1	5.8		189.7	20.7		110.9	124.9	0.2	146.7	143.5	0.0
Delay (s)	82.9	57.8		248.2	67.2		170.3	167.0	27.7	212.2	191.6	33.0
Level of Service	F	E		F	E		F	F	C	F	F	C
Approach Delay (s)		63.5			148.4			147.6			189.9	
Approach LOS		E			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			155.1			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.23									
Actuated Cycle Length (s)			141.5			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			107.8%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

115: US-97 & SW Evergreen Ave

07/05/2018

										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	72	246	385	473	305	1589	315	147	1292	35
v/c Ratio	0.69	0.70	1.38	0.91	1.17	1.27	0.41	1.20	1.30	0.06
Control Delay	98.4	58.3	232.4	67.6	161.7	161.8	4.8	199.3	182.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.4	58.3	232.4	67.6	161.7	161.8	4.8	199.3	182.4	0.2
Queue Length 50th (ft)	67	193	~479	405	~343	~990	0	~168	~820	0
Queue Length 95th (ft)	#151	290	#725	#565	#565	#1205	64	#331	#1022	0
Internal Link Dist (ft)		838		3278		1074			1019	
Turn Bay Length (ft)	150		450		275		575	350		100
Base Capacity (vph)	109	451	280	614	260	1256	760	122	992	573
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.55	1.38	0.77	1.17	1.27	0.41	1.20	1.30	0.06

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

116: SW 11th St & SW Glacier Ave

07/05/2018

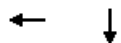
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↔↔						↔↔	
Traffic Volume (vph)	0	0	0	63	1505	0	0	0	0	0	32	24
Future Volume (vph)	0	0	0	63	1505	0	0	0	0	0	32	24
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5						4.5	
Lane Util. Factor					0.95						0.95	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					1.00						1.00	
Frt					1.00						0.94	
Flt Protected					1.00						1.00	
Satd. Flow (prot)					3256						3091	
Flt Permitted					1.00						1.00	
Satd. Flow (perm)					3256						3091	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	68	1636	0	0	0	0	0	35	26
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	0	0	0	1701	0	0	0	0	0	37	0
Confl. Peds. (#/hr)	3		1	1		3	3		2	2		3
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA						NA	
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					59.8						5.1	
Effective Green, g (s)					59.8						5.1	
Actuated g/C Ratio					0.81						0.07	
Clearance Time (s)					4.5						4.5	
Vehicle Extension (s)					3.0						3.0	
Lane Grp Cap (vph)					2634						213	
v/s Ratio Prot											c0.01	
v/s Ratio Perm					0.52							
v/c Ratio					0.65						0.17	
Uniform Delay, d1					2.8						32.4	
Progression Factor					1.00						1.00	
Incremental Delay, d2					0.6						0.4	
Delay (s)					3.4						32.8	
Level of Service					A						C	
Approach Delay (s)		0.0			3.4			0.0			32.8	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			4.4		HCM 2000 Level of Service					A		
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			73.9		Sum of lost time (s)					9.0		
Intersection Capacity Utilization			63.9%		ICU Level of Service					B		
Analysis Period (min)			15									

c Critical Lane Group

Queues

116: SW 11th St & SW Glacier Ave

07/05/2018



Lane Group	WBT	SBT
Lane Group Flow (vph)	1704	61
v/c Ratio	0.62	0.19
Control Delay	4.1	25.6
Queue Delay	0.2	0.0
Total Delay	4.3	25.6
Queue Length 50th (ft)	121	8
Queue Length 95th (ft)	187	30
Internal Link Dist (ft)	472	448
Turn Bay Length (ft)		
Base Capacity (vph)	3014	860
Starvation Cap Reductn	444	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.66	0.07
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

117: SW 9th St & SW Glacier Ave

07/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑		↑	↑↑				
Traffic Volume (vph)	0	0	0	0	1096	20	409	143	0	0	0	0
Future Volume (vph)	0	0	0	0	1096	20	409	143	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5		4.5	4.5				
Lane Util. Factor					0.95		0.91	0.91				
Frpb, ped/bikes					1.00		1.00	1.00				
Flpb, ped/bikes					1.00		1.00	1.00				
Frt					1.00		1.00	1.00				
Flt Protected					1.00		0.95	0.97				
Satd. Flow (prot)					3251		1482	3056				
Flt Permitted					1.00		0.95	0.97				
Satd. Flow (perm)					3251		1482	3056				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1191	22	445	155	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	0	51	51	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1212	0	171	327	0	0	0	0
Confl. Peds. (#/hr)	3					3	1					1
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					6			8				
Permitted Phases							8					
Actuated Green, G (s)					32.1		14.5	14.5				
Effective Green, g (s)					32.1		14.5	14.5				
Actuated g/C Ratio					0.58		0.26	0.26				
Clearance Time (s)					4.5		4.5	4.5				
Vehicle Extension (s)					3.0		3.0	3.0				
Lane Grp Cap (vph)					1876		386	796				
v/s Ratio Prot					c0.37							
v/s Ratio Perm							c0.12	0.11				
v/c Ratio					0.65		0.44	0.41				
Uniform Delay, d1					7.9		17.2	17.0				
Progression Factor					1.00		1.00	1.00				
Incremental Delay, d2					0.8		0.8	0.3				
Delay (s)					8.7		18.0	17.4				
Level of Service					A		B	B				
Approach Delay (s)		0.0			8.7			17.6			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			11.6				HCM 2000 Level of Service		B			
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			55.6				Sum of lost time (s)		9.0			
Intersection Capacity Utilization			87.3%				ICU Level of Service		E			
Analysis Period (min)			15									

c Critical Lane Group

Queues

117: SW 9th St & SW Glacier Ave

07/05/2018



Lane Group	WBT	NBL	NBT
Lane Group Flow (vph)	1213	222	378
v/c Ratio	0.66	0.51	0.45
Control Delay	10.7	18.7	17.3
Queue Delay	0.0	0.0	0.0
Total Delay	10.7	18.7	17.3
Queue Length 50th (ft)	119	43	43
Queue Length 95th (ft)	264	141	110
Internal Link Dist (ft)	765		275
Turn Bay Length (ft)			
Base Capacity (vph)	2980	983	2002
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.41	0.23	0.19

Intersection Summary

HCM Signalized Intersection Capacity Analysis

118: SW 6th St & SW Glacier Ave

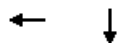
07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					 						 	
Traffic Volume (vph)	0	0	0	121	653	0	0	0	0	0	660	361
Future Volume (vph)	0	0	0	121	653	0	0	0	0	0	660	361
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5						4.5	
Lane Util. Factor					0.95						0.95	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					1.00						1.00	
Frt					1.00						0.95	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					3217						3112	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					3217						3112	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	130	702	0	0	0	0	0	710	388
RTOR Reduction (vph)	0	0	0	0	15	0	0	0	0	0	41	0
Lane Group Flow (vph)	0	0	0	0	817	0	0	0	0	0	1057	0
Confl. Peds. (#/hr)			2	2			2		2	2		2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Perm	NA						NA	
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.2						36.7	
Effective Green, g (s)					26.2						36.7	
Actuated g/C Ratio					0.36						0.51	
Clearance Time (s)					4.5						4.5	
Vehicle Extension (s)					3.0						3.0	
Lane Grp Cap (vph)					1172						1588	
v/s Ratio Prot											c0.34	
v/s Ratio Perm					0.25							
v/c Ratio					0.70						0.67	
Uniform Delay, d1					19.5						13.0	
Progression Factor					1.00						1.00	
Incremental Delay, d2					1.8						1.1	
Delay (s)					21.3						14.1	
Level of Service					C						B	
Approach Delay (s)		0.0			21.3			0.0			14.1	
Approach LOS		A			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			17.2								B	
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			71.9							9.0		
Intersection Capacity Utilization			63.3%								B	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

118: SW 6th St & SW Glacier Ave

07/05/2018



Lane Group	WBT	SBT
Lane Group Flow (vph)	832	1098
v/c Ratio	0.71	0.68
Control Delay	24.3	15.1
Queue Delay	0.3	0.0
Total Delay	24.7	15.1
Queue Length 50th (ft)	155	165
Queue Length 95th (ft)	298	291
Internal Link Dist (ft)	179	644
Turn Bay Length (ft)		
Base Capacity (vph)	1745	2423
Starvation Cap Reductn	386	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.61	0.45
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

119: SW 5th St & SW Glacier Ave

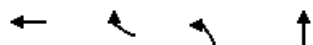
07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↔↔	↗	↖	↔↔				
Traffic Volume (vph)	0	0	0	0	650	192	108	645	0	0	0	0
Future Volume (vph)	0	0	0	0	650	192	108	645	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.5	4.5	4.5	4.5				
Lane Util. Factor					0.95	1.00	0.91	0.91				
Frpb, ped/bikes					1.00	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	1.00	1.00				
Frt					1.00	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	1.00				
Satd. Flow (prot)					3228	1440	1513	3182				
Flt Permitted					1.00	1.00	0.95	1.00				
Satd. Flow (perm)					3228	1440	1513	3182				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	707	209	117	701	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	100	47	9	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	707	109	58	704	0	0	0	0
Confl. Peds. (#/hr)	1					1			1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	3%	2%	0%	0%	0%	0%	0%	0%
Turn Type					NA	Perm	Perm	NA				
Protected Phases					4			6				
Permitted Phases						4	6					
Actuated Green, G (s)					20.5	20.5	20.4	20.4				
Effective Green, g (s)					20.5	20.5	20.4	20.4				
Actuated g/C Ratio					0.41	0.41	0.41	0.41				
Clearance Time (s)					4.5	4.5	4.5	4.5				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1326	591	618	1300				
v/s Ratio Prot					c0.22							
v/s Ratio Perm						0.08	0.04	0.22				
v/c Ratio					0.53	0.19	0.09	0.54				
Uniform Delay, d1					11.1	9.4	9.1	11.2				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					0.4	0.2	0.1	0.5				
Delay (s)					11.5	9.5	9.1	11.7				
Level of Service					B	A	A	B				
Approach Delay (s)		0.0			11.1			11.3			0.0	
Approach LOS		A			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			11.2		HCM 2000 Level of Service						B	
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			49.9		Sum of lost time (s)						9.0	
Intersection Capacity Utilization			71.2%		ICU Level of Service						C	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

119: SW 5th St & SW Glacier Ave

07/05/2018



Lane Group	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	707	209	105	713
v/c Ratio	0.54	0.31	0.16	0.55
Control Delay	13.8	4.9	5.3	13.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.8	4.9	5.3	13.7
Queue Length 50th (ft)	73	6	4	75
Queue Length 95th (ft)	164	47	35	169
Internal Link Dist (ft)	478			255
Turn Bay Length (ft)		125	75	
Base Capacity (vph)	2685	1225	1379	2885
Starvation Cap Reductn	0	0	0	99
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.26	0.17	0.08	0.26

Intersection Summary

HCM Signalized Intersection Capacity Analysis

120: US97 & Glacier Highland Ave

07/05/2018

										
Movement	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER	
Lane Configurations										
Traffic Volume (vph)	542	166	374	1556	1253	436	0	0	0	
Future Volume (vph)	542	166	374	1556	1253	436	0	0	0	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.5	4.5	4.5	5.5	5.5					
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95					
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99					
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00					
Frt	1.00	0.85	1.00	1.00	0.96					
Flt Protected	0.95	1.00	0.95	1.00	1.00					
Satd. Flow (prot)	3131	1473	3162	3167	3021					
Flt Permitted	0.95	1.00	0.95	1.00	1.00					
Satd. Flow (perm)	3131	1473	3162	3167	3021					
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	
Adj. Flow (vph)	571	175	394	1638	1319	459	0	0	0	
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	0	
Lane Group Flow (vph)	571	42	394	1638	1778	0	0	0	0	
Confl. Bikes (#/hr)						1				
Heavy Vehicles (%)	3%	1%	2%	5%	6%	3%	2%	2%	2%	
Turn Type	Prot	Perm	Prot	NA	NA		Perm			
Protected Phases	8		1	6	2					
Permitted Phases		3					2			
Actuated Green, G (s)	28.8	28.8	21.8	93.2	66.9					
Effective Green, g (s)	28.8	28.8	21.8	93.2	66.9					
Actuated g/C Ratio	0.22	0.22	0.17	0.71	0.51					
Clearance Time (s)	4.5	4.5	4.5	5.5	5.5					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0					
Lane Grp Cap (vph)	683	321	522	2236	1531					
v/s Ratio Prot	c0.18		0.12	c0.52	c0.59					
v/s Ratio Perm		0.03								
v/c Ratio	0.84	0.13	0.75	0.73	1.16					
Uniform Delay, d1	49.3	41.5	52.6	11.8	32.5					
Progression Factor	1.00	1.00	1.00	1.00	1.00					
Incremental Delay, d2	8.7	0.2	6.1	1.3	80.3					
Delay (s)	58.1	41.7	58.7	13.1	112.8					
Level of Service	E	D	E	B	F					
Approach Delay (s)	54.2			21.9	112.8			0.0		
Approach LOS	D			C	F			A		
Intersection Summary										
HCM 2000 Control Delay			62.7			HCM 2000 Level of Service			E	
HCM 2000 Volume to Capacity ratio			1.01							
Actuated Cycle Length (s)			132.0			Sum of lost time (s)			14.5	
Intersection Capacity Utilization			93.2%			ICU Level of Service			F	
Analysis Period (min)			15							
c Critical Lane Group										

Queues

120: US97 & Glacier Highland Ave

07/05/2018

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	571	175	394	1638	1778
v/c Ratio	0.84	0.39	0.76	0.73	1.16
Control Delay	61.5	9.2	62.9	15.0	112.1
Queue Delay	0.1	0.0	0.0	0.0	0.0
Total Delay	61.5	9.2	62.9	15.0	112.1
Queue Length 50th (ft)	242	3	168	410	~951
Queue Length 95th (ft)	328	66	237	595	#1276
Internal Link Dist (ft)	383			2738	1074
Turn Bay Length (ft)		200	325		
Base Capacity (vph)	870	532	783	2497	1529
Starvation Cap Reductn	11	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.66	0.33	0.50	0.66	1.16

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

MOVEMENT SUMMARY

 Site: [21 - SW Helmholtz @ OR 126]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SW Helmholtz Way											
3	L2	36	0.0	0.550	15.1	LOS C	2.9	73.3	0.75	0.84	30.5
8	T1	315	0.0	0.550	15.1	LOS C	2.9	73.3	0.75	0.84	30.4
18	R2	128	1.0	0.228	9.4	LOS A	0.8	21.0	0.65	0.65	31.9
Approach		479	0.3	0.550	13.6	LOS B	2.9	73.3	0.73	0.79	30.8
East: OR 126											
1	L2	173	3.0	0.917	34.8	LOS D	14.8	379.2	1.00	1.37	24.0
6	T1	645	3.0	0.917	34.8	LOS D	14.8	379.2	1.00	1.37	23.9
16	R2	103	0.0	0.123	5.5	LOS A	0.5	11.7	0.50	0.44	33.8
Approach		921	2.7	0.917	31.5	LOS D	14.8	379.2	0.94	1.27	24.7
North: SW Helmholtz Way											
7	L2	38	0.0	0.226	8.4	LOS A	0.8	20.6	0.62	0.62	33.0
4	T1	105	8.0	0.226	8.4	LOS A	0.8	20.6	0.62	0.62	32.7
14	R2	96	0.0	0.159	7.9	LOS A	0.6	14.4	0.62	0.62	32.6
Approach		239	3.5	0.226	8.2	LOS A	0.8	20.6	0.62	0.62	32.7
West: OR 126											
5	L2	162	0.0	0.841	23.0	LOS C	11.4	294.1	0.92	0.99	27.4
2	T1	705	5.0	0.841	23.0	LOS C	11.4	294.1	0.92	0.99	27.3
12	R2	68	5.0	0.072	4.4	LOS A	0.3	6.7	0.40	0.28	34.2
Approach		936	4.1	0.841	21.6	LOS C	11.4	294.1	0.88	0.94	27.7
All Vehicles		2575	2.8	0.917	22.4	LOS C	14.8	379.2	0.85	1.00	27.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: H:\17\17720 - Redmond Transportation System Plan\Task 5- Alternatives\ops\Future Alternative Conditions (Updated Model).sip7

HCM Signalized Intersection Capacity Analysis

122: SW 27th St & OR-126

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	162	732	48	236	869	233	70	328	132	214	285	70
Future Volume (vph)	162	732	48	236	869	233	70	328	132	214	285	70
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.7	5.0		4.7	5.0		4.7	5.0		4.7	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.97		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1662	1671		1662	1647		1583	1636		1630	1733	1410
Flt Permitted	0.10	1.00		0.09	1.00		0.36	1.00		0.16	1.00	1.00
Satd. Flow (perm)	179	1671		160	1647		606	1636		272	1733	1410
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	171	771	51	248	915	245	74	345	139	225	300	74
RTOR Reduction (vph)	0	2	0	0	10	0	0	14	0	0	0	56
Lane Group Flow (vph)	171	820	0	248	1150	0	74	470	0	225	300	18
Confl. Peds. (#/hr)	1						1	1		1	1	1
Confl. Bikes (#/hr)							1					1
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	5%	2%	1%	2%	1%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	45.4	39.1		56.0	45.0		28.9	23.9		31.5	25.2	25.2
Effective Green, g (s)	45.4	39.1		56.0	45.0		28.9	23.9		31.5	25.2	25.2
Actuated g/C Ratio	0.45	0.39		0.56	0.45		0.29	0.24		0.31	0.25	0.25
Clearance Time (s)	4.7	5.0		4.7	5.0		4.7	5.0		4.7	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	173	647		270	734		221	387		169	432	352
v/s Ratio Prot	0.06	0.49		c0.11	c0.70		0.02	0.29		c0.08	0.17	
v/s Ratio Perm	0.38			0.40			0.08			c0.33		0.01
v/c Ratio	0.99	1.27		0.92	1.57		0.33	1.21		1.33	0.69	0.05
Uniform Delay, d1	24.0	30.9		29.0	28.0		27.4	38.5		32.6	34.4	28.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	64.4	132.0		33.6	261.7		0.9	117.5		183.8	4.8	0.1
Delay (s)	88.4	162.9		62.6	289.6		28.3	156.0		216.4	39.2	28.8
Level of Service	F	F		E	F		C	F		F	D	C
Approach Delay (s)		150.1			249.6			139.1			104.5	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			180.1			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.47									
Actuated Cycle Length (s)			100.9			Sum of lost time (s)			19.4			
Intersection Capacity Utilization			131.3%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

122: SW 27th St & OR-126

07/05/2018

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	171	822	248	1160	74	484	225	300	74
v/c Ratio	0.98	1.25	0.91	1.54	0.31	1.24	1.33	0.69	0.15
Control Delay	88.0	156.0	60.7	276.6	26.5	162.0	212.5	44.5	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	88.0	156.0	60.7	276.6	26.5	162.0	212.5	44.5	0.7
Queue Length 50th (ft)	60	~663	108	~1051	32	~377	~144	179	0
Queue Length 95th (ft)	#198	#898	#255	#1304	65	#577	#298	#300	0
Internal Link Dist (ft)		5185		1541		2675		2548	
Turn Bay Length (ft)	225		275		125		150		150
Base Capacity (vph)	174	655	274	751	240	390	169	436	486
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	1.25	0.91	1.54	0.31	1.24	1.33	0.69	0.15

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

123: SW Rimrock Dr & OR-126

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	848	9	294	1133	386	21	219	196	258	180	107
Future Volume (vph)	146	848	9	294	1133	386	21	219	196	258	180	107
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1583	3223		1662	3292	1414	1662	1733	1468	1662	1733	1467
Flt Permitted	0.13	1.00		0.12	1.00	1.00	0.64	1.00	1.00	0.36	1.00	1.00
Satd. Flow (perm)	224	3223		212	3292	1414	1115	1733	1468	635	1733	1467
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	155	902	10	313	1205	411	22	233	209	274	191	114
RTOR Reduction (vph)	0	1	0	0	0	188	0	0	162	0	0	83
Lane Group Flow (vph)	155	911	0	313	1205	223	22	233	47	274	191	31
Confl. Peds. (#/hr)	3		2	2		3	1		1	1		1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	5%	3%	0%	0%	1%	3%	0%	1%	0%	0%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	36.2	29.7		47.8	36.8	43.3	22.0	19.6	19.6	30.2	23.7	23.7
Effective Green, g (s)	36.2	29.7		47.8	36.8	43.3	22.0	19.6	19.6	30.2	23.7	23.7
Actuated g/C Ratio	0.41	0.34		0.55	0.42	0.50	0.25	0.22	0.22	0.35	0.27	0.27
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	193	1095		341	1386	773	295	388	329	295	469	397
v/s Ratio Prot	0.06	0.28		c0.14	0.37	0.02	0.00	0.13		c0.07	0.11	
v/s Ratio Perm	0.27			c0.36		0.14	0.02		0.03	c0.25		0.02
v/c Ratio	0.80	0.83		0.92	0.87	0.29	0.07	0.60	0.14	0.93	0.41	0.08
Uniform Delay, d1	18.8	26.6		22.3	23.1	13.0	24.8	30.4	27.2	27.2	26.1	23.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.9	5.5		28.5	6.1	0.2	0.1	2.6	0.2	33.8	0.6	0.1
Delay (s)	39.7	32.1		50.9	29.2	13.2	24.9	33.0	27.4	61.0	26.7	23.8
Level of Service	D	C		D	C	B	C	C	C	E	C	C
Approach Delay (s)		33.2			29.3			30.1			42.4	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			32.3									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			87.4							18.0		
Intersection Capacity Utilization			86.9%									ICU Level of Service E
Analysis Period (min)			15									
c Critical Lane Group												

Queues

123: SW Rimrock Dr & OR-126

07/05/2018

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	155	912	313	1205	411	22	233	209	274	191	114
v/c Ratio	0.78	0.81	0.89	0.84	0.46	0.06	0.68	0.46	1.00	0.39	0.22
Control Delay	43.4	32.6	49.1	29.3	3.7	19.2	41.7	7.6	82.9	28.9	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.4	32.6	49.1	29.3	3.7	19.2	41.7	7.6	82.9	28.9	2.5
Queue Length 50th (ft)	36	224	111	287	8	8	116	0	116	76	0
Queue Length 95th (ft)	#155	#372	#302	#482	57	23	190	53	#274	156	17
Internal Link Dist (ft)		394		1820			1014			2700	
Turn Bay Length (ft)	225		200		200	200		175	250		250
Base Capacity (vph)	200	1146	351	1444	903	349	657	686	275	657	658
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.80	0.89	0.83	0.46	0.06	0.35	0.30	1.00	0.29	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

124: SW 15th St & OR-126

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	1065	59	47	1384	48	278	86	82	37	36	90
Future Volume (vph)	48	1065	59	47	1384	48	278	86	82	37	36	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.98			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1662	3204		1662	3243			1625			1559	
Flt Permitted	0.08	1.00		0.12	1.00			0.69			0.86	
Satd. Flow (perm)	143	3204		208	3243			1161			1353	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	1158	64	51	1504	52	302	93	89	40	39	98
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	9	0
Lane Group Flow (vph)	52	1222	0	51	1553	0	0	484	0	0	168	0
Confl. Peds. (#/hr)	1		8	8		1	6		1	1		6
Heavy Vehicles (%)	0%	3%	0%	0%	2%	0%	1%	3%	0%	0%	0%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	49.0	49.0		49.0	49.0			41.8			41.8	
Effective Green, g (s)	49.0	49.0		49.0	49.0			41.8			41.8	
Actuated g/C Ratio	0.50	0.50		0.50	0.50			0.42			0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	70	1589		103	1608			491			572	
v/s Ratio Prot		0.38			c0.48							
v/s Ratio Perm	0.36			0.25				c0.42			0.12	
v/c Ratio	0.74	0.77		0.50	0.97			0.99			0.29	
Uniform Delay, d1	19.9	20.3		16.6	24.1			28.2			18.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	34.2	2.3		3.7	15.0			36.6			0.3	
Delay (s)	54.1	22.6		20.3	39.1			64.8			19.1	
Level of Service	D	C		C	D			E			B	
Approach Delay (s)		23.9			38.5			64.8			19.1	
Approach LOS		C			D			E			B	
Intersection Summary												
HCM 2000 Control Delay			35.9			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			98.8			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			93.8%			ICU Level of Service			F			
Analysis Period (min)			15									

c Critical Lane Group

Queues

124: SW 15th St & OR-126

07/05/2018

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	52	1222	51	1556	484	177
v/c Ratio	0.73	0.77	0.50	0.97	0.99	0.30
Control Delay	78.5	24.7	38.1	41.0	67.1	18.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.5	24.7	38.1	41.0	67.1	18.7
Queue Length 50th (ft)	25	325	21	490	294	65
Queue Length 95th (ft)	#101	414	#77	#672	#509	116
Internal Link Dist (ft)		1820		1191	423	675
Turn Bay Length (ft)	125		125			
Base Capacity (vph)	71	1588	102	1610	505	597
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.77	0.50	0.97	0.96	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

125: SW 11th St & SW Highland Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 									 	
Traffic Volume (vph)	0	855	384	0	0	0	0	0	0	14	86	0
Future Volume (vph)	0	855	384	0	0	0	0	0	0	14	86	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5									4.0	
Lane Util. Factor		0.95									0.95	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.95									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		3096									3302	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		3096									3302	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	929	417	0	0	0	0	0	0	15	93	0
RTOR Reduction (vph)	0	46	0	0	0	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	1300	0	0	0	0	0	0	0	0	94	0
Confl. Peds. (#/hr)							3					3
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA								Perm	NA	
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		37.7									5.6	
Effective Green, g (s)		37.7									5.6	
Actuated g/C Ratio		0.73									0.11	
Clearance Time (s)		4.5									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2253									356	
v/s Ratio Prot		c0.42										
v/s Ratio Perm											0.03	
v/c Ratio		0.58									0.26	
Uniform Delay, d1		3.3									21.2	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.4									0.4	
Delay (s)		3.7									21.6	
Level of Service		A									C	
Approach Delay (s)		3.7			0.0			0.0			21.6	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			5.0									
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			51.8							8.5		
Intersection Capacity Utilization			52.0%							A		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

125: SW 11th St & SW Highland Way

07/05/2018

	→	↓
Lane Group	EBT	SBT
Lane Group Flow (vph)	1346	108
v/c Ratio	0.56	0.22
Control Delay	4.3	20.1
Queue Delay	0.0	0.0
Total Delay	4.3	20.1
Queue Length 50th (ft)	66	13
Queue Length 95th (ft)	123	36
Internal Link Dist (ft)	1097	269
Turn Bay Length (ft)		
Base Capacity (vph)	3098	1491
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.43	0.07
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

126: SW 9th St & SW Highland Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 				
Traffic Volume (vph)	38	866	0	0	0	0	0	508	144	0	0	0
Future Volume (vph)	38	866	0	0	0	0	0	508	144	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5						4.5	4.5			
Lane Util. Factor		0.95						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		3250						3260	1488			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		3250						3260	1488			
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	41	931	0	0	0	0	0	546	155	0	0	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	70	0	0	0
Lane Group Flow (vph)	0	964	0	0	0	0	0	546	85	0	0	0
Confl. Peds. (#/hr)								2				2
Heavy Vehicles (%)	4%	2%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
Turn Type	Perm	NA						NA	Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		24.6						16.3	16.3			
Effective Green, g (s)		24.6						16.3	16.3			
Actuated g/C Ratio		0.49						0.33	0.33			
Clearance Time (s)		4.5						4.5	4.5			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		1602						1064	486			
v/s Ratio Prot								c0.17				
v/s Ratio Perm		0.30							0.06			
v/c Ratio		0.60						0.51	0.17			
Uniform Delay, d1		9.1						13.6	12.0			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.6						0.4	0.2			
Delay (s)		9.8						14.0	12.2			
Level of Service		A						B	B			
Approach Delay (s)		9.8			0.0			13.6			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		11.4						HCM 2000 Level of Service	B			
HCM 2000 Volume to Capacity ratio		0.57										
Actuated Cycle Length (s)		49.9						Sum of lost time (s)	9.0			
Intersection Capacity Utilization		52.6%						ICU Level of Service	A			
Analysis Period (min)		15										

c Critical Lane Group

Queues

126: SW 9th St & SW Highland Ave

07/05/2018



Lane Group	EBT	NBT	NBR
Lane Group Flow (vph)	972	546	155
v/c Ratio	0.61	0.52	0.28
Control Delay	11.5	16.7	7.8
Queue Delay	0.0	0.0	0.0
Total Delay	11.5	16.7	7.8
Queue Length 50th (ft)	94	64	10
Queue Length 95th (ft)	194	141	53
Internal Link Dist (ft)	460	568	
Turn Bay Length (ft)			175
Base Capacity (vph)	3043	2567	1193
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.32	0.21	0.13

Intersection Summary

HCM Signalized Intersection Capacity Analysis

127: SW 6th St & SW Highland Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗							↖	↑↑	
Traffic Volume (vph)	0	884	69	0	0	0	0	0	0	168	589	0
Future Volume (vph)	0	884	69	0	0	0	0	0	0	168	589	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0	4.0							4.0	4.0	
Lane Util. Factor		0.95	1.00							1.00	0.95	
Frpb, ped/bikes		1.00	0.99							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	1.00	
Satd. Flow (prot)		3260	1469							1657	3292	
Flt Permitted		1.00	1.00							0.95	1.00	
Satd. Flow (perm)		3260	1469							1657	3292	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	931	73	0	0	0	0	0	0	177	620	0
RTOR Reduction (vph)	0	0	30	0	0	0	0	0	0	67	0	0
Lane Group Flow (vph)	0	931	43	0	0	0	0	0	0	110	620	0
Confl. Peds. (#/hr)									4	4		
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type		NA	Perm							Perm	NA	
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		25.7	25.7							19.9	19.9	
Effective Green, g (s)		25.7	25.7							19.9	19.9	
Actuated g/C Ratio		0.48	0.48							0.37	0.37	
Clearance Time (s)		4.0	4.0							4.0	4.0	
Vehicle Extension (s)		3.0	3.0							3.0	3.0	
Lane Grp Cap (vph)		1563	704							615	1222	
v/s Ratio Prot		c0.29									c0.19	
v/s Ratio Perm			0.03							0.07		
v/c Ratio		0.60	0.06							0.18	0.51	
Uniform Delay, d1		10.2	7.5							11.3	13.1	
Progression Factor		1.00	1.00							1.00	1.00	
Incremental Delay, d2		0.6	0.0							0.1	0.3	
Delay (s)		10.8	7.5							11.5	13.4	
Level of Service		B	A							B	B	
Approach Delay (s)		10.5			0.0			0.0			13.0	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			11.6		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			53.6		Sum of lost time (s)					8.0		
Intersection Capacity Utilization			63.3%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

127: SW 6th St & SW Highland Ave

07/05/2018

	→	↘	↙	↓
Lane Group	EBT	EBR	SBL	SBT
Lane Group Flow (vph)	931	73	177	620
v/c Ratio	0.60	0.10	0.26	0.51
Control Delay	13.0	4.4	7.6	16.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.0	4.4	7.6	16.0
Queue Length 50th (ft)	99	2	13	73
Queue Length 95th (ft)	217	24	62	166
Internal Link Dist (ft)	782			261
Turn Bay Length (ft)		100	150	
Base Capacity (vph)	2939	1330	1269	2474
Starvation Cap Reductn	0	0	0	102
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.32	0.05	0.14	0.26
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

128: SW 5th St & SW Highland Ave

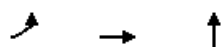
07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	407	658	0	0	0	0	0	324	51	0	0	0
Future Volume (vph)	407	658	0	0	0	0	0	324	51	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5						4.5				
Lane Util. Factor	0.91	0.91						0.95				
Frt	1.00	1.00						0.98				
Flt Protected	0.95	1.00						1.00				
Satd. Flow (prot)	1513	3114						3257				
Flt Permitted	0.95	1.00						1.00				
Satd. Flow (perm)	1513	3114						3257				
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	438	708	0	0	0	0	0	348	55	0	0	0
RTOR Reduction (vph)	153	8	0	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	219	766	0	0	0	0	0	388	0	0	0	0
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA						NA				
Protected Phases		8						6				
Permitted Phases	8											
Actuated Green, G (s)	21.7	21.7						11.5				
Effective Green, g (s)	21.7	21.7						11.5				
Actuated g/C Ratio	0.51	0.51						0.27				
Clearance Time (s)	4.5	4.5						4.5				
Vehicle Extension (s)	3.0	3.0						3.0				
Lane Grp Cap (vph)	778	1601						887				
v/s Ratio Prot								c0.12				
v/s Ratio Perm	0.15	0.25										
v/c Ratio	0.28	0.48						0.44				
Uniform Delay, d1	5.8	6.6						12.7				
Progression Factor	1.00	1.00						1.00				
Incremental Delay, d2	0.2	0.2						0.3				
Delay (s)	6.0	6.8						13.0				
Level of Service	A	A						B				
Approach Delay (s)		6.6			0.0			13.0			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		8.2			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.46										
Actuated Cycle Length (s)		42.2			Sum of lost time (s)			9.0				
Intersection Capacity Utilization		42.3%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

128: SW 5th St & SW Highland Ave

07/05/2018



Lane Group	EBL	EBT	NBT
Lane Group Flow (vph)	372	774	403
v/c Ratio	0.40	0.49	0.45
Control Delay	2.9	7.9	15.3
Queue Delay	0.1	0.0	0.0
Total Delay	3.0	7.9	15.3
Queue Length 50th (ft)	6	52	37
Queue Length 95th (ft)	43	114	94
Internal Link Dist (ft)		156	664
Turn Bay Length (ft)	75		
Base Capacity (vph)	1480	3030	2867
Starvation Cap Reductn	225	495	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.30	0.31	0.14
Intersection Summary			

MOVEMENT SUMMARY

 Site: [29 - SE 9th St @ OR 126]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SE 9th St											
3	L2	36	1.0	0.191	8.6	LOS A	0.8	19.1	0.66	0.66	32.6
8	T1	33	1.0	0.191	8.6	LOS A	0.8	19.1	0.66	0.66	32.5
18	R2	43	1.0	0.191	8.6	LOS A	0.8	19.1	0.66	0.66	31.6
Approach		112	1.0	0.191	8.6	LOS A	0.8	19.1	0.66	0.66	32.2
East: OR 126											
1	L2	30	1.0	0.535	9.5	LOS A	3.7	96.9	0.49	0.32	32.9
6	T1	415	4.0	0.535	9.5	LOS A	3.7	96.9	0.49	0.32	32.8
16	R2	160	6.0	0.535	9.5	LOS A	3.7	96.9	0.49	0.32	31.8
Approach		605	4.4	0.535	9.5	LOS A	3.7	96.9	0.49	0.32	32.5
North: SE 9th St											
7	L2	180	6.0	0.433	10.1	LOS B	2.3	59.3	0.66	0.68	31.2
4	T1	24	1.0	0.433	10.1	LOS B	2.3	59.3	0.66	0.68	31.3
14	R2	138	4.0	0.433	10.1	LOS B	2.3	59.3	0.66	0.68	30.4
Approach		342	4.8	0.433	10.1	LOS B	2.3	59.3	0.66	0.68	30.9
West: OR 126											
5	L2	82	2.0	0.621	12.0	LOS B	5.2	131.8	0.67	0.56	31.5
2	T1	540	3.0	0.621	12.0	LOS B	5.2	131.8	0.67	0.56	31.5
12	R2	27	1.0	0.621	12.0	LOS B	5.2	131.8	0.67	0.56	30.7
Approach		649	2.8	0.621	12.0	LOS B	5.2	131.8	0.67	0.56	31.5
All Vehicles		1709	3.6	0.621	10.5	LOS B	5.2	131.8	0.61	0.51	31.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: H:\17\17720 - Redmond Transportation System Plan\Task 5- Alternatives\ops\Future Alternative Conditions (Updated Model).sip7

HCM Signalized Intersection Capacity Analysis

130: SW 27th St & SW Obsidian Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	31	57	22	30	1	117	396	18	4	248	80
Future Volume (vph)	35	31	57	22	30	1	117	396	18	4	248	80
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0			4.0		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.94			1.00		1.00	0.99		1.00	0.96	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1559			1709		1614	1722		1662	1665	
Flt Permitted		0.90			0.85		0.38	1.00		0.50	1.00	
Satd. Flow (perm)		1419			1479		650	1722		872	1665	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	39	34	63	24	33	1	130	440	20	4	276	89
RTOR Reduction (vph)	0	39	0	0	1	0	0	2	0	0	15	0
Lane Group Flow (vph)	0	97	0	0	57	0	130	458	0	4	350	0
Confl. Peds. (#/hr)	1		1	1		1						
Confl. Bikes (#/hr)						1						1
Heavy Vehicles (%)	3%	0%	4%	0%	0%	0%	3%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		8.9			8.9		28.1	22.9		19.3	18.5	
Effective Green, g (s)		8.9			8.9		28.1	22.9		19.3	18.5	
Actuated g/C Ratio		0.20			0.20		0.62	0.50		0.42	0.41	
Clearance Time (s)		4.0			4.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		276			288		510	864		382	675	
v/s Ratio Prot							c0.03	c0.27		0.00	0.21	
v/s Ratio Perm		c0.07			0.04		0.13			0.00		
v/c Ratio		0.35			0.20		0.25	0.53		0.01	0.52	
Uniform Delay, d1		15.9			15.4		4.2	7.7		7.6	10.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.3		0.3	0.6		0.0	0.7	
Delay (s)		16.6			15.7		4.5	8.3		7.6	10.9	
Level of Service		B			B		A	A		A	B	
Approach Delay (s)		16.6			15.7			7.5			10.8	
Approach LOS		B			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			10.1				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			45.6				Sum of lost time (s)			13.0		
Intersection Capacity Utilization			48.7%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

130: SW 27th St & SW Obsidian Ave

07/05/2018

	→	←	↖	↑	↘	↓
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	58	130	460	4	365
v/c Ratio	0.41	0.19	0.24	0.50	0.01	0.58
Control Delay	16.4	18.4	5.3	9.4	4.2	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	18.4	5.3	9.4	4.2	15.2
Queue Length 50th (ft)	18	12	11	46	0	66
Queue Length 95th (ft)	70	44	33	197	3	152
Internal Link Dist (ft)	1098	1419		1239		2675
Turn Bay Length (ft)			75		125	
Base Capacity (vph)	946	969	552	1604	555	1540
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.06	0.24	0.29	0.01	0.24
Intersection Summary						

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	41	2	18	0	2	13	11	370	11	14	257	47
Future Vol, veh/h	41	2	18	0	2	13	11	370	11	14	257	47
Conflicting Peds, #/hr	4	0	0	0	0	4	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	0	0
Mvmt Flow	44	2	19	0	2	14	12	394	12	15	273	50

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	765	759	300	762	778	403	325	0	0	405	0	0
Stage 1	330	330	-	423	423	-	-	-	-	-	-	-
Stage 2	435	429	-	339	355	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	323	338	744	324	330	652	1246	-	-	1165	-	-
Stage 1	687	649	-	613	591	-	-	-	-	-	-	-
Stage 2	604	587	-	680	633	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	306	328	743	307	320	650	1246	-	-	1161	-	-
Mov Cap-2 Maneuver	306	328	-	307	320	-	-	-	-	-	-	-
Stage 1	677	637	-	606	584	-	-	-	-	-	-	-
Stage 2	580	580	-	650	622	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.7	11.5	0.2	0.4
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1246	-	-	371	571	1161	-
HCM Lane V/C Ratio	0.009	-	-	0.175	0.028	0.013	-
HCM Control Delay (s)	7.9	0	-	16.7	11.5	8.1	0
HCM Lane LOS	A	A	-	C	B	A	A
HCM 95th %tile Q(veh)	0	-	-	0.6	0.1	0	-

HCM Signalized Intersection Capacity Analysis

132: SW Canal Blvd & SW Veterans Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	219	129	139	385	212	131	268	89	185	356	10
Future Volume (vph)	9	219	129	139	385	212	131	268	89	185	356	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1661	1699	1473	1646	3228	1438	1646	1733	1444	3193	1726	1726
Flt Permitted	0.52	1.00	1.00	0.40	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	902	1699	1473	699	3228	1438	1646	1733	1444	3193	1726	1726
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	228	134	145	401	221	136	279	93	193	371	10
RTOR Reduction (vph)	0	0	80	0	0	146	0	0	55	0	1	0
Lane Group Flow (vph)	9	228	54	145	401	75	136	279	38	193	380	0
Confl. Peds. (#/hr)	3					3	3		1	1		3
Heavy Vehicles (%)	0%	3%	1%	1%	3%	1%	1%	1%	2%	1%	1%	0%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	NA
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)	20.2	19.2	30.3	30.4	25.4	25.4	11.1	23.4	30.6	8.7	21.0	
Effective Green, g (s)	20.2	19.2	30.3	30.4	25.4	25.4	11.1	23.4	30.6	8.7	21.0	
Actuated g/C Ratio	0.27	0.26	0.41	0.41	0.34	0.34	0.15	0.31	0.41	0.12	0.28	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	254	437	678	376	1100	490	245	544	670	372	486	
v/s Ratio Prot	0.00	c0.13	0.01	c0.04	0.12		c0.08	0.16	0.01	0.06	c0.22	
v/s Ratio Perm	0.01		0.03	0.12		0.05			0.02			
v/c Ratio	0.04	0.52	0.08	0.39	0.36	0.15	0.56	0.51	0.06	0.52	0.78	
Uniform Delay, d1	19.9	23.7	13.6	14.8	18.5	17.1	29.4	20.9	13.2	30.9	24.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	1.1	0.1	0.7	0.2	0.1	2.7	0.8	0.0	1.2	8.0	
Delay (s)	20.0	24.8	13.6	15.5	18.7	17.2	32.1	21.7	13.3	32.2	32.7	
Level of Service	B	C	B	B	B	B	C	C	B	C	C	
Approach Delay (s)		20.7			17.7			23.0			32.5	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			23.2				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			74.5				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			63.6%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

132: SW Canal Blvd & SW Veterans Way

07/05/2018

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	9	228	134	145	401	221	136	279	93	193	381
v/c Ratio	0.03	0.61	0.19	0.41	0.35	0.34	0.54	0.49	0.14	0.50	0.75
Control Delay	17.4	34.7	3.6	21.8	20.8	5.4	39.7	22.7	3.2	37.9	33.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.4	34.7	3.6	21.8	20.8	5.4	39.7	22.7	3.2	37.9	33.9
Queue Length 50th (ft)	2	91	0	43	64	0	55	96	0	41	149
Queue Length 95th (ft)	13	189	31	102	150	54	135	182	23	92	284
Internal Link Dist (ft)		693			446			553			1860
Turn Bay Length (ft)	125		200	175		150	225		125	250	
Base Capacity (vph)	366	765	778	354	1455	768	334	932	670	417	803
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.30	0.17	0.41	0.28	0.29	0.41	0.30	0.14	0.46	0.47
Intersection Summary											

HCM Signalized Intersection Capacity Analysis

133: US-97 & SW Veterans Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	108	319	287	307	147	379	1676	134	59	1313	51
Future Volume (vph)	65	108	319	287	307	147	379	1676	134	59	1313	51
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	5.0		4.5	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1661	1683	1464	1583	3072		1646	3059		1599	3068	
Flt Permitted	0.25	1.00	1.00	0.50	1.00		0.06	1.00		0.06	1.00	
Satd. Flow (perm)	434	1683	1464	837	3072		102	3059		106	3068	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	70	116	343	309	330	158	408	1802	144	63	1412	55
RTOR Reduction (vph)	0	0	31	0	41	0	0	3	0	0	2	0
Lane Group Flow (vph)	70	116	312	309	447	0	408	1943	0	63	1465	0
Confl. Peds. (#/hr)	7					7			2	2		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	4%	1%	5%	2%	3%	1%	7%	12%	4%	8%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	27.5	22.4	47.0	34.3	25.8		92.5	78.6		72.8	63.4	
Effective Green, g (s)	27.5	22.4	47.0	34.3	25.8		92.5	78.6		72.8	63.4	
Actuated g/C Ratio	0.20	0.16	0.34	0.25	0.19		0.67	0.57		0.53	0.46	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	132	274	548	255	576		345	1749		158	1415	
v/s Ratio Prot	0.02	0.07	0.10	c0.07	0.15		c0.21	0.64		0.03	0.48	
v/s Ratio Perm	0.09		0.11	c0.23			c0.58			0.18		
v/c Ratio	0.53	0.42	0.57	1.21	0.78		1.18	1.11		0.40	1.04	
Uniform Delay, d1	46.3	51.7	36.9	51.3	53.0		47.1	29.4		28.5	37.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.0	1.1	1.4	125.9	6.5		107.9	58.6		1.7	33.6	
Delay (s)	50.4	52.8	38.3	177.2	59.5		155.0	88.0		30.2	70.6	
Level of Service	D	D	D	F	E		F	F		C	E	
Approach Delay (s)		43.1			105.1			99.6			69.0	
Approach LOS		D			F			F			E	
Intersection Summary												
HCM 2000 Control Delay			85.7			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.25									
Actuated Cycle Length (s)			137.4			Sum of lost time (s)				18.5		
Intersection Capacity Utilization			103.8%			ICU Level of Service				G		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

133: US-97 & SW Veterans Way

07/05/2018

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	70	116	343	309	488	408	1946	63	1467
v/c Ratio	0.47	0.44	0.65	1.25	0.78	1.17	1.10	0.33	1.04
Control Delay	49.7	55.9	35.6	181.9	56.1	141.0	81.6	22.1	70.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	55.9	35.6	181.9	56.1	141.0	81.6	22.1	70.4
Queue Length 50th (ft)	48	93	208	~317	199	~387	~1074	18	~743
Queue Length 95th (ft)	89	155	310	#520	263	#652	#1332	60	#977
Internal Link Dist (ft)		446			2921		4483		2738
Turn Bay Length (ft)	175			150		150		175	
Base Capacity (vph)	148	452	528	247	907	349	1777	197	1414
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.26	0.65	1.25	0.54	1.17	1.10	0.32	1.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection

Intersection Delay, s/veh 11.6

Intersection LOS B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↘	
Traffic Vol, veh/h	32	119	149	92	246	64
Future Vol, veh/h	32	119	149	92	246	64
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	3	9	5	9	4	4
Mvmt Flow	35	129	162	100	267	70
Number of Lanes	1	1	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.1	11.7	12.7
HCM LOS	A	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1
Vol Left, %	79%	0%	0%	62%
Vol Thru, %	0%	100%	0%	38%
Vol Right, %	21%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	310	32	119	241
LT Vol	246	0	0	149
Through Vol	0	32	0	92
RT Vol	64	0	119	0
Lane Flow Rate	337	35	129	262
Geometry Grp	2	7	7	5
Degree of Util (X)	0.474	0.055	0.184	0.386
Departure Headway (Hd)	5.059	5.734	5.128	5.302
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	708	618	691	671
Service Time	3.134	3.533	2.927	3.39
HCM Lane V/C Ratio	0.476	0.057	0.187	0.39
HCM Control Delay	12.7	8.9	9.1	11.7
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	2.6	0.2	0.7	1.8

HCM Signalized Intersection Capacity Analysis

135: SE Veterans Way & OR-126

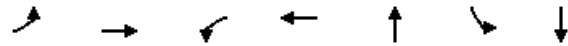
07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	586	3	267	349	37	0	5	92	119	10	37
Future Volume (vph)	13	586	3	267	349	37	0	5	92	119	10	37
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Flt	1.00	1.00		1.00	0.99			0.86		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1630	1695		1630	1647			1457		1630	1514	
Flt Permitted	0.52	1.00		0.12	1.00			1.00		0.43	1.00	
Satd. Flow (perm)	891	1695		204	1647			1457		736	1514	
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.92	0.93	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	14	630	3	287	375	40	0	5	99	129	11	40
RTOR Reduction (vph)	0	0	0	0	2	0	0	90	0	0	31	0
Lane Group Flow (vph)	14	633	0	287	413	0	0	14	0	129	20	0
Heavy Vehicles (%)	2%	3%	40%	2%	5%	2%	0%	2%	3%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	29.8	28.7		49.9	43.8			7.0		15.9	15.9	
Effective Green, g (s)	29.8	28.7		49.9	43.8			7.0		15.9	15.9	
Actuated g/C Ratio	0.40	0.38		0.67	0.59			0.09		0.21	0.21	
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	365	650		444	964			136		215	321	
v/s Ratio Prot	0.00	c0.37		c0.14	0.25			0.01		c0.04	0.01	
v/s Ratio Perm	0.01			0.29						c0.09		
v/c Ratio	0.04	0.97		0.65	0.43			0.10		0.60	0.06	
Uniform Delay, d1	13.7	22.7		15.3	8.6			31.0		25.4	23.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	28.6		3.2	0.3			0.3		4.5	0.1	
Delay (s)	13.7	51.3		18.5	8.9			31.4		29.9	23.6	
Level of Service	B	D		B	A			C		C	C	
Approach Delay (s)		50.5			12.8			31.4			28.1	
Approach LOS		D			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			74.8			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			75.2%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

135: SE Veterans Way & OR-126

07/05/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	14	633	287	415	104	129	51
v/c Ratio	0.03	1.07	0.62	0.40	0.44	0.53	0.14
Control Delay	8.0	84.2	18.7	9.8	15.1	32.6	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	84.2	18.7	9.8	15.1	32.6	11.4
Queue Length 50th (ft)	2	~318	67	73	2	47	4
Queue Length 95th (ft)	9	#615	156	213	46	101	31
Internal Link Dist (ft)		2626		631	1973		4566
Turn Bay Length (ft)	150		150			100	
Base Capacity (vph)	814	593	611	1034	564	243	545
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	1.07	0.47	0.40	0.18	0.53	0.09

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

136: SW 27th St & SW Salmon Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	59	30	90	126	89	62	430	74	38	270	5
Future Volume (vph)	15	59	30	90	126	89	62	430	74	38	270	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.94		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1660	1650		1645	1596		1662	1697		1662	1711	
Flt Permitted	0.61	1.00		0.54	1.00		0.49	1.00		0.23	1.00	
Satd. Flow (perm)	1061	1650		930	1596		853	1697		399	1711	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	17	67	34	102	143	101	70	489	84	43	307	6
RTOR Reduction (vph)	0	22	0	0	28	0	0	7	0	0	1	0
Lane Group Flow (vph)	17	79	0	102	216	0	70	566	0	43	312	0
Confl. Peds. (#/hr)	3		1	1		3						
Heavy Vehicles (%)	0%	0%	0%	1%	1%	3%	0%	1%	0%	0%	2%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	14.7	13.9		22.7	17.9		29.3	26.4		28.3	25.9	
Effective Green, g (s)	14.7	13.9		22.7	17.9		29.3	26.4		28.3	25.9	
Actuated g/C Ratio	0.22	0.21		0.35	0.27		0.45	0.40		0.43	0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	245	350		374	436		417	683		218	676	
v/s Ratio Prot	0.00	0.05		c0.02	c0.14		c0.01	c0.33		0.01	0.18	
v/s Ratio Perm	0.01			0.07			0.07			0.08		
v/c Ratio	0.07	0.23		0.27	0.49		0.17	0.83		0.20	0.46	
Uniform Delay, d1	19.9	21.3		15.0	20.0		10.6	17.5		12.2	14.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3		0.4	0.9		0.2	8.2		0.4	0.5	
Delay (s)	20.0	21.7		15.4	20.9		10.8	25.7		12.6	15.1	
Level of Service	C	C		B	C		B	C		B	B	
Approach Delay (s)		21.4			19.3			24.1			14.8	
Approach LOS		C			B			C			B	
Intersection Summary												
HCM 2000 Control Delay			20.5			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			65.5			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			59.1%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

136: SW 27th St & SW Salmon Ave

07/05/2018

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	17	101	102	244	70	573	43	313
v/c Ratio	0.05	0.31	0.27	0.49	0.14	0.77	0.14	0.43
Control Delay	19.2	23.3	20.8	22.7	9.0	25.3	9.4	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	23.3	20.8	22.7	9.0	25.3	9.4	16.8
Queue Length 50th (ft)	5	27	31	67	11	188	7	88
Queue Length 95th (ft)	19	71	71	168	38	#417	26	194
Internal Link Dist (ft)		602		599		2595		1305
Turn Bay Length (ft)	100		100		75		75	
Base Capacity (vph)	335	771	374	820	503	1120	307	1104
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.13	0.27	0.30	0.14	0.51	0.14	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

137: SW Canal Blvd & SW Odem Medo Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	216	0	543	0	339	166	316	340	0
Future Volume (vph)	0	0	0	216	0	543	0	339	166	316	340	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					5.0	5.0		5.0	5.0	5.0	5.0	
Lane Util. Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes					1.00	0.98		1.00	1.00	1.00	1.00	
Flpb, ped/bikes					0.99	1.00		1.00	1.00	1.00	1.00	
Frt					1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected					0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)					1641	1436		1733	1473	1662	1733	
Flt Permitted					0.76	1.00		1.00	1.00	0.31	1.00	
Satd. Flow (perm)					1308	1436		1733	1473	549	1733	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	225	0	566	0	353	173	329	354	0
RTOR Reduction (vph)	0	0	0	0	0	327	0	0	120	0	0	0
Lane Group Flow (vph)	0	0	0	0	225	239	0	353	53	329	354	0
Confl. Peds. (#/hr)	4		10	10		4	3					3
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	1%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)					14.9	14.9		17.0	17.0	30.8	30.8	
Effective Green, g (s)					14.9	14.9		17.0	17.0	30.8	30.8	
Actuated g/C Ratio					0.27	0.27		0.31	0.31	0.55	0.55	
Clearance Time (s)					5.0	5.0		5.0	5.0	5.0	5.0	
Vehicle Extension (s)					2.0	2.0		3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)					349	384		528	449	479	958	
v/s Ratio Prot								0.20		c0.11	0.20	
v/s Ratio Perm					c0.17	0.17			0.04	c0.27		
v/c Ratio					0.64	0.62		0.67	0.12	0.69	0.37	
Uniform Delay, d1					18.1	17.9		16.9	13.9	8.2	7.0	
Progression Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2					3.0	2.2		3.2	0.1	3.3	0.2	
Delay (s)					21.1	20.2		20.1	14.1	11.4	7.2	
Level of Service					C	C		C	B	B	A	
Approach Delay (s)		0.0			20.4			18.1			9.2	
Approach LOS		A			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			16.0				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			55.7				Sum of lost time (s)		15.0			
Intersection Capacity Utilization			70.5%				ICU Level of Service		C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

137: SW Canal Blvd & SW Odem Medo Way

07/05/2018



Lane Group	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	225	566	353	173	329	354
v/c Ratio	0.65	0.80	0.68	0.31	0.69	0.37
Control Delay	29.0	14.9	25.5	4.8	18.2	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	14.9	25.5	4.8	18.2	9.3
Queue Length 50th (ft)	67	32	101	0	54	58
Queue Length 95th (ft)	146	#162	206	37	#152	134
Internal Link Dist (ft)	931		2881			465
Turn Bay Length (ft)				100	100	
Base Capacity (vph)	533	850	773	752	487	996
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.67	0.46	0.23	0.68	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

138: US-97 & SW Odem Medo Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	282	21	218	15	33	21	409	1903	16	13	1491	319
Future Volume (vph)	282	21	218	15	33	21	409	1903	16	13	1491	319
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	5.0
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1563	1579	1436	1661	1594		1646	3194		1662	3107	1426
Flt Permitted	0.52	0.52	1.00	0.65	1.00		0.06	1.00		0.06	1.00	1.00
Satd. Flow (perm)	853	848	1436	1135	1594		96	3194		104	3107	1426
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	300	22	232	16	35	22	435	2024	17	14	1586	339
RTOR Reduction (vph)	0	0	59	0	17	0	0	0	0	0	0	100
Lane Group Flow (vph)	159	163	173	16	40	0	435	2041	0	14	1586	239
Confl. Peds. (#/hr)	1		1	1		1	2		1	1		2
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	1%	0%	3%	0%	0%	7%	1%	4%	0%	0%	7%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	3	8	1	7	4		1	6		5	2	3
Permitted Phases	8		8	4			6			2		2
Actuated Green, G (s)	27.3	27.3	46.1	15.2	12.9		98.4	90.4		70.3	67.3	76.7
Effective Green, g (s)	27.3	27.3	46.1	15.2	12.9		98.4	90.4		70.3	67.3	76.7
Actuated g/C Ratio	0.20	0.20	0.34	0.11	0.09		0.72	0.66		0.51	0.49	0.56
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	219	219	536	135	150		365	2112		87	1529	800
v/s Ratio Prot	0.05	c0.05	0.06	0.00	0.02		c0.23	0.64		0.00	0.51	0.02
v/s Ratio Perm	0.09	c0.10	0.06	0.01			c0.63			0.08		0.15
v/c Ratio	0.73	0.74	0.32	0.12	0.27		1.19	0.97		0.16	1.04	0.30
Uniform Delay, d1	50.1	51.4	33.7	54.5	57.5		47.2	21.7		22.3	34.7	15.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.3	12.8	0.4	0.4	1.0		110.3	12.5		0.9	33.3	0.2
Delay (s)	61.4	64.2	34.0	54.9	58.4		157.5	34.2		23.2	68.0	16.0
Level of Service	E	E	C	D	E		F	C		C	E	B
Approach Delay (s)		50.8			57.7			55.9			58.6	
Approach LOS		D			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			56.4			HCM 2000 Level of Service		E				
HCM 2000 Volume to Capacity ratio			1.16									
Actuated Cycle Length (s)			136.7			Sum of lost time (s)		21.0				
Intersection Capacity Utilization			98.8%			ICU Level of Service		F				
Analysis Period (min)			15									
c Critical Lane Group												

Queues

138: US-97 & SW Odem Medo Way

07/05/2018

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	159	163	232	16	57	435	2041	14	1586	339
v/c Ratio	0.79	0.81	0.41	0.09	0.35	1.14	0.92	0.09	1.04	0.37
Control Delay	76.3	78.5	19.9	43.3	44.5	130.0	27.8	10.1	66.5	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.3	78.5	19.9	43.3	44.5	130.0	27.8	10.1	66.5	6.0
Queue Length 50th (ft)	129	132	77	11	31	~385	603	3	~758	39
Queue Length 95th (ft)	#207	#215	162	31	74	#670	#1259	12	#1026	110
Internal Link Dist (ft)		931			261		4040		4483	
Turn Bay Length (ft)	150		125	150		100		150		275
Base Capacity (vph)	201	287	564	170	394	380	2213	153	1529	912
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.57	0.41	0.09	0.14	1.14	0.92	0.09	1.04	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

139: SW Helmholtz Way & SW Wickiup Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	13	1	46	10	66	6	380	94	72	194	8
Future Volume (vph)	4	13	1	46	10	66	6	380	94	72	194	8
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		3.5			3.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.99			0.93		1.00	0.97		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1718			1592		1662	1698		1662	1660	
Flt Permitted		0.94			0.88		0.63	1.00		0.33	1.00	
Satd. Flow (perm)		1632			1435		1098	1698		573	1660	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	4	13	1	47	10	68	6	392	97	74	200	8
RTOR Reduction (vph)	0	1	0	0	55	0	0	11	0	0	1	0
Lane Group Flow (vph)	0	17	0	0	70	0	6	478	0	74	207	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		8.5			8.5		21.3	20.5		27.3	23.5	
Effective Green, g (s)		8.5			8.5		21.3	20.5		27.3	23.5	
Actuated g/C Ratio		0.18			0.18		0.46	0.44		0.59	0.51	
Clearance Time (s)		3.5			3.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		299			263		514	751		427	842	
v/s Ratio Prot							0.00	c0.28		c0.01	c0.12	
v/s Ratio Perm		0.01			c0.05		0.01			0.09		
v/c Ratio		0.06			0.27		0.01	0.64		0.17	0.25	
Uniform Delay, d1		15.6			16.2		6.8	10.0		4.8	6.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.5		0.0	1.8		0.2	0.2	
Delay (s)		15.7			16.8		6.8	11.8		5.0	6.6	
Level of Service		B			B		A	B		A	A	
Approach Delay (s)		15.7			16.8			11.7			6.1	
Approach LOS		B			B			B			A	
Intersection Summary												
HCM 2000 Control Delay		10.8					HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio		0.49										
Actuated Cycle Length (s)		46.3					Sum of lost time (s)			13.5		
Intersection Capacity Utilization		57.7%					ICU Level of Service			B		
Analysis Period (min)		15										
c Critical Lane Group												

Queues

139: SW Helmholtz Way & SW Wickiup Ave

07/05/2018

	→	←	↖	↑	↘	↓
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	125	6	489	74	208
v/c Ratio	0.06	0.37	0.01	0.65	0.14	0.23
Control Delay	19.4	14.7	3.7	15.6	4.1	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.4	14.7	3.7	15.6	4.1	6.4
Queue Length 50th (ft)	4	14	1	102	5	16
Queue Length 95th (ft)	20	61	3	219	19	79
Internal Link Dist (ft)	831	737		9408		839
Turn Bay Length (ft)			250		250	
Base Capacity (vph)	1083	975	641	1504	557	1506
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.13	0.01	0.33	0.13	0.14
Intersection Summary						

MOVEMENT SUMMARY

 Site: [40 - SW 27th @ SW Wickiup]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SW 27th											
3	L2	195	2.0	0.671	12.4	LOS B	6.4	161.6	0.62	0.41	31.1
8	T1	586	1.0	0.671	12.4	LOS B	6.4	161.6	0.62	0.41	31.1
18	R2	12	0.0	0.671	12.4	LOS B	6.4	161.6	0.62	0.41	30.3
Approach		792	1.2	0.671	12.4	LOS B	6.4	161.6	0.62	0.41	31.1
East: SW Wickiup											
1	L2	9	0.0	0.265	9.5	LOS A	1.1	27.6	0.68	0.68	32.9
6	T1	141	0.0	0.265	9.5	LOS A	1.1	27.6	0.68	0.68	32.9
16	R2	8	0.0	0.265	9.5	LOS A	1.1	27.6	0.68	0.68	32.0
Approach		158	0.0	0.265	9.5	LOS A	1.1	27.6	0.68	0.68	32.8
North: SW 27th											
7	L2	4	0.0	0.323	7.2	LOS A	1.6	41.3	0.55	0.46	34.2
4	T1	271	1.0	0.323	7.2	LOS A	1.6	41.3	0.55	0.46	34.1
14	R2	34	3.0	0.323	7.2	LOS A	1.6	41.3	0.55	0.46	33.1
Approach		309	1.2	0.323	7.2	LOS A	1.6	41.3	0.55	0.46	34.0
West: SW Wickiup											
5	L2	34	3.0	0.191	5.3	LOS A	0.9	22.3	0.45	0.34	34.6
2	T1	101	1.0	0.191	5.3	LOS A	0.9	22.3	0.45	0.34	34.6
12	R2	60	0.0	0.191	5.3	LOS A	0.9	22.3	0.45	0.34	33.6
Approach		195	1.0	0.191	5.3	LOS A	0.9	22.3	0.45	0.34	34.3
All Vehicles		1453	1.1	0.671	10.0	LOS B	6.4	161.6	0.59	0.44	32.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: H:\17\17720 - Redmond Transportation System Plan\Task 5- Alternatives\ops\Future Alternative Conditions (Updated Model).sip7

MOVEMENT SUMMARY

 Site: 101 [41 - SW 27th @ SW Canal Blvd]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SW Canal Dr											
3	L2	191	5.0	0.594	12.6	LOS B	4.5	115.5	0.73	0.73	30.7
8	T1	221	1.0	0.594	12.6	LOS B	4.5	115.5	0.73	0.73	30.7
18	R2	127	3.0	0.594	12.6	LOS B	4.5	115.5	0.73	0.73	29.9
Approach		538	2.9	0.594	12.6	LOS B	4.5	115.5	0.73	0.73	30.5
East: SW Yew Ave											
1	L2	110	0.0	0.976	46.6	LOS E	25.2	633.0	1.00	1.63	21.3
6	T1	602	1.0	0.976	46.6	LOS E	25.2	633.0	1.00	1.63	21.3
16	R2	141	0.0	0.976	46.6	LOS E	25.2	633.0	1.00	1.63	20.9
Approach		853	0.7	0.976	46.6	LOS E	25.2	633.0	1.00	1.63	21.2
North: SW Canal Blvd											
7	L2	101	0.0	0.722	25.8	LOS D	5.3	132.4	0.87	1.06	26.3
4	T1	210	1.0	0.722	25.8	LOS D	5.3	132.4	0.87	1.06	26.2
14	R2	77	0.0	0.722	25.8	LOS D	5.3	132.4	0.87	1.06	25.7
Approach		388	0.5	0.722	25.8	LOS D	5.3	132.4	0.87	1.06	26.1
West: SW 27th St											
5	L2	17	0.0	0.391	8.5	LOS A	2.1	51.5	0.62	0.57	33.4
2	T1	266	0.0	0.391	8.5	LOS A	2.1	51.5	0.62	0.57	33.3
12	R2	66	0.0	0.391	8.5	LOS A	2.1	51.5	0.62	0.57	32.4
Approach		350	0.0	0.391	8.5	LOS A	2.1	51.5	0.62	0.57	33.1
All Vehicles		2130	1.1	0.976	28.0	LOS D	25.2	633.0	0.85	1.13	25.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: H:\17\117720 - Redmond Transportation System Plan\Task 5- Alternatives\ops\SW 27th St at SW Canal Blvd (Updated Model).sip7

HCM Signalized Intersection Capacity Analysis

142: US-97 SB Ramps & SW Yew Ave

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	256	232	352	741	0	0	0	0	109	0	183
Future Volume (vph)	0	256	232	352	741	0	0	0	0	109	0	183
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1667	1423	1567	1733						1662	1458
Flt Permitted		1.00	1.00	0.47	1.00						0.95	1.00
Satd. Flow (perm)		1667	1423	776	1733						1662	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	278	252	383	805	0	0	0	0	118	0	199
RTOR Reduction (vph)	0	0	144	0	0	0	0	0	0	0	0	91
Lane Group Flow (vph)	0	278	108	383	805	0	0	0	0	0	118	108
Confl. Peds. (#/hr)			4	4								
Heavy Vehicles (%)	0%	5%	2%	6%	1%	0%	0%	0%	0%	0%	0%	2%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		2		1	6						4	
Permitted Phases			2	6						4		4
Actuated Green, G (s)		23.0	23.0	34.0	34.0						9.7	9.7
Effective Green, g (s)		23.0	23.0	34.0	34.0						9.7	9.7
Actuated g/C Ratio		0.43	0.43	0.63	0.63						0.18	0.18
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		713	609	579	1097						300	263
v/s Ratio Prot		0.17		0.07	c0.46							
v/s Ratio Perm			0.08	0.34							0.07	c0.07
v/c Ratio		0.39	0.18	0.66	0.73						0.39	0.41
Uniform Delay, d1		10.5	9.5	5.5	6.7						19.4	19.5
Progression Factor		1.00	1.00	1.00	1.00						1.00	1.00
Incremental Delay, d2		0.4	0.1	2.8	2.6						0.9	1.0
Delay (s)		10.9	9.6	8.3	9.3						20.3	20.5
Level of Service		B	A	A	A						C	C
Approach Delay (s)		10.3			9.0			0.0			20.4	
Approach LOS		B			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			11.1		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			53.7		Sum of lost time (s)					15.0		
Intersection Capacity Utilization			83.1%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

c Critical Lane Group

Queues

142: US-97 SB Ramps & SW Yew Ave

07/05/2018

						
Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	278	252	383	805	118	199
v/c Ratio	0.39	0.34	0.66	0.73	0.39	0.56
Control Delay	13.4	3.3	13.6	13.4	23.6	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	3.3	13.6	13.4	23.6	16.5
Queue Length 50th (ft)	56	0	46	137	35	25
Queue Length 95th (ft)	127	37	#141	#429	72	75
Internal Link Dist (ft)	1380			488	462	
Turn Bay Length (ft)		75	150			200
Base Capacity (vph)	750	777	579	1137	935	868
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.32	0.66	0.71	0.13	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

143: US-97 NB Ramps & SE Airport Way

07/05/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	250	0	0	662	188	430	1	247	0	0	0
Future Volume (vph)	115	250	0	0	662	188	430	1	247	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0			5.0	5.0	5.0	5.0				
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00				
Frpb, ped/bikes	1.00	1.00			1.00	0.98	1.00	1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	0.85				
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00				
Satd. Flow (prot)	1599	1667			1683	1395	1630	1431				
Flt Permitted	0.12	1.00			1.00	1.00	0.95	1.00				
Satd. Flow (perm)	205	1667			1683	1395	1630	1431				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	272	0	0	720	204	467	1	268	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	60	0	173	0	0	0	0
Lane Group Flow (vph)	125	272	0	0	720	144	467	96	0	0	0	0
Confl. Peds. (#/hr)	3		1	1		3						
Heavy Vehicles (%)	4%	5%	0%	0%	4%	4%	2%	0%	4%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8					
Actuated Green, G (s)	37.3	37.3			27.8	27.8	25.8	25.8				
Effective Green, g (s)	37.3	37.3			27.8	27.8	25.8	25.8				
Actuated g/C Ratio	0.51	0.51			0.38	0.38	0.35	0.35				
Clearance Time (s)	5.0	5.0			5.0	5.0	5.0	5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	190	850			640	530	575	505				
v/s Ratio Prot	c0.04	0.16			c0.43			0.07				
v/s Ratio Perm	0.29					0.10	c0.29					
v/c Ratio	0.66	0.32			1.12	0.27	0.81	0.19				
Uniform Delay, d1	15.6	10.5			22.6	15.7	21.5	16.4				
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00				
Incremental Delay, d2	8.0	0.2			75.2	0.3	8.6	0.2				
Delay (s)	23.6	10.7			97.8	15.9	30.0	16.6				
Level of Service	C	B			F	B	C	B				
Approach Delay (s)		14.8			79.8			25.1			0.0	
Approach LOS		B			E			C			A	
Intersection Summary												
HCM 2000 Control Delay			47.7				HCM 2000 Level of Service		D			
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			73.1				Sum of lost time (s)		15.0			
Intersection Capacity Utilization			83.1%				ICU Level of Service		E			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

143: US-97 NB Ramps & SE Airport Way

07/05/2018



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	125	272	720	204	467	269
v/c Ratio	0.66	0.32	1.13	0.35	0.81	0.40
Control Delay	31.9	13.4	103.8	11.9	33.3	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	13.4	103.8	11.9	33.3	4.1
Queue Length 50th (ft)	30	71	~399	33	186	0
Queue Length 95th (ft)	#94	139	#660	91	296	43
Internal Link Dist (ft)		488	979			520
Turn Bay Length (ft)	150			100		
Base Capacity (vph)	190	849	637	588	740	796
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.32	1.13	0.35	0.63	0.34

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

MOVEMENT SUMMARY

 Site: [44 - SW 19th @ SE Airport Way]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SW 19th St											
3	L2	267	0.0	0.329	7.8	LOS A	1.6	40.7	0.60	0.55	31.5
18	R2	21	8.0	0.329	7.8	LOS A	1.6	40.7	0.60	0.55	30.5
Approach		288	0.6	0.329	7.8	LOS A	1.6	40.7	0.60	0.55	31.4
East: SE Airport Way											
1	L2	10	0.0	0.536	10.4	LOS B	3.5	90.7	0.61	0.50	32.7
6	T1	527	5.0	0.536	10.4	LOS B	3.5	90.7	0.61	0.50	32.5
Approach		537	4.9	0.536	10.4	LOS B	3.5	90.7	0.61	0.50	32.5
West: SE Airport Way											
2	T1	428	3.0	0.427	7.0	LOS A	2.8	73.7	0.09	0.02	34.2
12	R2	123	16.0	0.427	7.0	LOS A	2.8	73.7	0.09	0.02	32.9
Approach		551	5.9	0.427	7.0	LOS A	2.8	73.7	0.09	0.02	33.9
All Vehicles		1376	4.4	0.536	8.5	LOS A	3.5	90.7	0.40	0.32	32.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: H:\17\17720 - Redmond Transportation System Plan\Task 5- Alternatives\ops\Future Alternative Conditions (Updated Model).sip7

MOVEMENT SUMMARY

 Site: [45 - SW Helmholtz @ SW Canal]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
NorthEast: SW Canal											
6x	T1	198	1.0	0.240	6.9	LOS A	1.1	27.3	0.58	0.53	34.3
16x	R2	2	0.0	0.240	6.9	LOS A	1.1	27.3	0.58	0.53	33.4
Approach		200	1.0	0.240	6.9	LOS A	1.1	27.3	0.58	0.53	34.3
NorthWest: SW Helmholtz											
7x	L2	7	0.0	0.221	5.4	LOS A	1.0	27.0	0.39	0.26	34.9
14x	R2	233	4.0	0.221	5.4	LOS A	1.0	27.0	0.39	0.26	33.7
Approach		239	3.9	0.221	5.4	LOS A	1.0	27.0	0.39	0.26	33.8
SouthWest: SW Canal											
5x	L2	479	1.0	0.636	10.3	LOS B	7.1	179.4	0.12	0.02	31.3
2x	T1	388	0.0	0.636	10.3	LOS B	7.1	179.4	0.12	0.02	31.3
Approach		867	0.6	0.636	10.3	LOS B	7.1	179.4	0.12	0.02	31.3
All Vehicles		1307	1.2	0.636	8.9	LOS A	7.1	179.4	0.24	0.14	32.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Appendix G Redmond Airport Master Plan Update

Redmond Municipal Airport Master Plan as of 2020:

<http://www.flyrdm.com/images/uploads//Policies/Master%20Plan%202019/RDM%20MP%20Chapters%20Combined.pdf>

This plan is maintained and regularly updated by the City of Redmond.

Appendix H Identification of Preferred and Cost-Constrained Alternatives



REDMOND

Transportation System Plan

Date: June 26, 2019

To: Project Management Team

From: Julia Kuhn & Matt Kittelson

Subject: TM# 7: Identification of Preferred and Cost-Constrained Alternatives

Based on the evaluation of transportation system needs and alternatives, this memorandum presents the list of cost-constrained projects and associated planning-level cost estimates needed to fulfill the Redmond Transportation System Plan (TSP) goals and policies. This memorandum fulfills Task 5.1 of the TSP Work Scope.

The recommended multimodal transportation projects are organized into the following categories for implementation based on complexity, likely availability of funding, and assessment of need:

- Strategic Street Capacity Investment Corridors
- New Planned Streets
- Intersection Capacity Improvements
- Grade-Separated Intersection Improvements
- Key Multi-Use Pathways
- Key Bicycle Corridors
- Key Pedestrian Improvements

Some projects may be accelerated and others postponed due to changing conditions, funding availability, public input, or more detailed study performed during programming and budgeting processes. Further, the projects included in the preferred TSP list represent the best estimation for appropriate design available at this time. Because the TSP is being drafted at a citywide scale, project design may change before construction commences as public input, available funding, and unique site conditions are taken into consideration. Projects identified herein may be funded through a variety of sources including federal, state, or local transportation funds, system development charges (SDCs), through partnerships with private developers, or a combination of these sources.

PROJECT COSTS

The estimated construction costs for each project are provided in the subsequent tables. These costs are order-of-magnitude (e.g., planning-level) estimates that account for right-of-way, design engineering, and construction and generally include a 30 percent contingency factor. The costs were calculated for each project using the methodology and procedures recommended by the American Association of Cost Engineers (Class 5 estimates). All costs are rounded to the nearest \$100,000 and provided in 2018 dollars.

Detailed cost estimate sheets are included in Appendix A. The detailed costs include all estimation assumptions as well as any deviations related to unique topographic, right-of-way, or other constraints.

Costs for individual transit corridors are not provided. The City and Cascades East Transit are working to refine the transit corridors and identify a list of capital improvements and strategic policies that can help implement more robust transit service within Redmond. These efforts are currently ongoing and the results can be incorporated into future updates of the TSP.

STRATEGIC STREET CAPACITY INVESTMENT CORRIDORS

The projects shown in Table 1 represent the City's current priorities for street capacity investments. Improvements to these key corridors help accommodate growth and economic development in the region and continue to shape the urban context for the City. Such improvements can strengthen mobility and connectivity as well as create opportunities to incorporate bicycle, pedestrian, and transit facilities where they do not exist. These projects are illustrated in Figure 1.

Table 1: Priority Street Capacity Investments

Map ID	Corridor	S-W Limit	E-N Limit	Improvement	Length (miles)	2018 Cost Estimates
S1	Pershall Way	New Pershall Arterial	US 97	Widen to 3-Lane Arterial	0.6	\$3.1M
S7	Northwest Way	Maple Ave	NW Upas Ave	Widen to 3 Lanes	1.0	\$5.6M
S14	SW/NW Helmholtz Way	SW Canal Boulevard	NW Maple Avenue	Widen roadway to add center turn lane	5.0	\$27.8M
S21	OR 126	US 97	SE 9th St	Widen to 3 Lanes	0.6	\$5.2M
S22	OR 126	SW Helmholtz Way	SW 27th St	Upgrade roadway as necessary	1.0	\$8.4M
S26	SW Veterans	Railroad	SE 1st St	Widen to 3 Lanes (turn lanes where needed)	0.4	\$2.0M
Total Priority Street Capacity Investments						\$52.1M



Figure 1

NEW PLANNED STREETS

The projects shown in Table 2 represent the City's current priorities for planned new streets to improve connectivity between and within existing neighborhoods, employment, and commercial areas; provide connections to newly developed or developing areas; and to provide alternative travel routes for all modes to existing streets. These projects are illustrated in Figure 1.

Table 2: Priority Planned New Streets

Map ID	Corridor	S-W Limit	E-N Limit	Improvement	Length (miles)	2018 Cost Estimates
S2	NW Pershall Way	NW Upas Way	NW Pershall Way	Proposed 3-Lane Arterial	1.0	\$8.6M
S5	NW Upas Ave	NW 10th St	East of NW Canal Blvd	Proposed Collector & Overcrossing	0.6	\$10.6M
S6	NE 3rd	King Way	UGB	Proposed Collector	0.3	\$1.4M
S10	NW Maple Ave	SW Helmholtz Way	NW 35th St	Proposed 3-Lane Arterial	0.5	\$4.1M
S13	NW 27th St	NW Greenwood Ave	NW Maple Ave	Proposed Arterial	0.6	\$5.0M
S15	NW Hemlock Ave	NW Helmholtz Way	NW 35th St	Proposed Collector	0.5	\$2.8M
S16	NE 5th St	E Antler Ave	NE Hemlock Ave	Proposed Collector	0.5	\$2.8M
S17	SE/NE 17th St	OR 126	NE Kingwood	Proposed Collector	1.7	\$9.3M
S23	SE 9th St	Veterans Way	OR 126	Proposed Arterial	0.8	\$6.5M
S24	SE Veterans Way	SE 1st St	SE Veterans Way	Proposed Collector	0.4	\$2.0M
S29	SW Pumice Ave	SW 15th St	SW Canal Blvd	Proposed Collector	0.1	\$0.7M
S30	SW Quartz Ave	SW Helmholtz Way	SW 37th St	Proposed Collector	0.3	\$1.8M
S31	SW Quartz Ave	SW Canal Blvd	S 1 st St	Proposed Collector	0.7	\$6.9M
S32	SW 6th St	SE Airport Way	SE Veterans Way	Proposed Collector	1.0	\$3.5M
S34	SE Airport Way	SE Airport Way	SW Veterans Way	Proposed Arterial	0.3	\$2.2M
S35	SW 45th St	SW Salmon Ave	SW Helmholtz Way	Proposed Collector	0.1	\$0.6M
S38	SW Odem Medo	SW Canal Blvd	SW 19th St	Proposed Collector	0.1	\$0.7M
S39	SE Salmon Drive	13 th Street	S 1st St	Proposed Collector	0.7	\$3.9M
S41	SW 43rd St	SW Badger Ave	SW Yew Ave	Proposed Collector	0.4	\$1.9M
S42	SW Badger Ave	SW Helmholtz Way	SW 43rd St	Proposed Collector	0.5	\$2.8M
S44	SW 21st St	SW Elkhorn Ave	south of SW Airport Ave	Proposed Collector	0.6	\$3.3M

Map ID	Corridor	S-W Limit	E-N Limit	Improvement	Length (miles)	2018 Cost Estimates
S47	SW Elkhorn Ave	SW 39 th St	SW 19th St	Proposed Collector and Overcrossing	1.3	\$25.0M
S48	SW 19th St	UGB	SW Elkhorn Ave	Proposed Collector	0.5	\$3.2M
Total New Planned Streets						\$109.6M

INTERSECTION CAPACITY IMPROVEMENTS

The projects shown in Table 3 and Table 4 represent the City's current priorities for intersection capacity improvements. The TSP is not inclusive of all of the intersection projects that the City will pursue over the next twenty years. Rather, these are those that the City can pursue to strategically improve the operational efficiency of specific intersections and important roadways. These projects can enhance system operations and can be completed as opportunities arise. In all cases, the City will review the appropriate intersection control options at the time of project development and delivery. These projects are illustrated in Figure 2.

Table 3: Priority Intersection Capacity Improvements

Map ID	N-S Street	E-W Street	Improvement	Description	2018 Cost Estimates
I3	NW Canal Blvd	NE King Way	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I4	NW Helmholtz Way	NW Maple Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.1M (roundabout)
I5	NW 35th St	NW Maple Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I6	NW 27th St	NW Maple Ave	Consider traffic signal or roundabout	Roundabout Preferred	\$3.1M
I7	NW 19th St	NW Maple Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I8	NW 9th St	NW Maple Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I10	NE 5th St	NE Maple Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.1M (roundabout)
I11	NE 9th St	NE Maple Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.1M (roundabout)
I13	NW 6th St	NW Kingwood Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I14	NW 27th St	NW Hemlock Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M

Map ID	N-S Street	E-W Street	Improvement	Description	2018 Cost Estimates
I15	NE 9th St	NE Hemlock Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I16	NW 27th St	W Antler Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I17	NE 9th St	E Antler Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I22	SW Helmholtz Way	OR 126	Consider traffic signal or roundabout	Roundabout Preferred	\$3.1M
I23	SW 35th St	OR 126	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I25	SW 15th St	OR 126	Consider traffic signal modification or roundabout	-	\$0.5M (signal) or \$3.1M (roundabout)
I29	SE 9th St	OR 126	Consider traffic signal or roundabout	Roundabout Preferred	\$3.1M
I30	SW Helmholtz Way	SW Obsidian Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.1M (roundabout)
I31	SW 27th St	SW Obsidian Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I34	SE 9th St	SW Veterans Way	Consider traffic signal or roundabout	Roundabout Preferred	\$3.1M
I36	SE Veterans Way	OR 126	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I37	SW Canal Blvd	SW Pumice	Consider traffic signal or roundabout	Disconnect SW Obsidian Ave	\$0.5M (signal) or \$3.1M (roundabout)
I38	SW Canal Blvd	SW Quartz Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I39	SW Helmholtz Way	SW Salmon Ave	Consider traffic signal or roundabout		\$0.5M (signal) or \$3.1M (roundabout)
I40	SW 27th St	SW Salmon Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I41	SW Helmholtz Way	SW Wickiup Ave	Consider traffic signal or roundabout	Signal Preferred	\$0.5M
I42	SW 27th St	SW Wickiup Ave	Consider traffic signal or roundabout	Roundabout Preferred	\$3.1M
I45	SW 19th St	SW Airport Way	Consider traffic signal or roundabout	Roundabout Preferred	\$3.1M
I46	SW Canal Blvd	SW Badger Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.1M (roundabout)

Map ID	N-S Street	E-W Street	Improvement	Description	2018 Cost Estimates
I47	SW Helmholtz Way	SW Elkhorn Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.1M (roundabout)
I48	SW Canal Blvd	SW Elkhorn Ave	Consider traffic signal or roundabout	-	\$0.5M (signal) or \$3.1M (roundabout)
I49	SW Helmholtz Way	SW Canal Blvd	Consider traffic signal or roundabout	Roundabout Preferred	\$3.1M
Total Intersection Capacity Improvements					\$34.2M to \$60.2M depending on control type selected

Table 4: Other Priority Intersection Capacity Improvements

Map ID	N-S Street	E-W Street	Improvement	Description	2018 Cost Estimates
I2	NW 10th St	NW Pershall Way	Consider Additional Lanes	Add Eastbound Right-Turn	\$0.3M
I19	SE Lake Rd	OR 126	Consider Access Management	Create Right-In/Right-Out in Conjunction with 9th Street Project	\$0.1M
I24	SW Rimrock Way	OR 126	Consider Additional Lanes	Carry Westbound Lane through Intersection; Add Southbound and Westbound Right-Turns	\$0.7M
I32	US 97	Veterans Way	Improvement to be identified by South Corridor Project		-
I33	SW Lake Rd	SW Veterans Way	Consider Access Management	Create Right-In/Right-Out in Conjunction with 9th Street Project	\$0.1M
I35	SE 10th St	SE Veterans Way	Consider Intersection Control Change	Remove Stop Signs on Veterans in Conjunction with 9th Street Project	\$0.5M (signal) or \$3.1M (roundabout)
Total for Other Intersection Capacity Improvements					\$1.7M to \$4.3M depending on intersection control type selected



Figure 2

GRADE-SEPARATED INTERSECTION IMPROVEMENTS

Three intersections were identified for grade separation to eliminate conflict points and improve traffic flows. One intersection was identified for future evaluation. These are identified in Table 5 and shown in Figure 1 and Figure 2. A brief description of each is included below:

- **US 97/O'Neil Highway:** The Interchange Area Management Plan (IAMP) for this location identified the need to provide a grade-separated overcrossing of US 97 that would connect O'Neil Highway to Pershall Way. An interim option is to restrict the US 97/O'Neil Highway intersection to right-in, right-out.
- **Airport Way Rail Crossing:** Airport Way connects US 97 to the Redmond Airport. US 97 and the Redmond Airport are both critical statewide infrastructure as identified in the Oregon Resilience Plan. The planned grade-separation would eliminate the at-grade rail crossing between the highway and airport.
- **US 97/Elkhorn Avenue:** Construct overcrossing of US 97 as part of the Elkhorn Avenue extension from Canal Boulevard to SW 19th Street.
- **US 97/Hemlock Avenue:** Conduct a study to evaluate a possible grade-separated crossing of US 97.

Table 5: Identified Grade Separation Projects

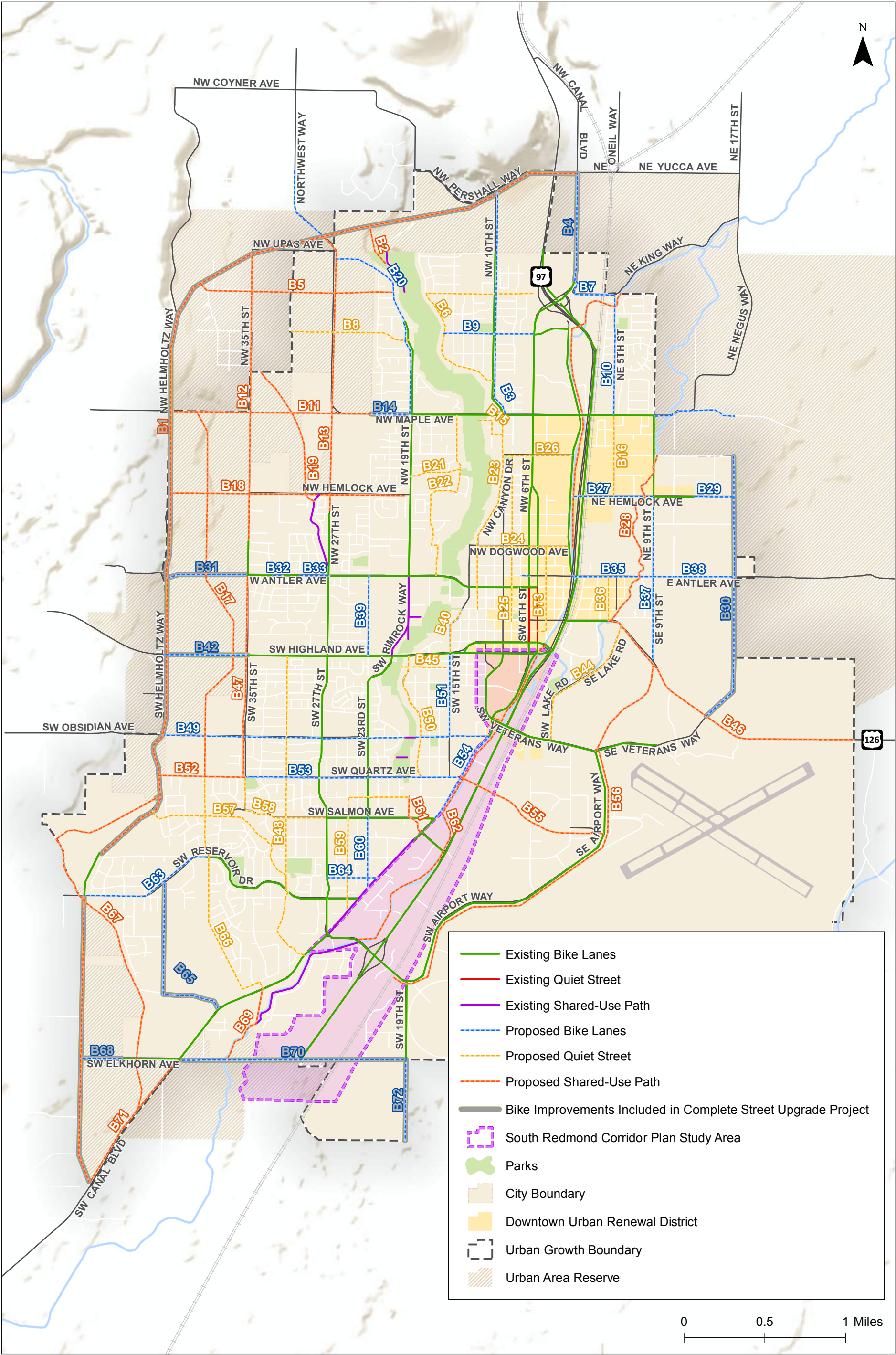
Map ID	N-S Street	E-W Street	Improvement	Description	2018 Cost Estimates
I1	US 97	O'Neil Hwy	North Interchange IAMP Project	Interim project would modify US 97/O'Neil Hwy intersection to right-in/right-out; eventual project would result in grade-separation	\$0.1M
I44	Railroad	SW Airport Way	Grade Separated Crossing	Remove Existing At-Grade Rail Crossing	\$16.2M
S47	US 97	Elkhorn Avenue	Grade Separated Crossing	Construct US 97 overcrossing at part of roadway extension.	\$25.0M
Total Grade-Separated Intersection Improvements					\$41.3M

KEY MULTI-USE PATHWAYS

The projects shown in Table 6 represent the City's current priorities for multi-use pathways. The multiuse pathway system is intended to improve continuity for bicyclists and pedestrians to move freely throughout the transportation network and help to eliminate north-south barriers for east-west access, particularly through the Dry Canyon and across US 97. These projects are shown in Figure 3. Table 6 identifies the associated costs.

Table 6: Priority Multi-Use Pathways

Map ID	Corridor	S-W Limit	E-N Limit	Length (miles)	2018 Cost Estimates
B1	SW/NW Helmholtz Way	SW Canal Blvd	NW Canal Blvd	8.0	Costs included in S14
B2	NW Pershall Way	Dry Canyon Trail	B1	0.3	\$0.9M
B5	NW Spruce Ave	NW Helmholtz Way	NW 19th St	1.2	\$4.5M
B11	NW Maple Ave	NW Helmholtz Way	west of NW 22nd St	1.2	\$4.5M
B12	NW 35th St	NW Dogwood Ave	NW Upas Way	1.8	\$6.5M
B13	NW 27th St	NW Greenwood Ave	NW Upas Way	1.7	\$6.4M
B17	SW 39th St	SW Quartz Ave	NW Maple Ave	2.4	\$8.9M
B18	NW Hemlock Ave	NW Helmholtz Way	NW 19th St	1.4	\$5.3M
B19	NW 29th St	NW Hemlock Ave	UGB	0.9	\$3.4M
B28	Lateral E Pilot Butte Canal	OR 126	NE Kingwood Ave	1.2	\$4.6M
B46	OR 126	SE Jackson St	UGB	1.8	\$6.7M
B47	SW 35th St	SW Quartz Ave	W Antler Ave	1.2	\$4.5M
B52	SW Quartz Ave	SW Helmholtz Way	SW 35th St	0.5	\$2.0M
B55	SW Quartz Ave	SW Canal Blvd	SE Airport Way	1.0	\$7.3M
B56	SE Airport Way/SE 9th St	Railroad	OR 126	3.0	\$11.0M
B61	SW 19th St	SW Canal Blvd	SW Reindeer Ave	0.3	\$1.0M
B62	SW Canal Blvd/Pilot Butte Canal	SW 27th St	NE King Way	2.4	\$8.7M
B67	SW Helmholtz Way	SW Canal Blvd	SW Reservoir Dr	2.5	\$9.4M
B69	Pilot Butte Canal	SW Elkhorn Ave	SW Canal Blvd	0.5	\$1.9M
B71	SW Canal Blvd	SW Helmholtz Way	SW Elkhorn Ave	0.9	\$3.4M
Total Multi-Use Pathways					\$71.3M



Existing and Planned Bicycle Facilities
Redmond, Oregon

Figure
3

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl

KEY BICYCLE CORRIDORS

More than forty bicycle corridors were identified as the City's current priorities for inclusion into the TSP. Crossing improvements, though not specifically identified in the TSP, may be provided when bicycle facilities are constructed that cross major roads. The need for and type of crossing treatments will be evaluated at the time of project development and design. Further, the City of Redmond will consider upgrades to existing bicycle facilities (such as including a marked buffer) on a case-by-case basis. Such upgrades typically occur in conjunction with scheduled maintenance operations.

These projects are shown in Figure 3. Table 7 identifies the associated costs.

Table 7: Current Bicycle Corridor Priorities

Map ID	Corridor	S-W Limit	E-N Limit	Improvement	Length (miles)	2018 Cost Estimates
B3	NW 10th St	NW Maple Ave	NW Pershall Way	Bike Lanes	1.0	\$0.2M
B6	NW Canyon Dr/NW Spruce Ave	NW 10th St	US 97	Quiet Street	1.4	\$0.4M
B7	NE King Way	NW Canal Blvd	NE 5th St	Bike Lanes	0.3	\$0.5M
B8	NW Quince Ave	UGB	NW 19th St	Quiet Street	0.7	\$0.2M
B9	NW Quince Ave	NW Canyon Dr	NW 6th St	Bike Lanes	0.3	\$0.5M
B10	NE 5th St	NE Negus Way	NE King Way	Bike Lanes	0.7	\$1.0M
B15	NW 10th St/NW Larch/NW Rockcrest Ct	Dry Canyon Trail	NW 9th St	Quiet Street	0.2	\$0.1M
B16	NE 5th St	NE Hemlock Ave	NE Maple Ave	Quiet Street	0.5	\$0.1M
B20	NW 19th St	NW Maple Ave.	Northwest Way	Bike Lanes	0.7	\$0.5M
B21	NW Ivy Ave	NW 19th St	NW Rimrock Ct	Quiet Street	0.3	\$0.1M
B22	NW 17th St/NW Rimrock Ct	W Antler Ave	NW Maple Ave	Quiet Street	1.2	\$0.3M
B23	NW Canyon Dr	SW Deschutes Ave	NW Maple Ave	Quiet Street	1.2	\$0.3M
B24	NW Dogwood Ave	NW Canyon Dr	NW Canal Blvd	Quiet Street	0.5	\$0.2M
B25	SW 8th St	SW Evergreen Ave	NW Kingwood Ave	Quiet Street	1.0	\$0.3M
B26	NW Kingwood Ave	NW Canyon Dr	NW Canal Blvd	Quiet Street	0.4	\$0.1M
B27	NE Hemlock Ave	NW Canal Blvd	NE 9th St	Bike Lanes/Crossing	0.5	\$0.7M
B29	NE Hemlock Ave	west of NE 15th St	NE 17th St	Bike Lanes	0.2	\$0.1M
B32	W Antler Ave	NW 32nd Ct	SW 31st St	Bike Lanes	0.1	\$0.1M
B33	W Antler Ave	NW 29th St	SW 27th St	Bike Lanes	0.2	\$0.3M
B35	E Antler Ave	SW 7th St	NE 17th St	Bike Lanes/Crossing	0.8	\$1.1M
B36	SE Jackson St	OR 126	E Antler Ave	Quiet Street	0.3	\$0.1M
B37	SE 9th St	OR 126	NE Hemlock Ave	Bike Lanes	1.0	\$1.4M
B38	E Antler Ave	SE 9th St	NE 17th St	Bike Lanes	0.1	\$0.2M
B39	SW 23rd St	SW Highland Ave	W Antler Ave	Bike Lanes	0.5	\$0.1M

Map ID	Corridor	S-W Limit	E-N Limit	Improvement	Length (miles)	2018 Cost Estimates
B40	SW 15th St	SW Highland Ave	SW Deschutes Ave	Quiet Street	0.3	\$0.1M
B44	SW Lake Rd	SW Veterans Way	OR 126	Quiet Street	0.9	\$0.3M
B45	SW Juniper Ave	Dry Canyon Trail	SW 15th St	Quiet Street	0.3	\$0.1M
B48	SW 31st St	SW Canal Blvd	SW Highland Ave	Quiet Street	2.0	\$0.1M
B49	SW Obsidian Ave	SW Helmholtz Way	SW Canal Blvd	Bike Lanes	1.4	\$0.3M
B50	SW Canyon Dr	SW Quartz Ave	SW Highland Ave	Quiet Street	0.8	\$0.2M
B51	SW 15th St	SW Obsidian Ave	SW Highland Ave	Bike Lanes	0.5	\$0.7M
B53	SW Quartz Ave	SW 35th St	SW Canal Blvd	Bike Lanes	1.3	\$0.3M
B54	SW Canal Blvd	SW Salmon Ave	SW Obsidian Ave	Bike Lanes	0.6	\$0.8M
B57	SW Salmon Ave/SW Valleyview Dr/SW 32nd Ct	SW Helmholtz Way	SW 31st St	Quiet Street	0.9	\$0.2M
B58	SW 35th St/SW Salmon Ave	SW Quartz Ave	SW 27th St	Quiet Street	0.7	\$0.2M
B59	SW 25th St/SW Reindeer Ave	SW Canal Blvd	Dry Canyon Trail/SW 19th St	Quiet Street	1.1	\$0.3M
B60	SW 23rd St	SW Canal Blvd	SW Salmon Ave	Bike Lanes	0.4	\$0.6M
B63	SW Reservoir Dr	SW Helmholtz Way	SW 39th St	Bike Lanes	0.8	\$1.1M
B64	Volcano Avenue	27th Street	SW Canal Boulevard	Bike Lanes	0.3	\$0.2M
B66	SW Cascade Vista Dr/SW Antelope Ave	SW Canal Blvd	SW Quartz Ave	Quiet Street	1.5	\$1.3M
B73	SW 4th St/SW Forest/SW 5th	SW Highland	SW Dogwood Ave	Quiet Street	0.6	\$0.2M
Total Bicycle Corridors						\$15.9M

KEY PEDESTRIAN IMPROVEMENTS

Key priority sidewalk investment areas are intended to prioritize new sidewalk facilities along ADA routes and provide key missing connections in the pedestrian system. Pedestrian crossing improvements at intersections, though not specifically identified, may be provided when pedestrian facilities are constructed that cross major roads. The need for and type of crossing treatments will be evaluated at the time of project development and design.

These projects are shown in Figure 4. Table 8 and Table 9 identify the associated costs.

Table 8: Priority New Sidewalk Facilities along ADA Routes

Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note	Length (miles)	2018 Cost Estimates
P4	NW 10th St	NW 9th St	NW Quince Ave	West	Add Sidewalk or Ramps	0.4	\$0.4M
P8	NW 9th St	NW Hemlock Ave	NW Maple Ave	Both	Add Sidewalk or Ramps	0.9	\$0.9M

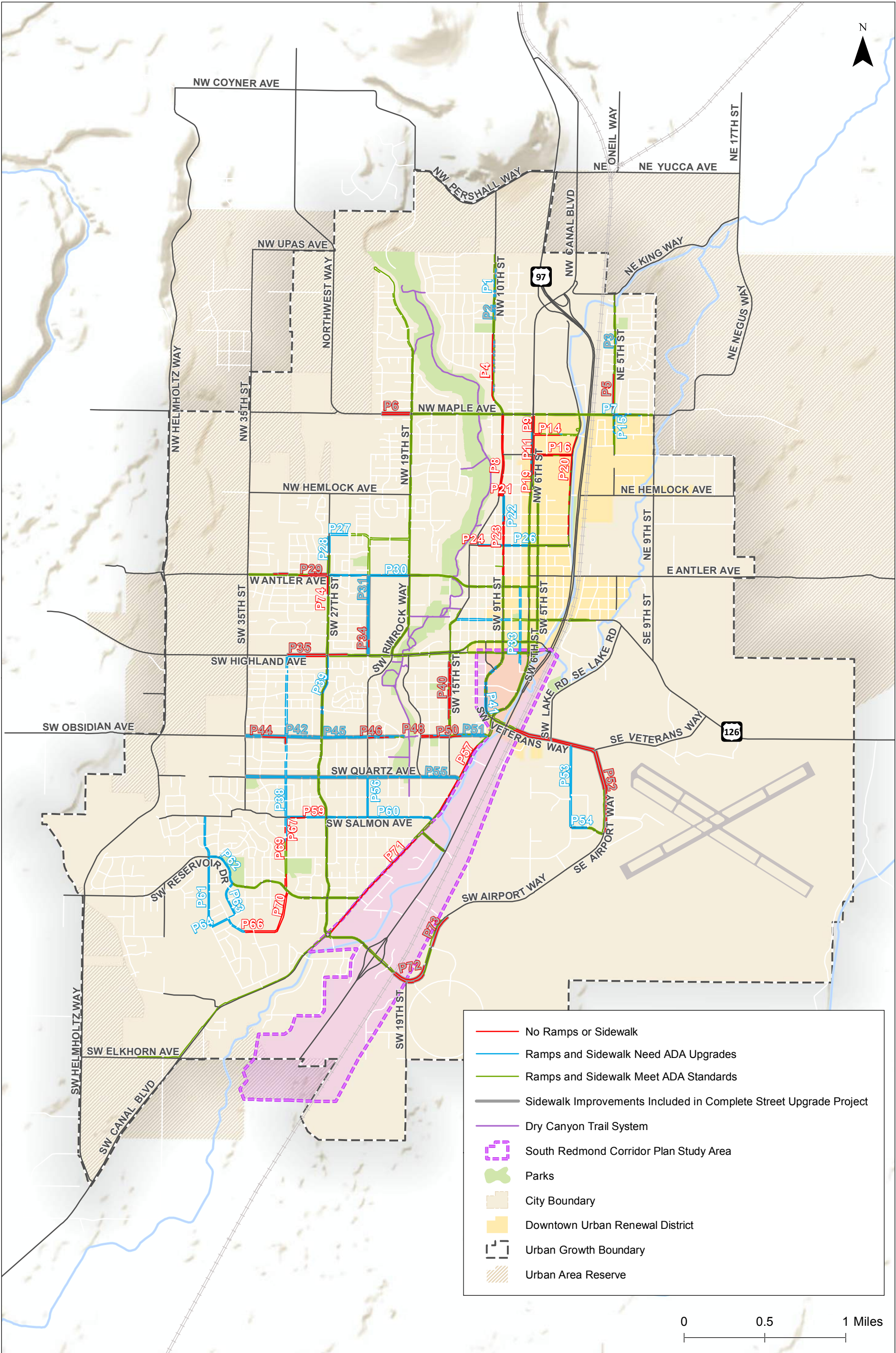
Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note	Length (miles)	2018 Cost Estimates
P9	NW 6th St	North of NW Larch Ave	NW Maple Ave	Both	Add Sidewalk or Ramps	0.2	\$0.2M
P11	NW 6th St	NW Jackpine Ave	NW Larch Ave	East	Add Sidewalk or Ramps	0.1	\$0.1M
P12	NW 6th St	South of NW Kingwood Ave	South of Larch Ave	West	Add Sidewalk or Ramps	0.1	\$0.1M
P13	NW Larch Ave	NW 6th St	NW 4th St	Both	Add Sidewalk or Ramps	0.1	\$0.1M
P14	NW Larch Ave	NW 4th St	West of NW Canal Blvd	South	Add Sidewalk or Ramps	0.1	\$0.1M
P16	NW Kingwood Ave	NW 6th St	NW Canal Blvd	Both	Add Sidewalk or Ramps	0.4	\$0.4M
P18	NW 6th St	North of NW Jackpine Ave	South of NW Kingwood Ave	West	Add Sidewalk or Ramps	0.04	<\$0.1M
P19	NW 6th St	NW Jackpine Ave	NW Kingwood Ave	East	Add Sidewalk or Ramps	0.1	\$0.1M
P20	NW Canal Blvd	NW Elm Ave	NW Larch Ave	West	Add Sidewalk or Ramps	0.4	\$0.4M
P21	NW Hemlock Ave	NW Canyon Dr	NW 9th St	Both	Add Sidewalk or Ramps	0.03	<\$0.1M
P23	NW 9th St	W Antler Ave	NW Greenwood Ave	Both	Add Sidewalk or Ramps	0.5	\$0.4M
P24	NW Dogwood Ave	NW Canyon Dr	NW 10th St	South	Add Sidewalk or Ramps	0.1	\$0.1M
P37	SW Highland Ave	SW Indian Cir	SW 27th St	South	Add Sidewalk or Ramps	0.1	\$0.1M
P57	SW Canal Blvd	North of SW Salmon Ave	South of SW Obsidian Ave	West	Add Sidewalk or Ramps	0.4	\$0.4M
P59	SW Salmon Ave	SW 31st St	SW 29th St	South	Add Sidewalk or Ramps	0.1	\$0.1M
P66	SW Xero Ln	West of SW 34th St	SW 31st St	Both	Add Sidewalk or Ramps	0.3	\$0.3M
P67	SW 31st St	SW 33rd St	SW Savannah Ct	West	Add Sidewalk or Ramps	0.03	<\$0.1M
P69	SW 31st St	SW Timber Ct	SW 33rd St	East	Add Sidewalk or Ramps	0.1	\$0.1M
P70	SW 31st St	SW Xero Ln	SW Volcano Way	Both	Add Sidewalk or Ramps	0.5	\$0.5M
P71	SW Canal Blvd	SW 27th St	SW Timber Ave	East	Add Sidewalk or Ramps	0.8	\$0.7M
Total New Sidewalk Facilities							\$5.4M

Table 9: Identified Priority Pedestrian Improvements – Sidewalk and Ramp ADA Upgrades

Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note	Length (miles)	2018 Cost Estimates
P1	NW 10th St	NW Redwood Ave	NW Teak Ave	West	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P7	NE Negus Way	NE 5th St	NE 7th St	Both	Upgrade Sidewalk or Ramps	0.1	\$0.1M

Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note	Length (miles)	2018 Cost Estimates
P10	NW 6th St	North of NW Kingwood Ave	North of NW Larch Ave	West	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P15	NE 5th St	NE Larch Ave	NE Negus Way	Both	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P17	NW 6th St	NW Jackpine Ave	NW Kingwood Ave	West	Upgrade Sidewalk or Ramps	0.03	<\$0.1M
P22	NW 9th St	NW Fir Ave	NW Hemlock Ave	Both	Upgrade Sidewalk or Ramps	0.3	\$0.3M
P25	NW Dogwood Ave	NW Canyon Dr	NW 10th St	North	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P26	NW Dogwood Ave	NW 10th St	NW 6th St	Both	Upgrade Sidewalk or Ramps	0.3	\$0.3M
P27	NW Elm Ave	NW 27th St	NW 25th St	Both	Upgrade Sidewalk or Ramps	0.2	\$0.2M
P28	NW 27th St	NW Cedar Ave	NW Elm Ave	Both	Upgrade Sidewalk or Ramps	0.2	\$0.2M
P30	W Antler Ave	SW 27th St	SW Rimrock Way	Both	Upgrade Sidewalk or Ramps	0.8	\$0.8M
P32	W Evergreen Ave	SW Canyon Dr	SW 8th St	Both	Upgrade Sidewalk or Ramps	0.6	\$0.5M
P33	SW 7th St	SW Indian Ave	SW Black Butte Blvd	Both	Upgrade Sidewalk or Ramps	0.7	\$0.7M
P36	SW Highland Ave	SW 31st St	SW Indian Cir	South	Upgrade Sidewalk or Ramps	0.1	\$0.1M
P38	SW 31st St	SW Savanna Ct	SW Highland Ave	Both	Upgrade Sidewalk or Ramps	1.6	\$1.5M
P39	SW 27th St	SW Metolius Ave	SW Highland Ave	East	Upgrade Sidewalk or Ramps	0.3	\$0.3M
P41	SW Veterans Way	SW Canal Blvd	SW Indian Ave	Both	Upgrade Sidewalk or Ramps	0.4	\$0.4M
P53	S 1st St	SE Salmon Dr	SW Veterans Way	Both	Upgrade Sidewalk or Ramps	0.9	\$0.9M
P54	SE Salmon Dr	S 1st St	West of Timber Ave	Both	Upgrade Sidewalk or Ramps	0.2	\$0.2M
P56	SW 23rd St	SW Salmon Ave	SW Quartz Ave	Both	Upgrade Sidewalk or Ramps	0.5	\$0.4M
P58	SW Salmon Ave	SW 31st St	SW Canal Blvd	North	Upgrade Sidewalk or Ramps	0.8	\$0.7M

Map ID	Corridor	S-W Limit	E-N Limit	Street Side	Note	Length (miles)	2018 Cost Estimates
P60	SW Salmon Ave	SW 29th St	SW Canal Blvd	South	Upgrade Sidewalk or Ramps	0.7	\$0.6M
P61	SW 39th St	SW 35th St	SW Salmon Ave	Both	Upgrade Sidewalk or Ramps	1.2	\$1.1M
P62	SW Reservoir Dr	SW 39th St	SW 36th St	Both	Upgrade Sidewalk or Ramps	0.5	\$0.5M
P63	SW 36th St	SW 35th St	SW Reservoir Dr	Both	Upgrade Sidewalk or Ramps	0.4	\$0.3M
P64	SW 35th St	SW Cascade Vista Dr	SW 36th St	Both	Upgrade Sidewalk or Ramps	0.2	\$0.2M
P65	SW Xero Ln	SW 35th St	West of SW 34th St	Both	Upgrade Sidewalk or Ramps	0.2	\$0.2M
Total Sidewalk and ADA Ramp Upgrades							\$11.0M



**Priority (ADA) Pedestrian Routes and Projects
Redmond, Oregon**

**Figure
4**



SOUTH REDMOND TRANSPORTATION NEEDS

The Oregon Department of State Lands (DSL), in partnership with the City, Deschutes County, and the Oregon Military Department, pursued an amendment to the City's UGB to allow annexation of 949 acres for expansion of the Deschutes County Fairgrounds, potential National Guard and military maintenance facilities, and 789 acres of future large lot industrial uses. To support development of these lands, the following transportation improvements were identified for implementation within the TSP:

- SW 19th Street/Airport Way – installation of a roundabout; this improvement is included in the list of prioritized intersection improvements identified in the above section of priority improvements.
- OR 126/Veterans Way – installation of a traffic signal; this improvement is included in the list of prioritized intersection improvements identified in the above section of priority improvements.
- SE 9th Street Extension
 - Airport Way extended north to connect with OR 126/SE 9th Street; this improvement is included in the above section of priority projects.
 - Veterans Way/Airport Way/SE 9th Street – installation of a roundabout; this improvement is included in the improvement is included in the above section of priority projects.
 - OR 126/SE 9th Street – installation of a traffic signal; this improvement is included in the list of prioritized intersection improvements.
- A future northbound connection at OR 126/Veterans Way to provide access to industrial lands; this improvement is included in the list of prioritized new street improvements identified above.
- SW 21st Avenue/SE Airport Way – construction of a raised median to limit movements SW 21st Street to right-in-right-out; the construction of a median at this location will need to consider how local properties are provided access and the timing of roundabout construction at SW 19th Avenue/SE Airport Way.
- Canal Boulevard/Yew Avenue – potential expansion of this roundabout; the operational benefits of an improvement should be balanced against the cost and potential impacts to adjacent properties.

TRANSPORTATION FUNDING

Today's fiscal environment is beset by uncertainty about future federal, state, and local funding for transportation projects. This uncertainty provides challenges to accurately forecast the amount of funding available for transportation investments and what projects or programs will receive funding. In this context, the TSP provides a prudent and conservative list of capital construction projects, an emphasis on lower cost methods of improving personal mobility within the City, and an increased reliance on technologies that can improve the efficiencies of our streets.

Further, the City policies and priorities seek to include strategic investments that support mixed-use, pedestrian-friendly neighborhoods, increase use of active modes of transportation, and reduce reliance on travel by single-occupant automobile. These priorities include improved convenience and safety for walking and biking; and continued support for the economic health and prosperity of the region.

The highest priority projects for strategic investments are those that (1) protect the existing system and (2) improve the efficiency and safety of existing multimodal facilities. These projects are to be implemented first unless a lower priority measure is demonstrated to be more cost-effective or is one that better supports safety, growth management, or other livability and economic considerations. Further, the list of projects identified above are intended to make streets safer for all users as well as more efficient with use of emerging technologies.

The timing of project implementation will depend on future policy direction and funding availability at the federal, state, or local level; changes in local development priorities; or the formation of public-private or public-public partnerships.

Transportation Revenue

Revenue forecasts from the City provided a basis for extrapolating an estimate of revenues that might be available for transportation projects over the next twenty years. Table 10 summarizes the potential revenue forecast and sources for the identified list of strategic priorities.

Table 10: Forecast Revenue Sources

Revenue Source	Average Annual Revenue	20-Year Revenue Forecast
SDC Improvement Sub-Fund	\$1.02M	\$20.35M
SDC Reimbursement Sub-Fund	\$0.12M	\$2.35M
Capital Projects Sub-Fund	\$0.85M	\$17.07M
Total Revenue	\$1.99M	\$39.77M

Summary of Transportation System Costs

Table 11 summarizes the total cost by category of recommended multimodal transportation projects.

Table 11: Project Costs

Project Category	Total Cost (\$2018)
Strategic Street Capacity Investment Corridors	\$52.1M
New Planned Streets	\$109.6M
Intersection Capacity Improvements	\$34.2M to \$60.2M depending on intersection control type selected
Other Priority Intersection Capacity Improvements	\$1.7M to \$4.3M depending on intersection control type selected
Grade-Separated Intersection Improvements	\$41.3M
Key Multi-Use Pathways	\$71.3M
Key Bicycle Corridors	\$15.9M
New Sidewalk Facilities along ADA Routes	\$5.4M
Sidewalk and ADA Ramp Upgrades	\$11.0M
Total Cost	\$342.5M to \$371.1M depending on intersection control type selected

Funding Gap

Comparing Tables 10 and 11 demonstrate that City funding alone is insufficient to address the TSP needs. As such, the City will need to partner with other agencies, the private development community and pursue alternative funding sources to address the 20-year list of prioritized projects.

Potential Funding Sources

While highway user taxes and fees, including Oregon State fuel taxes, licensing, and registration fees, as well as local fuel taxes, are available to fund transportation-related projects in the City, per local policy these sources have increasingly been devoted to operations, maintenance, and preservation. This practice diverts funds away from capacity development or expansion projects. The City will need to develop a strategy to fund the improvements identified in the TSP. Possible elements of this strategy are outlined below.

Local Funding Mechanisms

Table 12 outlines potential funding sources at the local level that either can currently be used to fund future projects or that the City Council may want to consider adopting as a new funding source. The City has used some of these funding mechanisms in the past; others would be new. Inclusion of this table in the TSP does not create a new funding source but rather is intended to the various funding sources that local governments throughout Oregon utilized. In general, local funding sources are more flexible than funding obtained from state or federal grant sources.

Table 12: Potential Local Funding Mechanisms

Funding Source	Description	Potential Application
Street Utility Fees (also called road maintenance fees)	A fee based on the number of automobile trips a particular land use generates; usually collected through a regular utility bill. Fees can also be tied to the annual registration of a vehicle to pay for improvements, expansion, and maintenance of the street system.	System-wide transportation facilities including streets, sidewalks, bike lanes, and shared use paths.
Transportation Systems Development Charge (SDC)	SDCs are impact fees assessed to development for the capacity demand it creates on public infrastructure systems. SDCs may be an improvement fee, a reimbursement fee, or a combination thereof. Reimbursement fee revenues are dedicated to capital projects that increase capacity to meet the needs of growth. SDC credits are provided to developers for public improvements they construct which add capacity to the system beyond that required to serve their development. SDC credits may also be given for development provisions that reduce vehicular capacity demand on the transportation system, such as providing end-of-trip bike facilities within the new development.	The City currently has an SDC program. They may update the SDC to reflect the adoption of projects included in the updated TSP after adoption.
Stormwater SDCs, grants, and loans	SDCs, grants, loans, and stormwater improvement fees can be obtained for improving stormwater management facilities constructed as part of transportation system improvements.	SDCs may only be used for that portion of transportation improvements which generate additional stormwater management capacity related to growth.
Local gas tax	A local tax can be assessed on the purchase of gas within the City. This tax is added to the cost of gasoline at the pump, along with the state and federal gas taxes.	System-wide transportation facilities including streets, sidewalks, and bike lanes.
Parking in-lieu fees	Parking in-lieu fees are developer fees paid if they cannot or do not want to provide on-site parking for the development. The idea behind these fees is to decrease the amount of off-street, private parking and consolidating parking supplies on-street or in parking garages as a way to decrease parking demand on the development	System-wide transportation facilities including streets, sidewalks, bike lanes, shared use paths, and transit.

	site. In-lieu fees may benefit developers by reducing costs and allowing more intensive development on a site.	
Incentives	The City provides enticements such as bonus densities and flexibility in design in exchange for a public benefit. Examples might include a commute trip reduction (CTR) program or transit facilities in exchange for bonus densities. Incentives may be used with SDC methods to reduce transportation impacts from new development.	System-wide transportation facilities including streets, sidewalks, bike lanes, shared use paths, and transit.
Public/private partnerships	Public/private partnerships have been used around the country to provide public transportation amenities within the public right-of-way in exchange for operational revenue from the facilities. These partnerships could be used to provide services such as vehicle charging stations, public parking lots, bicycle lockers, or car share facilities.	System-wide transportation facilities including streets, sidewalks, bike lanes, shared use paths, and transit.
Tax Increment Financing (TIF)	TIF is a tool that cities may use to create special districts (tax increment areas) where public improvements are made to generate private-sector development. During a defined period, the City freezes the tax base at the pre-development level. Property taxes for that period can be waived or paid, but taxes derived from increases in assessed values (the tax increment) resulting from new development can go into a special fund created to retire bonds issued to originate the development or leverage future improvements. A number of small-to-medium sized communities in Oregon have implemented, or are considering implementing, urban renewal districts that will result in a TIF revenue stream.	System-wide transportation facilities including streets, sidewalks, bike lanes, shared use paths, and transit.
Streets District	Oregon state law (Oregon Revised Statute [ORS] 371) allows for the formation of special streets taxing districts for purposes of constructing and maintaining streets within the taxing district boundaries. A Streets District would be a separate entity from the City of Redmond, with its own property tax levy rate and an elected board of commissioners. Those within the potential district boundaries must vote on the creation of a Streets District.	Roadway improvement projects.
Revenue and general obligation bonds	Bonding allows municipal and county government to finance construction projects by borrowing money and paying it back over time, with interest. Financing requires smaller regular payments over time compared to paying the full cost at once, but financing increases the total cost of the project by adding interest. General obligation bonds are often used to pay for construction of large capital improvements and must be approved by a public vote. These bonds add the cost of the improvement to property taxes over time.	Construction of major capital improvement projects within the city, street maintenance and incidental improvements.
Reimbursement Districts	Also called Zones of Benefit or Advance Financed Districts, a city determines the boundary of the district. Property owners of new development or large redevelopment permits pay a fee for the installation of public improvements. They then recover some portion of the cost over a period of years (often 15).	Construction of major capital improvement projects within the city (possibly in Study Areas).

State and Federal Grants

In addition to local funding sources, the City can seek to leverage opportunities for funding from grants at the state and federal levels for specific projects. Table 13 outlines state and federal sources and their potential applications.

Potential state funding sources are extremely limited, with some having significant competition. Any future improvements that rely on state funding may require City and regional consensus that these improvements are more important than transportation needs elsewhere in the region and the state. It will likely be necessary to combine multiple funding sources to pay for a single improvement project (e.g., combining state, regional, or City bicycle and pedestrian funds to pay for new bike lanes and sidewalks).

Table 13: Potential State and Federal Grants

Funding Source	Description	Potential Application
Statewide Transportation Improvement Program (STIP)	STIP is the State of Oregon's four-year transportation capital improvement program. ODOT's system for distributing these funds has varied over recent years. Generally, local agencies apply in advance for projects to be funded in each four-year cycle.	Projects on any facility that meet the benefit categories of the STIP.
Statewide Transportation Improvement Program-Urban (STIP-U)	STIP-U is the State of Oregon's four-year transportation capital improvement program for urban areas. ODOT's system for distributing these funds has varied over recent years. Generally, local agencies apply in advance for projects to be funded in each four-year cycle.	Projects on any facility that meet the benefit categories of the STIP-U.
Transportation and Growth Management (TGM) Grants	TGM Grants are planning grants administered by ODOT and awarded on an annual basis. The TGM grants are generally awarded to projects that will lead to more livable, economically vital, transportation efficient, sustainable, and pedestrian-friendly communities. The grants are awarded in two categories: transportation system planning and integrated land use/transportation planning.	Refinement of any identified study projects.
Transportation Alternatives Program (TAP)	TAP is a federal program that provides funding for pedestrian and bicycle facilities, projects for improving public transit access, safe routes to schools, and recreational trails. Local governments, regional transportation authorities, transit agencies, school districts or schools, natural resource or public land agencies, and tribal governments are all eligible to receive TAP funds.	Bicycle and pedestrian facilities, shared use paths.
All Roads Transportation Safety Program (ARTS)	The federal Highway Safety Improvement Program is administered as ARTS in Oregon. ARTS provides funding to infrastructure and non-infrastructure projects that improve safety on all public roads. ARTS requires a data-driven approach and prioritizes projects in demonstrated problem areas.	Areas of safety concerns within the city, consistent with Oregon's Transportation Safety Action Plan.
Immediate Opportunity Fund (IOF)	This fund is discretionary and provides funding for transportation projects essential for supporting site-specific economic development projects. These funds are distributed on a case-by-case basis in cooperation with the Oregon Economic and Community Development Department. These funds can only be used when other sources of financial support are insufficient or unavailable. These funds are reserved for projects where a documented transportation problem exists or where private firm location decisions hinge on the immediate commitment of road construction. A minimum 50 percent match is required from project applications.	Any identified projects that would improve economic development in the city and where there are documented transportation problems.
Connect Oregon	Lottery-backed bonds distributed to air, marine, rail, transit, and pedestrian and bicycle projects statewide. No less than 10 percent of Connect Oregon IV funds must be distributed to each of the five regions of the state, if there are qualified projects in the region. The objective is to improve the connections between the highway system and other modes of transportation.	System-wide transportation facilities including, shared use paths, and transit.
Oregon Parks and Recreation Local Government Grants	Oregon Parks and Recreation Department administers this program using Oregon Lottery revenues. These grants can fund acquisition, development, and major rehabilitation of public outdoor parks and recreation facilities. A match of at least 20 percent is required.	Trails and other recreational facility development or rehabilitation.
Oregon Transportation Infrastructure Bank (OTIB)	A statewide revolving loan fund is available to local governments for many transportation infrastructure improvements, including highway, transit, and non-motorized projects. Most funds made available through this program are federal; streets must be functionally classified as a major collector or higher to be eligible for loan funding.	Infrastructure improvements to major collectors or higher classified roads for vehicle, transit, and non-motorized travel.
State highway gas tax increase or user fee	ODOT is currently researching a state user fee for drivers to address steady or declining state gas tax revenues. An increase in the state gas tax or a user fee would need to pass through state legislation and would increase the state's transportation funds.	System-wide transportation facilities including streets, sidewalks, bike lanes, and transit.

Appendix A Cost Estimate Sheets

Planned Roadway Projects

Project S1 - Pershall Way (New Pershall Arterial - US 97)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**	2950	\$ 3,097,500.00
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 3,097,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assumes widening to north at 10th Street to avoid assumed utility structure.

Project S2 - NW Pershall Way (NW Upas Way - NW Pershall Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*	5440	\$ 8,568,000.00
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 8,568,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Requires cut/fill or realignment due to plateau.

Project S3 - NW 10th St (NW Upas Way - NW Pershall Way)	LINEAR FT	Total Cost
New 2 lane Collector*	2040	\$ 2,142,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 2,142,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: No reconstruction of irrigation canal crossing approximately 615 feet south of NW Parshall Way/NW 10th St Intersection

Project S4 - NW Canal Blvd (NE King Way - NE Oneil Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*	3540	\$ 5,575,500.00
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 5,575,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: No canal/ditch reconstruction.

Project S5 - NW Upas Ave (NW 10th St - East of NW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*	3180	\$ 3,339,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing	1	\$ 3,570,000.00
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
SF		
New Bridge	7020	\$ 3,685,500.00
TOTAL		\$ 10,594,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assume length of bridge is 135 feet, with 48 feet collector cross section plus 4' for bridge railings.

Project S6 - NE 3rd (King Way - UGB)	LINEAR FT	Total Cost
New 2 lane Collector*	1340	\$ 1,407,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,407,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S7 - Northwest Way (Maple Ave - NW Upas Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**	5320	\$ 5,586,000.00
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 5,586,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assumes no reconstruction of irrigation canal crossing approximately 750 feet north of Northwest Way/NW Maple Ave Intersection.

Project S8 - NW Spruce Ave (NW 31st - NW 22nd St)	LINEAR FT	Total Cost
New 2 lane Collector*	2780	\$ 2,919,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 2,919,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assume full reconstruction of unpaved NW Spruce Ave.

Project S9 - NW Quince Ave (NW 10th St - NW 6th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill	1330	\$ 349,125.00
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 349,125.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S10 - NW Maple Ave (SW Hemholtz Way - NW 35th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*	2620	\$ 4,126,500.00
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 4,126,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Steep grades likely require road meandering or significant cut/fill.

Project S11 - SW 35th St (NW Hemlock - NW Oak Ave)	LINEAR FT	Total Cost
New 2 lane Collector*	4160	\$ 4,368,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 4,368,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assumes no impacts to irrigation canal along the west side of SW 35th St.

Project S12 - NW Maple Ave (NW 35th St - NW 19th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*	5270	\$ 8,300,250.00
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 8,300,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S13 - NW 27th St (NW Greenwood Ave - NW Maple Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*	3180	\$ 5,008,500.00
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 5,008,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Not a significant canal crossing; culvert is sufficient.

Project S14 - SW Helmholtz Way (SW Canal Blvd - NW Maple Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**	26500	\$ 27,825,000.00
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 27,825,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S15 - NW Hemlock Ave (NW Helmholtz Way - NW 35th St)	LINEAR FT	Total Cost
New 2 lane Collector*	2680	\$ 2,814,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 2,814,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S16 - SE 5th St (E Antler Ave - NE Hemlock Ave)	LINEAR FT	Total Cost
New 2 lane Collector*	2650	\$ 2,782,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 2,782,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Right-of-way impacts not included.

Project S17 - NW 17th St (OR 126 - UGB)	LINEAR FT	Total Cost
New 2 lane Collector*	8830	\$ 9,271,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 9,271,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S18 - W Antler Aver (SW Helmholtz Way - SW 35th St)	LINEAR FT	Total Cost
New 2 lane Collector*	2720	\$ 2,856,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 2,856,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assumes full construction of existing pavement.

Project S19 - E Antler Ave (11thSt - NE 17th St)	LINEAR FT	Total Cost
New 2 lane Collector*	1970	\$ 2,068,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 2,068,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assumes full construction of existing pavement.

Project S20 - SW Evergreen Ave (SW 6th St - US 97)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*	1150	\$ 1,811,250.00
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,811,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Right-of-way impacts not included.

Project S21 - OR 126 (US 97 - SE 9th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*	3320	\$ 5,229,000.00
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 5,229,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S22 - OR 126 (SW Helmholtz Way - SW 27th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*	5320	\$ 8,379,000.00
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 8,379,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Improvements calls for "Upgrade roadway as necessary" (State highway improvements).

Project S23 - SE 9th St (Veterans Way - OR 126)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*	4120	\$ 6,489,000.00
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 6,489,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S24 - Veterans Way (1st St - Vererans Way)	LINEAR FT	Total Cost
New 2 lane Collector*	1880	\$ 1,974,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,974,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S25 - SW Obsidian Ave (UGB - SW 35th St)	LINEAR FT	Total Cost
New 2 lane Collector*	3940	\$ 4,137,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 4,137,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assumes full reconstruction of existing pavement.

Project S26 - SW Veterans Way (Railroad - SE 1st St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**	1870	\$ 1,963,500.00
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,963,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S27 - SE Veterans Way (east of SE Airport Way - OR 126)	LINEAR FT	Total Cost
New 2 lane Collector*	2950	\$ 3,097,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 3,097,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assume full reconstruction of existing pavement.

Project S28 - SW 15th St (SW Quartz - SW Obsidian Ave)	LINEAR FT	Total Cost
New 2 lane Collector*	1330	\$ 1,396,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,396,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S29 - SE Pumice Ave (SW 15th St - SW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*	680	\$ 714,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 714,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S30 - Quartz Ave (SW Helmholtz Way - SW 37th St)	LINEAR FT	Total Cost
New 2 lane Collector*	1730	\$ 1,816,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,816,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S31 - Quartz Ave (SW Canal Blvd - SE 1st St)	LINEAR FT	Total Cost
New 2 lane Collector*	3770	\$ 3,958,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing	1	\$ 2,975,000.00
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 6,933,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S32 - 6th St (Airport Way - Veterans Way)	LINEAR FT	Total Cost
New 2 lane Collector*	3000	\$ 3,150,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	2260	\$ 395,500.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 3,545,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S33 - SE 1st St (SW 6th St - SE Veterans Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill	4690	\$ 1,231,125.00
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,231,125.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S34 - SW Airport Way (SE Airport Way - SW Veterans Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*	1550	\$ 2,170,000.00
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 2,170,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S35 - SW 45th St (SW Salmon Ave - SW Helmholtz Way)	LINEAR FT	Total Cost
New 2 lane Collector*	580	\$ 609,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 609,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S36 - SW Salmon Ave (SW Forked Horn Butte - SW 43rd St)	LINEAR FT	Total Cost
New 2 lane Collector*	260	\$ 273,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 273,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assume full reconstruction of existing pavement (in conjunction of Project S35).

Project S37 - SW Salmon Ave (SW 39th St - SW 35th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	1520	\$ 266,000.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 266,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S38 - SW Odem Medo (SW Canal Blvd - Sw 19th St)	LINEAR FT	Total Cost
New 2 lane Collector*	640	\$ 672,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 672,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Right-of-way impacts not included.

Project S39 - SE Salmon Dr (SW 13th St - S 1st St)	LINEAR FT	Total Cost
New 2 lane Collector*	3670	\$ 3,853,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 3,853,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note:

Project S40 - SW 43rd St (SW Yew Ave - SW Reservoir Dr)	LINEAR FT	Total Cost
New 2 lane Collector*	1760	\$ 1,848,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,848,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assume full reconstruction of existing pavement.

Project S41 - SW 43rd St (SW Badger Ave - SW Yew Ave)	LINEAR FT	Total Cost
New 2 lane Collector*	1850	\$ 1,942,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,942,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assume full reconstruction of existing pavement.

Project S42 - SW Badger Road (SW Helmholtz Way - SW 43rd St)	LINEAR FT	Total Cost
New 2 lane Collector*	2670	\$ 2,803,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 2,803,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assume full reconstruction of existing pavement.

Project S43- SW Canal Blvd (SW Helmholtz Way - SW Badger Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**	7070	\$ 7,423,500.00
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 7,423,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assume full reconstruction of existing pavement.
Assume no reconstruction of existing canal culverts.

Project S44 - SW 21st St (SW Elkhorn Ave - South of SW Airport Ave)	LINEAR FT	Total Cost
New 2 lane Collector*	3190	\$ 3,349,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 3,349,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assume full reconstruction of existing pavement.
Right-of-way impacts not included.

Project S46 - SW Elkhorn Ave (SW Helmholtz Way - SW 39th St)	LINEAR FT	Total Cost
New 2 lane Collector*	1800	\$ 1,890,000.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing	1	\$ 2,975,000.00
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 4,865,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project S47 - SW Elkhorn Ave (SW 39th St - SW 19th St)	LINEAR FT	Total Cost
New 2 lane Collector*	6630	\$ 6,961,500.00
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing	1	\$ 2,975,000.00
RR Overpass	1	\$ 11,375,000.00
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
SF		
New Bridge	7020	\$ 3,685,500.00
TOTAL		\$ 24,997,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Assume length of bridge is 135 feet, with a 48 feet collector cross section plus 4 feet for bridge railings.

Project S48 - SW 19th St (UGB - SW Elkhorn Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*	2650	\$ 3,246,250.00
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 3,246,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Planned Intersection Projects

Project I2 - NW 10th St at NW Pershall Way	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps	900	\$ 315,000.00
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 315,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project I19 - SE Lake Rd at OR 126	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill	190	\$ 49,875.00
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 49,875.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project I24 - SW Rimrock Way at OR 126	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps	2000	\$ 700,000.00
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 700,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project I44 - Railroad Crossing with SW Airport Way	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*	2000	\$ 2,450,000.00
New 2 lane Arterial*		\$ -
New 3 lane Arterial*	1500	\$ 2,362,500.00
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass	1	\$ 11,375,000.00
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 16,187,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Existing and Planned Bicycle
Facilities

Project B1 - SW/NW Helmholz Way (SW Canal Blvd - NW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	42330	\$ 29,631,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 29,631,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Does not include bridges

Project B2 - NW Pershall Way (Dry Canyon Trail - Project B1)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	1300	\$ 910,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 910,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B3 - NW 10th St (NW Maple Ave - NW Pershall Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)	5340	\$ 233,625.00
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 233,625.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Length partially overlaps Project S3, therefore has been deducted.

Project B5 - NW Spruce Ave (NW Helmholtz Way - NW 19th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	6360	\$ 4,452,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 4,452,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Bike path meanders down from plateau for grade.

Project B6 - NW Canyon Dr/NW Spruce Ave (NW 10th St - US 97)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	7620	\$ 400,050.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 400,050.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B7 - NW King Way (NW Canal Blvd - NW 5th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	1760	\$ 462,000.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 462,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B8 - NW Quince Ave (UGB - NW 19th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	3850	\$ 202,125.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 202,125.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B9 - NW Quince Ave (NW Canyon Dr - NW 6th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	1760	\$ 462,000.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 462,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Length partially overlaps Project S9, therefore has been deducted.

Project B10 - NW 5th St (NE Negus Way - NW King Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	3850	\$ 1,010,625.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,010,625.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B11 - NW Maple Ave (NW Helmholtz Way - West of NW 22nd St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	6450	\$ 4,515,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 4,515,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B12 - NW 35th St (NW Dogwood Ave - NW Upas Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	9250	\$ 6,475,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 6,475,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B13 - NW 27th St (NW Greenwood Ave - NW Upas Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	9080	\$ 6,356,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 6,356,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B15 - NW 10th St - (Dry Canyon Trail - NW 9th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	1210	\$ 63,525.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 63,525.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B16 - NE 5th St (NE Hemlock Ave - NW Maple Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	2560	\$ 134,400.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 134,400.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B17 - SW/NW 39th St (SW Quartz Ave - NW Maple Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	12690	\$ 8,883,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 8,883,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B18 - NW Hemlock Ave (NW Helmholtz Way - NW 19th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	7570	\$ 5,299,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 5,299,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B19 - NW 29th St (NW Hemlock Way - UGB)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	4790	\$ 3,353,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 3,353,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B20 - NW 19th St (NW Maple Ave - Northwest Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)	2440	\$ 106,750.00
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	1510	\$ 396,375.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 503,125.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B21 - NW Jackpine Ave (NW 19th St - NW Rimrock Ct)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	1660	\$ 87,150.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 87,150.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B22 - NW 17th St/NW Rimrock Ct (W Antler Ave - NW Maple Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	6310	\$ 331,275.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 331,275.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B23 - NW Canyon Dr (SW deschutes Ave - NW Maple Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	6480	\$ 340,200.00
	IEACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 340,200.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B24 - NW Dogwood Ave (NW Canyon Dr - NW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	2780	\$ 145,950.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 145,950.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B25 - SW 8th St (SW Evergreen Ave - NW Kingwood Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	5410	\$ 284,025.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 284,025.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B26 - NW Kingwood Ave (NW Canyon Dr - NW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	2160	\$ 113,400.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 113,400.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B27 - NW Hemlock Ave (NW Canal Blvd - NE 9th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	2560	\$ 672,000.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 672,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B28 - Lateral E Pilot Butte Canal (OR 126 - NE Kingwood Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	6530	\$ 4,571,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 4,571,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B29 - NE Hemlock Ave (West of NE 15th St - NE 17th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)	1250	\$ 54,687.50
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 54,687.50

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B32 - W Antler Ave (NW 32nd Ct - SW 31st St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	310	\$ 81,375.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 81,375.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B33 - W Antler Ave (west of NW 29th St - SW 27th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	970	\$ 254,625.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 254,625.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B34 - SW 7th St (SW Glacier Ave - NW Dogwood Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)	3140	\$ 137,375.00
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 137,375.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B35 - W Antler Ave (SW 7th St - NE 17th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)	280	\$ 12,250.00
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	4100	\$ 1,076,250.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,088,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B36 - SE Jackson St (OR 126 - E Antler Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	1370	\$ 71,925.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 71,925.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B37 - SE 9th St (OR 126 - NE Hemlock Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	5270	\$ 1,383,375.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,383,375.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B38 - E Antler Ave (SE 9th St - NE 17th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	670	\$ 175,875.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 175,875.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Length partially overlaps Project S19, therefore has been deducted.

Project B39 - SW 23rd St (SW Highland Ave - W Antler Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)	2620	\$ 114,625.00
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 114,625.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B40 - SW 15th St (SW Highland Ave - SW Deschutes Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	1510	\$ 79,275.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 79,275.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B41 - SW Deschutes Ave (Dry Canyon Trail - SW 4th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	3060	\$ 160,650.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 160,650.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B43 - SW Indian Ave (SW Veterans Way - SW Highland Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)	660	\$ 28,875.00
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 28,875.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B44 - SW Lake Rd (SW Veterans Way - OR 126)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	4690	\$ 246,225.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 246,225.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B45 - SW Juniper Ave (Dry Canyon Trail - SW 15th Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	1490	\$ 78,225.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 78,225.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B46 - OR 126 (SE Jackson St - UGB)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	9610	\$ 6,727,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 6,727,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B47 - SW 35th St (SW Quartz Ave - W Antler Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	6450	\$ 4,515,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 4,515,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B48 - SW 31st St (SW Canal Blvd - SW Highland Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	640	\$ 448,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	10040	\$ 527,100.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 975,100.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B49 -SW Obsidian Ave (SW Helmholtz Way - SW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)	7340	\$ 321,125.00
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 321,125.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Length partially overlaps Project S25, therefore has been deducted.

Project B50 - SW Canyon Dr (SW Quartz Ave - SW Highland Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	4110	\$ 215,775.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 215,775.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B51 - SW 15th St (SW Obsidian Ave - SW Highland Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	2660	\$ 698,250.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 698,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B52 - SW Quartz Ave (SW Helmholtz Way - SW 35th Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	2840	\$ 1,988,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,988,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B53 - SW Quartz Ave (SW 35th St - SW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)	6690	\$ 292,687.50
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 292,687.50

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B54 - SW Canal Blvd (SW Salmon Ave - SW Obsidian Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	3190	\$ 837,375.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 837,375.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B55 - SW Quartz Ave (SW Canal Blvd - SE Airport Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	5260	\$ 3,682,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing	1	\$ 3,570,000.00
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 7,252,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Length partially overlaps Project S31, therefore has been deducted.

Canal crossing at Canal Blvd., cost covers canal crossing and at-grade US97 crossing.

Project B56 - SE Airport Way/SE 9th St (Railroad - OR 126)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	15660	\$ 10,962,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 10,962,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B57 - SW Salmon Ave/SW Valleyview Dr/SW 32nd Ct	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	4510	\$ 236,775.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 236,775.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Length partially overlaps Project S36 and S37, therefore has been deducted.

Project B58 - SW 35th St/SW Salmon Ave (SW Quartz Ave - Sw 27th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	3730	\$ 195,825.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 195,825.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B59 - SW 25th St/SW Reindeer Ave (SW Canal Blvd - Dry Canyon Trail/S	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	5590	\$ 293,475.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 293,475.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B60 - SW 23rd St (SW Canal Blvd - SW Salmon Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	2330	\$ 611,625.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 611,625.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B61 - SW 19th ST (SW Canal Blvd - SW Reindeer Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	1370	\$ 959,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 959,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B62 - SW Canal Blvd (SW 27th St - NW King Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	12460	\$ 8,722,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 8,722,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B63 - SW Reservoir Dr (SW Helmholtz Way - SW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	4380	\$ 1,149,750.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,149,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B64 - SW Volcano Ave (SW 27th St - SW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)	1000	\$ 43,750.00
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps	660	\$ 173,250.00
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 217,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B66 - SW Cascade Vista Dr/SW Antelope Ave	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	1300	\$ 910,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	6700	\$ 351,750.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 1,261,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B67 - SW Helmholtz Way (SW Canal Blvd - SW Reservoir Dr)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	13440	\$ 9,408,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 9,408,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B69 - Pilot Butte Canal (SW Elkhorn Ave - SW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	2680	\$ 1,876,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,876,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B71 - SW Canal Blvd (SW Helmholtz Way - SW Elkhorn Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps	4820	\$ 3,374,000.00
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 3,374,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project B73 - SW 4th St (SW 5th St/SW Forest Ave - SW Dogwood Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
Bike Boulevard	3060	\$ 160,650.00
	EACH	
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
	TOTAL	\$ 160,650.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Priority Pedestrian Routes and Projects

Project P1 - NW 10th St (NW Redwood Ave - NW Teak Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	460	\$ 80,500.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 80,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on west side of the road.

East side upgrades overlap with B3, therefore not included in this length.

Project P4 - NW 10th St (NW 9th St - NW Quince Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	2040	\$ 357,000.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 357,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Project P7 - NW Negus Way (NW 5th St - NW 7th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	590	\$ 103,250.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 103,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P8 - SW 9th St (NW Hemlock Ave - NW Maple Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	4870	\$ 852,250.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 852,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on both sides of the road.

Project P9 - NW 6th St (North of NW Larch Ave - NW Maple Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	1010	\$ 176,750.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 176,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on both sides of the road.

Project P10 - NW 6th St (North of NW Kingwood Ave - North of NW Larch Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	430	\$ 75,250.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 75,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on west side of road.

Project P11 - NW 6th St (NW Jackpine Ave - NW Larch Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	550	\$ 96,250.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 96,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on east side of the road

Project P12- NW 6th St (South of NW Kingwood Ave - South of Larch Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	390	\$ 68,250.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 68,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on west side of road.

Project P13- NW Larch Ave (NW 6th St - NW 4th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	530	\$ 92,750.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 92,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on both sides of the road.

Project P14- NW Larch Ave (NW 4th St -West of NW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	390	\$ 68,250.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 68,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on south side of the road.

Project P15 - NE 5th St (NW Larch Ave - NE Negus Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
r	510	\$ 89,250.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 89,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P16 - NW Kingwood Ave (NW 6th St - NW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	2100	\$ 367,500.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 367,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on both sides of the road.

Project P17 - NW 6th St (NW Jackpine Ave - NW Kingwood Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	140	\$ 24,500.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 24,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on west side of the road.

Project P18 - NW 6th St (North of NW Jackpine Ave - South of NW Kingwood Av	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	190	\$ 33,250.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 33,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on west side of the road.

Project P19 - NW 6th St (NW Jackpine Ave - NW Kingwood Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	580	\$ 101,500.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 101,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on east side of the road.

Project P20 - NW Canal Blvd (NW Elm Ave - NW Larch Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	2200	\$ 385,000.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 385,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on west side of the road.

Project P21 - NW Hemlock Ave (NW Canon Dr - NW 9th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	180	\$ 31,500.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 31,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill for both sides of the road.

Project P22 - NW 9th St (NW Fir Ave - NW Hemlock Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	1470	\$ 257,250.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 257,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades for both sides of the road.

Project P23 - NW 9th St (W Antler Ave - NW Greenwood Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	2530	\$ 442,750.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 442,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on both sides of the road.

Project P24 - NW Dogwood Ave (NW Canyon Dr - NW 10th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	500	\$ 87,500.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 87,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on south side of the road.

Project P25 - NW Dogwood Ave (NW Canyon Dr - NW 10th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	500	\$ 87,500.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 87,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on north side of the road.

Project P26 - NW Dogwood Ave (Nw 10th St - NW 6th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	1670	\$ 292,250.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 292,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P27 - NW Elm Ave (NW 27th St - NW 25th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	1100	\$ 192,500.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 192,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades for both sides of the road.

Project P28 - NW 27th St (NW Cedar Ave - NW Elm Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	1080	\$ 189,000.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 189,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades for both sides of the road.

Project P30 - W Antler Ave (SW 27th St - SW Rimrock Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	4320	\$ 756,000.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 756,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades for both sides of the road.

Project P32 - W Evergreen Ave (SW Canyon Dr - SW 8th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	2930	\$ 512,750.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 512,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P33 - SW 7th St (SW Indian Ave - SW Black Butte Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	3930	\$ 687,750.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 687,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P36 - SW Highland Ave (SW 32st St - SW Indian Cir)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	600	\$ 105,000.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 105,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on south side of the road.

Project P37 - SW Highland Ave (SW Indian Cir - SW 27th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	620	\$ 108,500.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 108,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on south side of the road.

Project P38 - SW 31st St (SW Timber Ct - SW Highland Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	8500	\$ 1,487,500.00
Upgrade 2 to 5 lane arterial		\$ 5.00
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,487,505.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrade on both sides of the road.

Project P39 - SW 27th St (SW Metolius Ave - SW Highland Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	1470	\$ 257,250.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 257,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrade on east side of the road.

Project P41 - SW Veterans Way (SW Canal Blvd - SW Indian Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	2050	\$ 358,750.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 358,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P53 - S 1st St (SE Salmon Dr - SW Veterans Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	5010	\$ 876,750.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 876,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P54 - SE Salmon Dr (S 1st St - West of Timber Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	1010	\$ 176,750.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 176,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P56 - SW 23rd St (SW Salmon Ave - SW Quartz Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	2360	\$ 413,000.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 413,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P57 - SW Canal Blvd (North of SW Salmon Ave - South of SW Obsidian	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	2230	\$ 390,250.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 390,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on west side of the road.

Project P58 - SW Salmon Ave (SW 31st St - SW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	3990	\$ 698,250.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 698,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on north side of the road.

Project P59 - SW Salmon Ave (SW 31st St - SW 29th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	410	\$ 71,750.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 71,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on south side of the road.

Project P60 - SW Salmon Ave (SW 29th St - SW Canal Blvd)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	3620	\$ 633,500.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 633,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on south side of the road.

Project P61 - SW 39th St (SW 35th St - Sw Salmon Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	6470	\$ 1,132,250.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 1,132,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road

Project P62 - SW Reservoir Dr (SW 39th St - SW 36th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	2550	\$ 446,250.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 446,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P63 - SW 36th St (SW 35th St - SW Reservoir Dr)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	1900	\$ 332,500.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 332,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P64 - SW 35th St (SW Cascade Vista Dr - SW 36th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	1290	\$ 225,750.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 225,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P65 - SW Xero Ln (SW 35th St - West of SW 34th St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	1250	\$ 218,750.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 218,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on both sides of the road.

Project P66 - SW Xero Ln (West of SW 34th St - SW 31st St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	1810	\$ 316,750.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 316,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on both sides of the road.

Project P67 - SW 31st St (SW 33rd St - SW Savannah Ct)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	180	\$ 31,500.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 31,500.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on west side of the road.

Project P68 - SW 31st St (SW 33rd St - SW Savannah Ct)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps		\$ -
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps	320	\$ 56,000.00
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 56,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp upgrades on east side of the road.

Project P69 - SW 31st St (SW Timber Ct - SW 33rd St)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	390	\$ 68,250.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 68,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on east side of the road.

Project P70 - SW 32st St (SW Xero Ln - SW Volcano Way)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	2680	\$ 469,000.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 469,000.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on both sides of the road.

Project P71 - SW Canal Blvd (SW 27th St - SW Timber Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	3950	\$ 691,250.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 691,250.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on east side of the road.

Project P74 - SW 27th St (SW Redwood Ave - NW Teak Ave)	LINEAR FT	Total Cost
New 2 lane Collector*		\$ -
New 3 lane Collector*		\$ -
New 2 lane Arterial*		\$ -
New 3 lane Arterial*		\$ -
New 5 lane Arterial*		\$ -
Bike Lane Infill (Parking Removal)		\$ -
Bike Lane Infill (Parking Removal), Sidewalk Infill & ADA Ramps		\$ -
Bike Lanes, Sidewalk Infill & ADA Ramps		\$ -
Capacity Three Lane Arterial**		\$ -
Common turn lane, Sidewalk Infill & Ramps		\$ -
Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Curb, Sidewalk Infill and ADA Ramps	570	\$ 99,750.00
Multi-use Trail, Curb, Sidewalk Infill and ADA Ramps		\$ -
New Channelization, Sidewalk infill		\$ -
New Frontage		\$ -
Partial Widening, Curb, Bike Lanes, Sidewalk Infill and ADA Ramps		\$ -
Sidewalk Infill and ADA Ramps		\$ -
Upgrade 2 to 5 lane arterial		\$ -
EACH		
Canal Crossing		\$ -
RR Overpass		\$ -
New Roundabout		\$ -
Roundabout Reconstruct		\$ -
Signal Upgrade		\$ -
TOTAL		\$ 99,750.00

*Includes curbs, sidewalks and bike lanes both directions

**Includes Sidewalks on both sides

Note: Sidewalk/ramp infill on west side of the road.

Appendix I South Corridor Recommendations

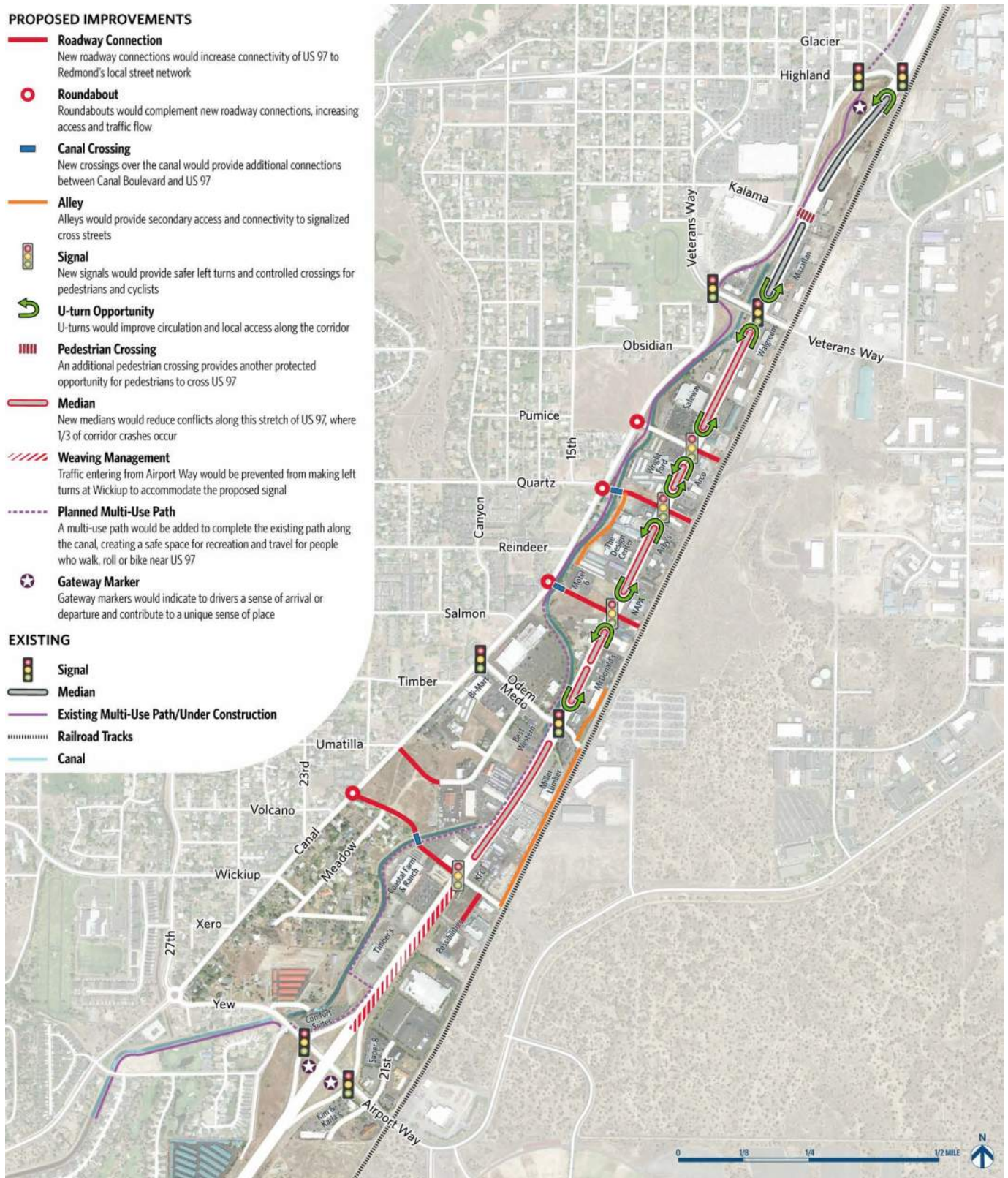
Figure 46. Recommended Concept

PROPOSED IMPROVEMENTS

- **Roadway Connection**
New roadway connections would increase connectivity of US 97 to Redmond's local street network
- **Roundabout**
Roundabouts would complement new roadway connections, increasing access and traffic flow
- **Canal Crossing**
New crossings over the canal would provide additional connections between Canal Boulevard and US 97
- **Alley**
Alleys would provide secondary access and connectivity to signalized cross streets
- ⬇ **Signal**
New signals would provide safer left turns and controlled crossings for pedestrians and cyclists
- ↻ **U-turn Opportunity**
U-turns would improve circulation and local access along the corridor
- |||| **Pedestrian Crossing**
An additional pedestrian crossing provides another protected opportunity for pedestrians to cross US 97
- **Median**
New medians would reduce conflicts along this stretch of US 97, where 1/3 of corridor crashes occur
- / / / / **Weaving Management**
Traffic entering from Airport Way would be prevented from making left turns at Wickiup to accommodate the proposed signal
- - - - **Planned Multi-Use Path**
A multi-use path would be added to complete the existing path along the canal, creating a safe space for recreation and travel for people who walk, roll or bike near US 97
- ★ **Gateway Marker**
Gateway markers would indicate to drivers a sense of arrival or departure and contribute to a unique sense of place

EXISTING

- ⬇ **Signal**
- **Median**
- **Existing Multi-Use Path/Under Construction**
- - - - **Railroad Tracks**
- **Canal**



Appendix K Quarry Avenue Analysis



REDMOND

Transportation System Plan

Technical Memorandum: Quarry Interchange Connection Analysis

Date: July 20, 2020

Project #: 17720
ODOT PA #27456

To: Redmond TSP Project Management Team (PMT)

From: Julia Kuhn, PE, Matt Kittelson, PE, and Miranda Barrus

Subject: Quarry Interchange Connection Analysis (Task 4.6 and 4.7)

To serve the urbanization of lands in the south part of the existing Urban Growth Boundary (UGB) and to alleviate travel demands at the Yew Avenue/US 97 interchange, the City, County and ODOT have explored the need to replace the existing at-grade SW Quarry Avenue/US 97 intersection with a new interchange. Homes and businesses within the existing UGB could have access to this interchange via SW Canal Boulevard and the extension of SW 19th Street.

The new interchange and the north-south connections into the UGB could provide a number of benefits to the transportation such as:

- Serve future development areas, especially the large lot industrial lands located near the Fairgrounds;
- Provide alternative grade-separated access to US 97, especially for travelers between Redmond and Bend and other destinations to the south; and
- Increase access to the Airport and provide alternative travel routes to US 97 in accordance with the City's Transportation System Plan (TSP) Policy 2.2 and the Oregon Resilience Plan.

ANALYSIS OVERVIEW & PLANNING CONTEXT

This memorandum summarizes an evaluation of the need for the new Quarry Avenue interchange by 2040 (i.e., the planning horizon of the Redmond TSP). As part of this evaluation future year conditions with and without¹ the interchange were analyzed at the following intersection:

- Canal Boulevard/Helmholtz Way
- Canal Boulevard/27th Street/Yew Avenue

¹ The without interchange scenario is based on analysis presented in *Technical Memorandum #6: Alternatives Analysis*.

- Yew Avenue/US 97 Southbound Ramps
- Yew Avenue/US 97 Northbound Ramps
- Airport Way/19th Street

Providing an interchange at SW Quarry Avenue and extending SW 19th Street to the south would occur outside of the UGB; because these roadways would serve land uses within the City, Oregon's Transportation Planning Rule (TPR) Section 660-012-0070 requires approval of an "Exception for Transportation Improvements on Rural Lands." Such goals exceptions required a specific process and coordination amongst affected agencies.

A first step in evaluating the need a goal exception in the case of the US 97/Quarry Avenue interchange would be to determine if the facility is needed to support an identified need within Redmond's UGB within the 20-year planning horizon. Figure 1 illustrates the potential interchange-related changes to the transportation system.

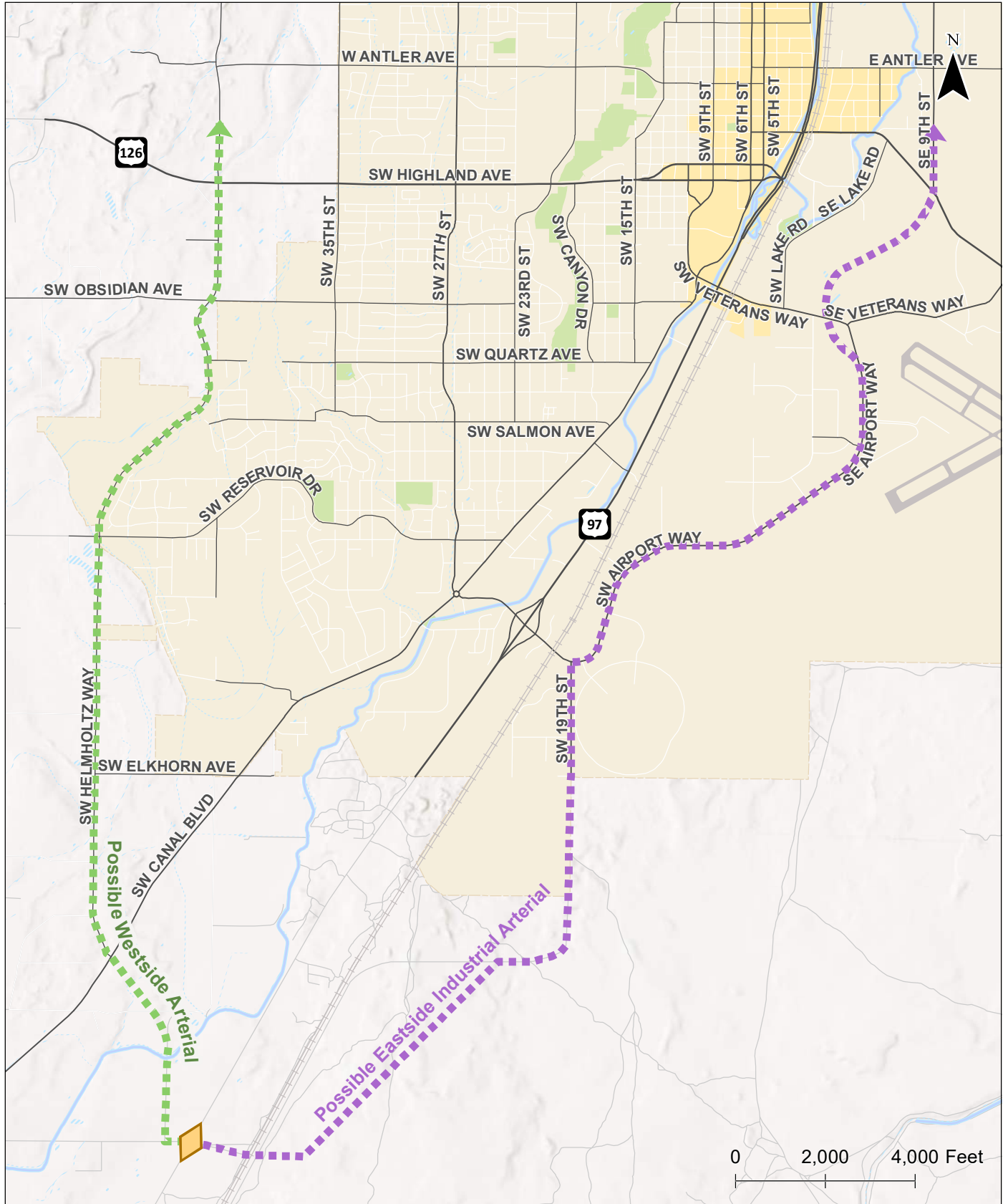
OVERVIEW OF FINDINGS

Findings presented herein show that the US 97/Quarry Avenue interchange:

- Will not measurably reduce traffic volumes anticipated on the arterial and collector streets in the south part of the City or at the US 97/Yew Avenue interchange;
- Can provide an alternative connection to US 97 for the large lot industrial lands near the Fairgrounds; however, the majority of the traffic anticipated from these lands over the next 20 years is anticipated to use the Yew Avenue Interchange; and
- The SW Quarry Avenue Interchange is not needed to meet the identified transportation needs within the TSP and would therefore be considered part of a "illustrative list" of potential projects for the City to consider at a future date.

Based on these findings, it does not appear that the requirements of a "Goal Exception" per the TPR is warranted at this time nor should the SW Quarry Avenue/US 97 Interchange be included in the list of reasonably funded TSP projects.





**Quarry Interchange and Possible Arterials
Redmond, Oregon**

**Figure
1**

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl
Data Source: Delete if there isn't one.

US 97 QUARRY INTERCHANGE OPERATIONAL ANALYSIS

Year 2040 conditions were evaluated based on forecasts from Bend-Redmond Travel Demand Model (BRM) to understand the effectiveness of this roadway network at addressing identified transportation needs within the City of Redmond.

Improvements identified within the Draft TSP at the study intersections are show in Table 1.

Table 1. Identified TSP Improvements at Study Intersections

Intersection	Existing Control	Identified TSP Improvement
Canal Boulevard/Helmholtz Way	Side-street stop controlled	Consider traffic control or roundabout (roundabout preferred)
Canal Boulevard/27th Street/Yew Avenue	Single lane roundabout	Safety improvements
Yew Avenue/US 97 Southbound Ramps	Traffic signal	No improvement identified (forecasted to meet operational standards in 2040)
Yew Avenue/US 97 Northbound Ramps	Traffic signal	No improvement identified
Airport Way/19th Street	Side-street stop controlled	Consider traffic control or roundabout (roundabout preferred)

QUARRY INTERCHANGE EFFECT ON TRAVEL DEMAND

Figure 2 shows the net changes in 2040 network demand with and without the US 97/Quarry Avenue interchange and supporting roadway network. This analysis is based on the difference between 2040 forecasts with and without the interchange.

As shown, the modeling analysis indicates that the interchange and street connection would have little to no change in overall network travel demand, including at roadway segments within the Redmond UGB. Overall segment demand change would be less than 1 percent in most places, which is well within typical variation levels in a travel demand model as well as within the daily fluctuations in average travel.

Travel demand at the US 97/Quarry Avenue interchange is forecast to be low in 2040 with less than 400 PM peak hour trips expected to utilize the facility if it were constructed. Travel demand would be higher west of the highway where existing homes and businesses primarily outside of the UGB would utilize the interchange to access US 97. Travel demand east of the interchange, which would provide access to large lot industrial lands², would be less based on expected development that could occur over the next 20-

² Travel demand to the area east of the US 97/Quarry Avenue intersection will be highly dependent on development of the large lot industrial lands. Current 2040 travel demand forecasts are based on coordinated population and



years. Most trips to or from these lands are expected to access US 97 via the Yew Avenue interchange based on the proximity of potential development to that existing facility.

2040 Traffic Volume Development

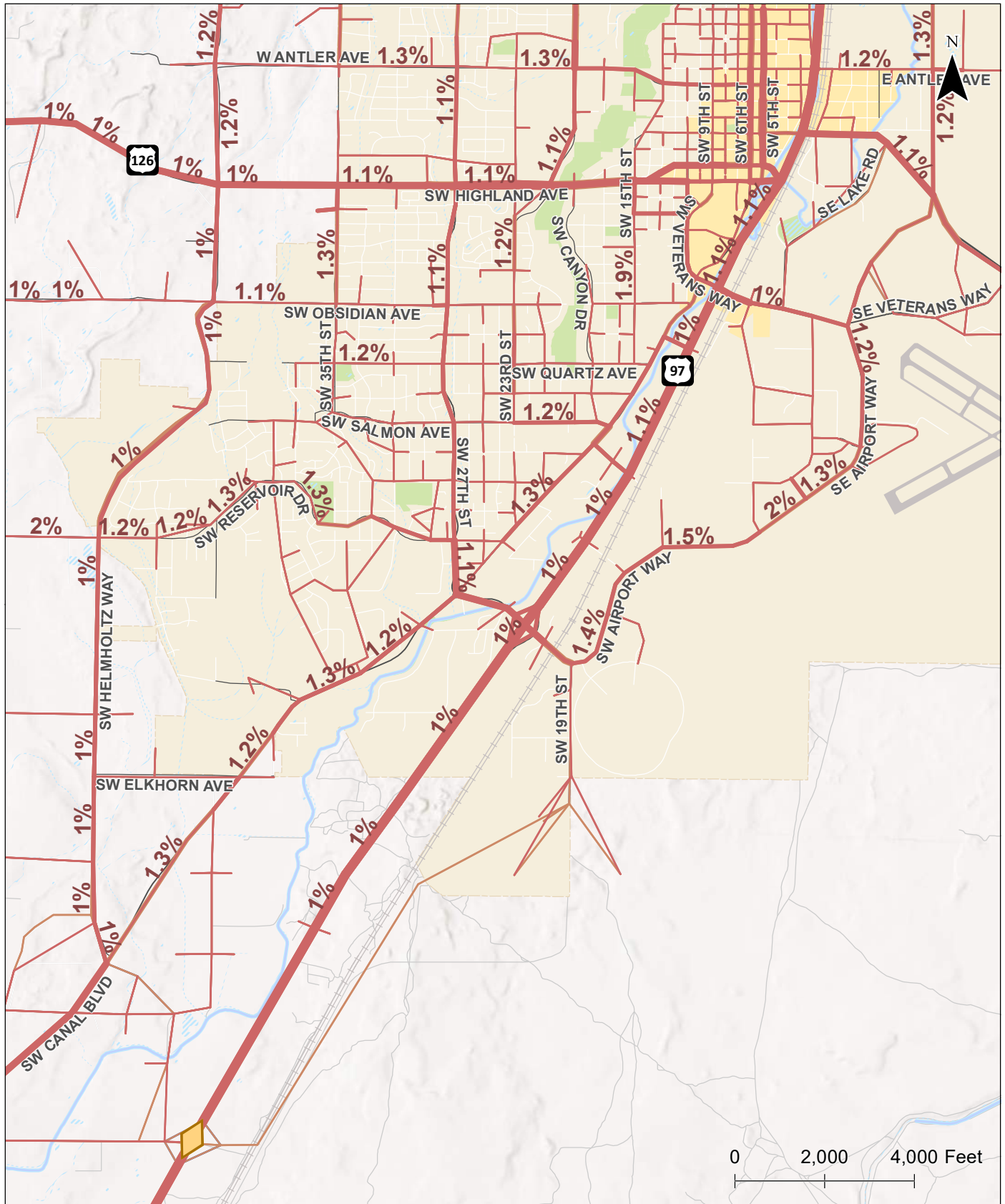
For the purposes of the intersection analyses, forecast traffic volumes were developed by applying the post-processing methodology identified in the National Cooperative Highway Research Program (NCHRP) Report 255. The methodology combines existing traffic volumes with base and future year traffic volume projections and derives forecast traffic volumes along the study area roadways and at the study intersections.

Figure 3 summarizes the year 2040 traffic volumes developed at the study intersections with and without the Quarry Avenue Interchange.

As shown, turning movement forecasts are similar within each scenario. Minor differences in forecasts are due to subtle model fluctuations and post-processing, not significant changes in travel demand as discussed in the previous section. Notably, travel demand increases on Airport Way east of the 19th Street intersection under the “with interchange” scenario. However, this change in travel demand is the result of model revisions that have occurred since the 2040 TSP Build Scenario (which is the basis of the “without interchange” scenario) that are reflected in the updated travel demand model analysis (with is the basis of the “with interchange” scenario), not the addition of the interchange at Quarry Avenue.

employment forecasts for Redmond. Development beyond these forecasts could change expected travel demands throughout the study area.

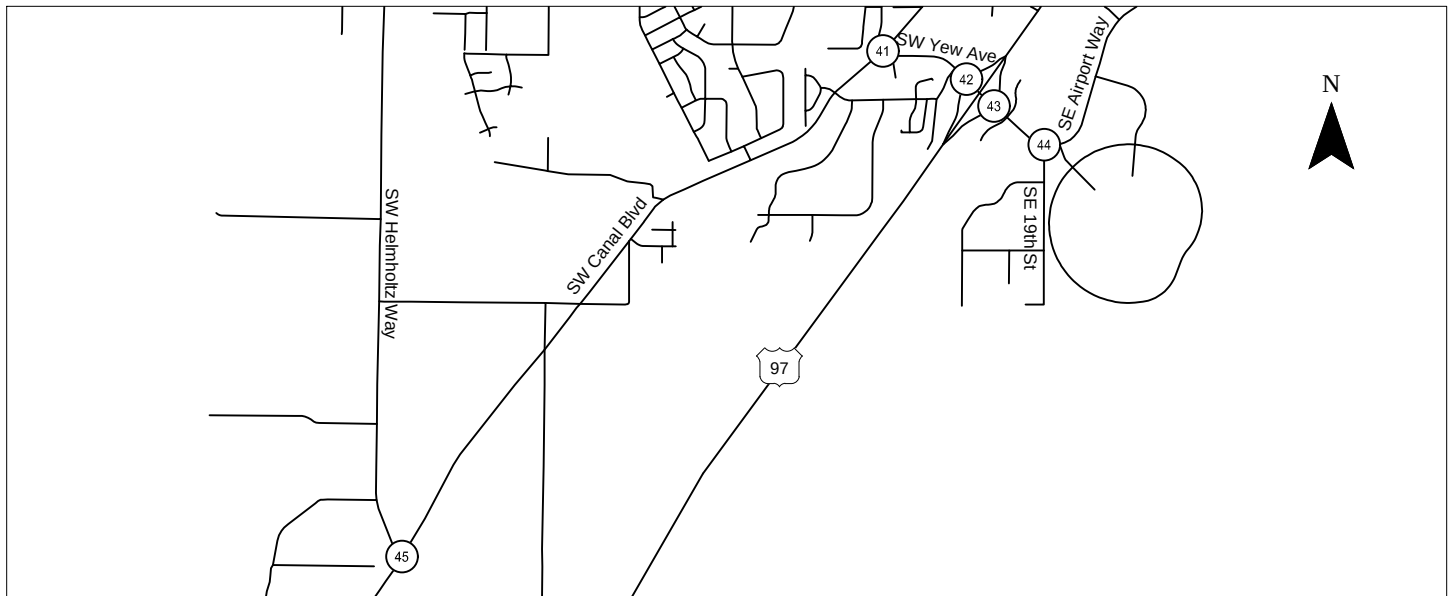




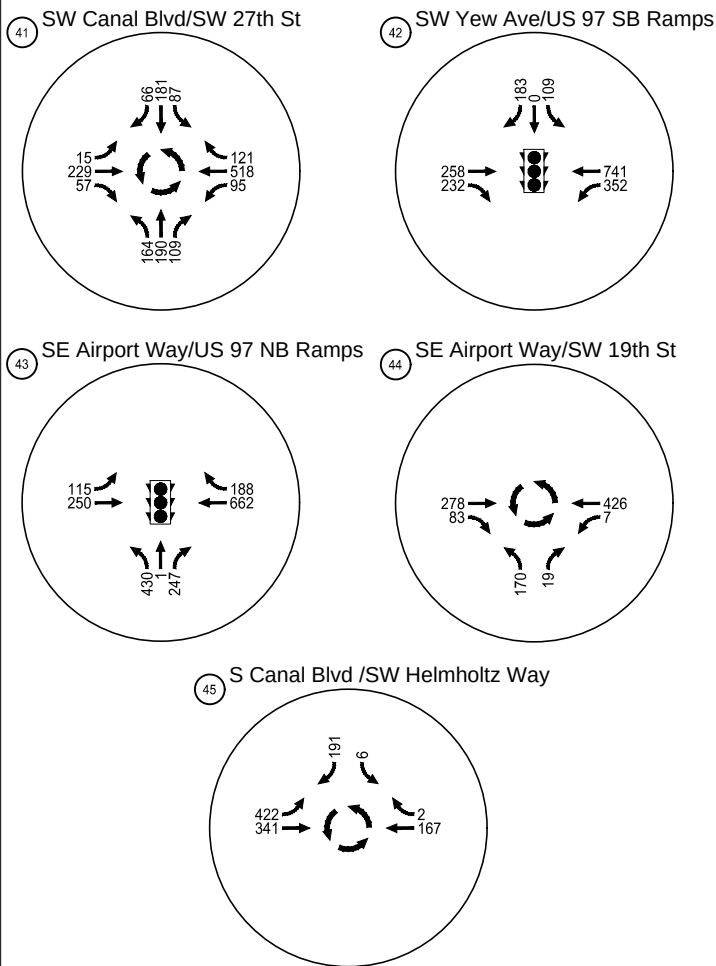
**Change in 2040 Peak Hour Travel Demand
with Quarry Avenue Interchange
Redmond, Oregon**

Figure
1

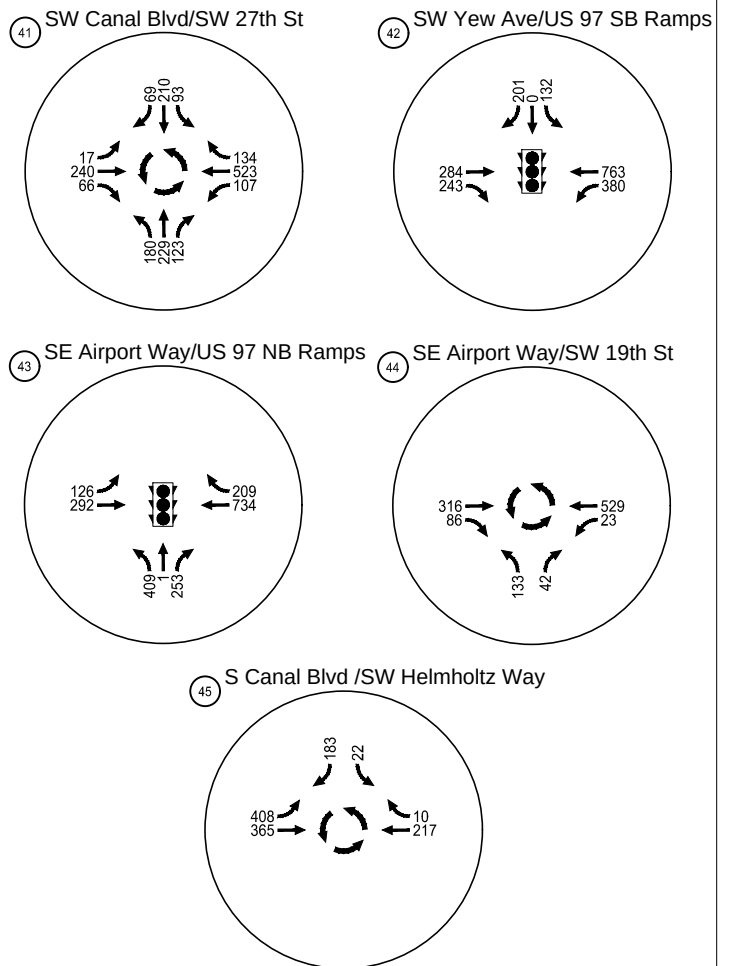
Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl
Data Source: Delete if there isn't one.



Without Interchange



With Interchange



- Traffic Signal
- Roundabout

Future 2040 Turning Volumes
Redmond, Oregon

Figure
3

H:\17\17720 - Redmond Transportation System Plan\Task 4- Future Conditions\quarry road\figures\Turning Volumes_2.dwg Jun 30, 2020 - 9:33am - mbarrus Layout Tab: Fig01

Intersection Operations Analysis

The intersection operations analysis was conducted using Synchro 10 and SIDRA 7, software tools designed to assist with operations analysis in accordance with Highway Capacity Manual (HCM) methodologies. The analysis results include level-of-service (LOS) and volume-to-capacity (v/c) at all intersections regardless of jurisdiction, which are reported for the overall intersection.

Table 3 summarizes the intersection operations analysis results for the “without interchange” and “with interchange” scenarios and compares them to the applicable performance standards established as part of the TSP (*Technical Memorandum #4: Existing Conditions Analysis*). As shown, SW Canal Boulevard/SW 27th Street and SE Airport Way/ US 97 NB Ramps are forecast to exceed their applicable performance standards under both scenarios. *Attachment A contains the “with interchange” traffic conditions worksheets. Analysis worksheets for the “without interchange” scenario have been previously summarized in the TSP’s Technical Memorandum #6: Alternatives Analysis.*

Table 3. Future Intersection Operations with and without the Interchange and Street Connection

Intersection	Jurisdiction	Proposed Control	Performance Standard	Without Interchange	With Interchange
				Performance	Performance
SW Canal Blvd/SW 27th St	City	Roundabout	LOS E, v/c<0.90	LOS D v/c = 0.98	LOS E v/c > 1.00
SW Yew Ave/US 97 SB Ramps	ODOT	Signalized	v/c<0.80	LOS B v/c = 0.75	LOSE B v/c = 0.78
SE Airport Way/US 97 NB Ramps	ODOT	Signalized	v/c<0.80	LOS D v/c = 0.95	LOS E v/c = 1.00
SE Airport Way/SW 19th St	City	Roundabout	LOS E, v/c<0.90	LOS A v/c = 0.43	LOS A v/c = 0.53
S Canal Blvd/SW Helmholtz Way	City	Roundabout	LOS E, v/c<0.90	LOS A v/c = 0.61	LOS A v/c = 0.63

Note: consistent with traffic operations analyses conducted for the Redmond TSP Update, HCM 2000 results are reported for signalized intersections and HCM 6th Edition results are reported for roundabout operations.

As shown, construction of a US 97/Quarry Avenue interchange and associated arterial connections has little effect on expected 2040 operational conditions at the study intersections. Specifically, we observe the following:

- All study intersections are expected to operate at the same level of service (LOS) or within one level of service grade in either scenario;
- Travel demand is relatively unchanged at the Yew Avenue interchange. The “with interchange” scenario forecasts a slight degradation of operations at the ramp terminals, which could be attributable to modifications to the overall travel demand assumptions in between the two scenarios or general “noise” within the analysis tool.



- Travel demand increases slightly along the Canal Boulevard corridor and 19th Street corridor under the “with interchange” scenario, which is consistent with the eastside and westside arterial road improvements assumed. However, the increases result in a change in volume-to-capacity ratios of less than 0.02 along the Canal Boulevard corridor and about 0.10 at the Airport Way/19th Street intersection. The latter operates at LOS A under both scenarios.

FINDINGS

As presented in this memorandum, the US 97 Quarry Avenue interchange and associated eastside and westside arterials:

- Would require an “Exception for Transportation Improvements on Rural Lands” per Oregon’s Transportation Planning Rule (TPR) Section 660-012-0070;
- Will not measurably reduce traffic volumes anticipated on the arterial and collector streets in the south part of the City or at the US 97/Yew Avenue interchange;
- Can provide an alternative connection to US 97 for the large lot industrial lands near the Fairgrounds; however, the majority of the traffic anticipated from these lands over the next 20 years is anticipated to use the Yew Avenue Interchange; and
- The SW Quarry Avenue Interchange is not needed to meet the identified transportation needs within the TSP and would therefore be considered part of a “illustrative list” of potential projects for the City to consider at a future date.

Based on these findings, it does not appear that the requirements of a “Goal Exception” per the TPR is warranted at this time nor should the SW Quarry Avenue/US 97 Interchange be included in the list of reasonably funded TSP projects.

Accordingly, the City, County and ODOT should monitor the need for planning, designing and constructing a SW Quarry Avenue as part of TSP implementation. This interchange is not part of the 20-year list of projects considered to be reasonably likely to be funded within the TSP.



Attachment A Traffic Operations Worksheets



MOVEMENT SUMMARY

 Site: 101 [41 - SW 27th @ SW Canal Blvd]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SW Canal Dr											
3	L2	209	5.0	0.698	16.4	LOS C	6.6	168.6	0.83	0.90	29.2
8	T1	266	1.0	0.698	16.4	LOS C	6.6	168.6	0.83	0.90	29.3
18	R2	143	3.0	0.698	16.4	LOS C	6.6	168.6	0.83	0.90	28.5
Approach		619	2.8	0.698	16.4	LOS C	6.6	168.6	0.83	0.90	29.1
East: SW Yew Ave											
1	L2	124	0.0	1.089	80.0	LOS F	43.7	1098.5	1.00	2.39	16.2
6	T1	608	1.0	1.089	80.0	LOS F	43.7	1098.5	1.00	2.39	16.2
16	R2	156	0.0	1.089	80.0	LOS F	43.7	1098.5	1.00	2.39	16.0
Approach		888	0.7	1.089	80.0	LOS F	43.7	1098.5	1.00	2.39	16.2
North: SW Canal Blvd											
7	L2	108	0.0	0.788	30.6	LOS D	6.7	167.3	0.91	1.16	24.9
4	T1	244	1.0	0.788	30.6	LOS D	6.7	167.3	0.91	1.16	24.9
14	R2	80	0.0	0.788	30.6	LOS D	6.7	167.3	0.91	1.16	24.4
Approach		433	0.6	0.788	30.6	LOS D	6.7	167.3	0.91	1.16	24.8
West: SW 27th St											
5	L2	20	0.0	0.439	9.7	LOS A	2.5	62.8	0.67	0.67	32.9
2	T1	279	0.0	0.439	9.7	LOS A	2.5	62.8	0.67	0.67	32.8
12	R2	77	0.0	0.439	9.7	LOS A	2.5	62.8	0.67	0.67	31.9
Approach		376	0.0	0.439	9.7	LOS A	2.5	62.8	0.67	0.67	32.6
All Vehicles		2315	1.1	1.089	42.4	LOS E	43.7	1098.5	0.88	1.48	22.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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HCM Signalized Intersection Capacity Analysis

142: US-97 SB Ramps & SW Yew Ave

2040 Peak Hour

06/02/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	284	243	380	763	0	0	0	0	132	0	201
Future Volume (vph)	0	284	243	380	763	0	0	0	0	132	0	201
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1667	1423	1567	1733						1662	1458
Flt Permitted		1.00	1.00	0.44	1.00						0.95	1.00
Satd. Flow (perm)		1667	1423	731	1733						1662	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	309	264	413	829	0	0	0	0	143	0	218
RTOR Reduction (vph)	0	0	137	0	0	0	0	0	0	0	0	83
Lane Group Flow (vph)	0	309	127	413	829	0	0	0	0	0	143	135
Confl. Peds. (#/hr)			4	4								
Heavy Vehicles (%)	0%	5%	2%	6%	1%	0%	0%	0%	0%	0%	0%	2%
Turn Type		NA	Perm	pm+pt	NA						Perm	NA
Protected Phases		2		1	6						4	
Permitted Phases			2	6						4		4
Actuated Green, G (s)		24.1	24.1	35.1	35.1						10.6	10.6
Effective Green, g (s)		24.1	24.1	35.1	35.1						10.6	10.6
Actuated g/C Ratio		0.43	0.43	0.63	0.63						0.19	0.19
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		721	615	550	1092						316	277
v/s Ratio Prot		0.19		0.08	c0.48							
v/s Ratio Perm			0.09	0.39							0.09	c0.09
v/c Ratio		0.43	0.21	0.75	0.76						0.45	0.49
Uniform Delay, d1		11.0	9.8	6.7	7.3						20.0	20.1
Progression Factor		1.00	1.00	1.00	1.00						1.00	1.00
Incremental Delay, d2		0.4	0.2	5.7	3.1						1.0	1.3
Delay (s)		11.4	10.0	12.4	10.4						21.0	21.5
Level of Service		B	B	B	B						C	C
Approach Delay (s)		10.8			11.1			0.0			21.3	
Approach LOS		B			B			A			C	
Intersection Summary												
HCM 2000 Control Delay			12.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			55.7			Sum of lost time (s)				15.0		
Intersection Capacity Utilization			83.1%			ICU Level of Service				E		
Analysis Period (min)			15									

c Critical Lane Group

Queues
142: US-97 SB Ramps & SW Yew Ave

2040 Peak Hour
06/02/2020

	→	↘	↙	←	↓	↗
Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	309	264	413	829	143	218
v/c Ratio	0.43	0.35	0.75	0.76	0.45	0.60
Control Delay	14.4	4.1	19.1	15.1	24.4	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.4	4.1	19.1	15.1	24.4	18.6
Queue Length 50th (ft)	66	4	54	154	42	34
Queue Length 95th (ft)	148	46	#201	#469	85	88
Internal Link Dist (ft)	1380			488	462	
Turn Bay Length (ft)		75	150			200
Base Capacity (vph)	719	749	550	1090	896	834
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.35	0.75	0.76	0.16	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

143: US-97 NB Ramps & SE Airport Way

2040 Peak Hour

06/02/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	292	0	0	734	209	409	1	253	0	0	0
Future Volume (vph)	126	292	0	0	734	209	409	1	253	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0			5.0	5.0	5.0	5.0				
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00				
Frpb, ped/bikes	1.00	1.00			1.00	0.98	1.00	1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	0.85				
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00				
Satd. Flow (prot)	1599	1667			1683	1395	1630	1431				
Flt Permitted	0.12	1.00			1.00	1.00	0.95	1.00				
Satd. Flow (perm)	205	1667			1683	1395	1630	1431				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	317	0	0	798	227	445	1	275	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	60	0	180	0	0	0	0
Lane Group Flow (vph)	137	317	0	0	798	167	445	96	0	0	0	0
Confl. Peds. (#/hr)	3		1	1		3						
Heavy Vehicles (%)	4%	5%	0%	0%	4%	4%	2%	0%	4%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8					
Actuated Green, G (s)	37.3	37.3			27.8	27.8	24.9	24.9				
Effective Green, g (s)	37.3	37.3			27.8	27.8	24.9	24.9				
Actuated g/C Ratio	0.52	0.52			0.39	0.39	0.34	0.34				
Clearance Time (s)	5.0	5.0			5.0	5.0	5.0	5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	192	861			648	537	562	493				
v/s Ratio Prot	c0.04	0.19			c0.47			0.07				
v/s Ratio Perm	0.32					0.12	c0.27					
v/c Ratio	0.71	0.37			1.23	0.31	0.79	0.19				
Uniform Delay, d1	15.5	10.4			22.2	15.5	21.3	16.6				
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00				
Incremental Delay, d2	11.8	0.3			117.3	0.3	7.5	0.2				
Delay (s)	27.3	10.7			139.5	15.8	28.8	16.8				
Level of Service	C	B			F	B	C	B				
Approach Delay (s)		15.7			112.1			24.2			0.0	
Approach LOS		B			F			C			A	
Intersection Summary												
HCM 2000 Control Delay			63.4				HCM 2000 Level of Service		E			
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			72.2				Sum of lost time (s)		15.0			
Intersection Capacity Utilization			86.6%				ICU Level of Service		E			
Analysis Period (min)			15									

c Critical Lane Group

Queues
143: US-97 NB Ramps & SE Airport Way

2040 Peak Hour
06/02/2020

						
Lane Group	EBL	EBT	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	137	317	798	227	445	276
v/c Ratio	0.71	0.37	1.24	0.38	0.79	0.41
Control Delay	36.3	13.6	144.6	12.7	32.3	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	13.6	144.6	12.7	32.3	4.2
Queue Length 50th (ft)	31	82	~461	39	174	0
Queue Length 95th (ft)	#109	164	#750	106	278	44
Internal Link Dist (ft)		488	979			520
Turn Bay Length (ft)	150			100		
Base Capacity (vph)	193	860	645	595	750	807
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.37	1.24	0.38	0.59	0.34

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

MOVEMENT SUMMARY

 Site: [44 - SW 19th @ SE Airport Way]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SW 19th St											
3	L2	145	0.0	0.202	5.8	LOS A	0.9	23.1	0.50	0.40	32.7
18	R2	46	8.0	0.202	5.8	LOS A	0.9	23.1	0.50	0.40	31.6
Approach		190	1.9	0.202	5.8	LOS A	0.9	23.1	0.50	0.40	32.4
East: SE Airport Way											
1	L2	25	0.0	0.528	9.3	LOS A	3.7	95.1	0.48	0.31	33.1
6	T1	575	5.0	0.528	9.3	LOS A	3.7	95.1	0.48	0.31	32.9
Approach		600	4.8	0.528	9.3	LOS A	3.7	95.1	0.48	0.31	33.0
West: SE Airport Way											
2	T1	343	3.0	0.344	6.0	LOS A	2.0	52.0	0.14	0.04	34.7
12	R2	93	16.0	0.344	6.0	LOS A	2.0	52.0	0.14	0.04	33.4
Approach		437	5.8	0.344	6.0	LOS A	2.0	52.0	0.14	0.04	34.4
All Vehicles		1227	4.7	0.528	7.6	LOS A	3.7	95.1	0.36	0.23	33.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 Site: [45 - SW Helmholtz @ SW Canal]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
NorthEast: SW Canal											
6x	T1	236	1.0	0.285	7.2	LOS A	1.3	33.9	0.58	0.53	34.1
16x	R2	11	0.0	0.285	7.2	LOS A	1.3	33.9	0.58	0.53	33.2
Approach		247	1.0	0.285	7.2	LOS A	1.3	33.9	0.58	0.53	34.1
NorthWest: SW Helmholtz											
7x	L2	24	0.0	0.213	5.4	LOS A	1.0	25.6	0.42	0.30	34.6
14x	R2	199	4.0	0.213	5.4	LOS A	1.0	25.6	0.42	0.30	33.5
Approach		223	3.6	0.213	5.4	LOS A	1.0	25.6	0.42	0.30	33.6
SouthWest: SW Canal											
5x	L2	443	1.0	0.627	10.2	LOS B	6.7	167.5	0.24	0.08	31.4
2x	T1	397	0.0	0.627	10.2	LOS B	6.7	167.5	0.24	0.08	31.4
Approach		840	0.5	0.627	10.2	LOS B	6.7	167.5	0.24	0.08	31.4
All Vehicles		1310	1.1	0.627	8.8	LOS A	6.7	167.5	0.34	0.20	32.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

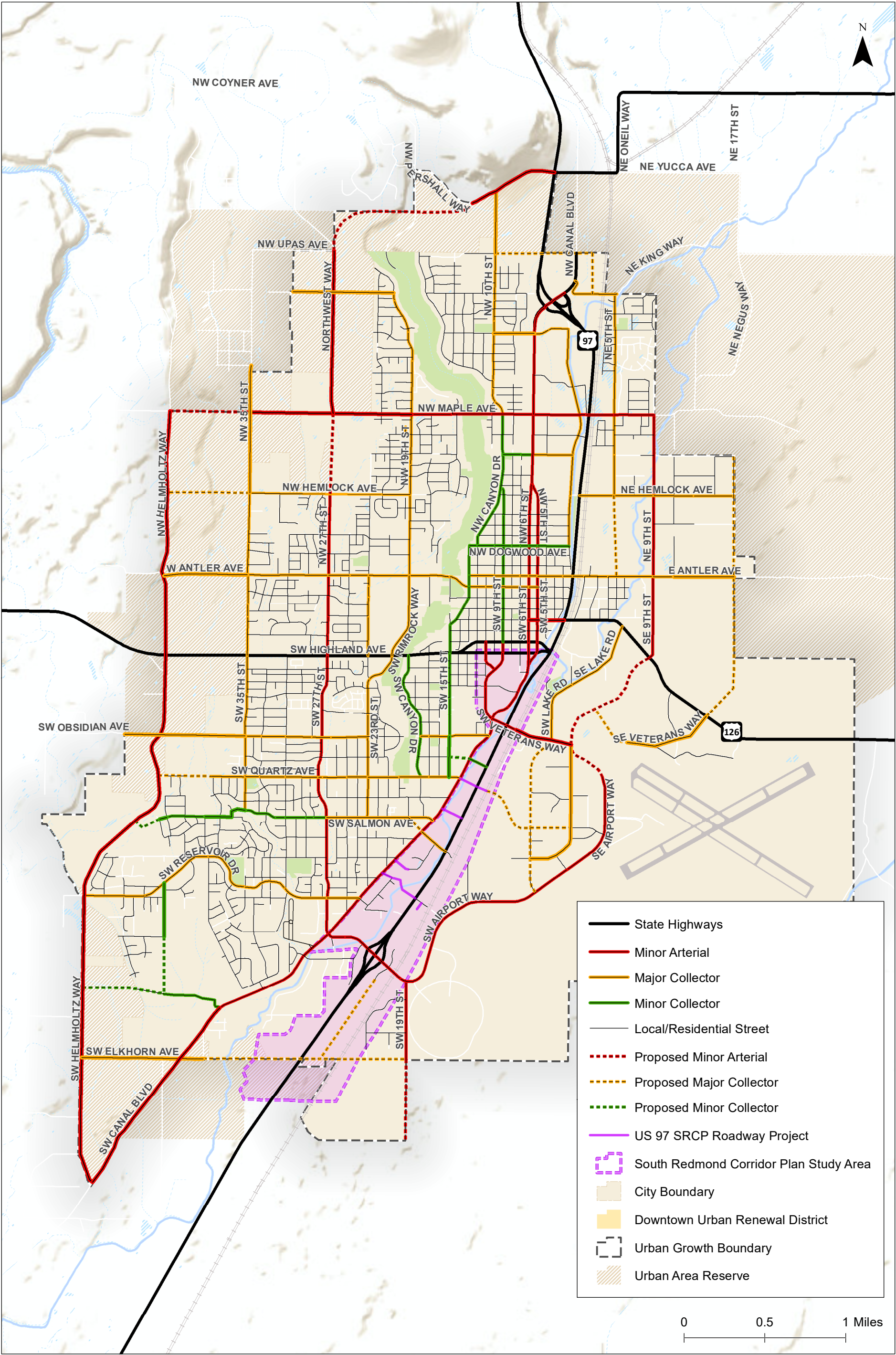
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Redmond TSP Update – Errata Table

#	TOPIC	SOURCE	COMMENT	PROPOSED CHANGE
1	Functional Classification Map	City of Redmond Staff	Update Functional Classification map to reflect recent roadway constructions	Update GIS base layer to show completed roads, such as 27 th Street just south of Hemlock Avenue
2	5 th Street Extension: Maple Avenue to Hemlock Avenue	City of Redmond Staff	Add future 5 th Street Extension (Major Collector) between Maple Avenue and Hemlock Avenue	Modify Functional Classification Map and add Roadway Project to reflect proposed extension.
3	Quartz Avenue Extension: East of Railroad Tracks	City of Redmond Staff	Modify proposed east-west collectors between Airport Way and Veterans Way (two collectors currently shown) to show a single east-west connection between future Quartz Avenue extension and existing Salmon Drive.	Modify Functional Classification Map and Roadway Project lists to reflect proposed collector.
4	19 th Street Functional Classification	City of Redmond Staff	Modify 19 th Street Functional Classification from Major Collector to Minor Arterial. 19 th Street will provide key north-south connection for future development in Redmond.	Update Functional Classification Map to show 19 th Street as a Major Arterial.



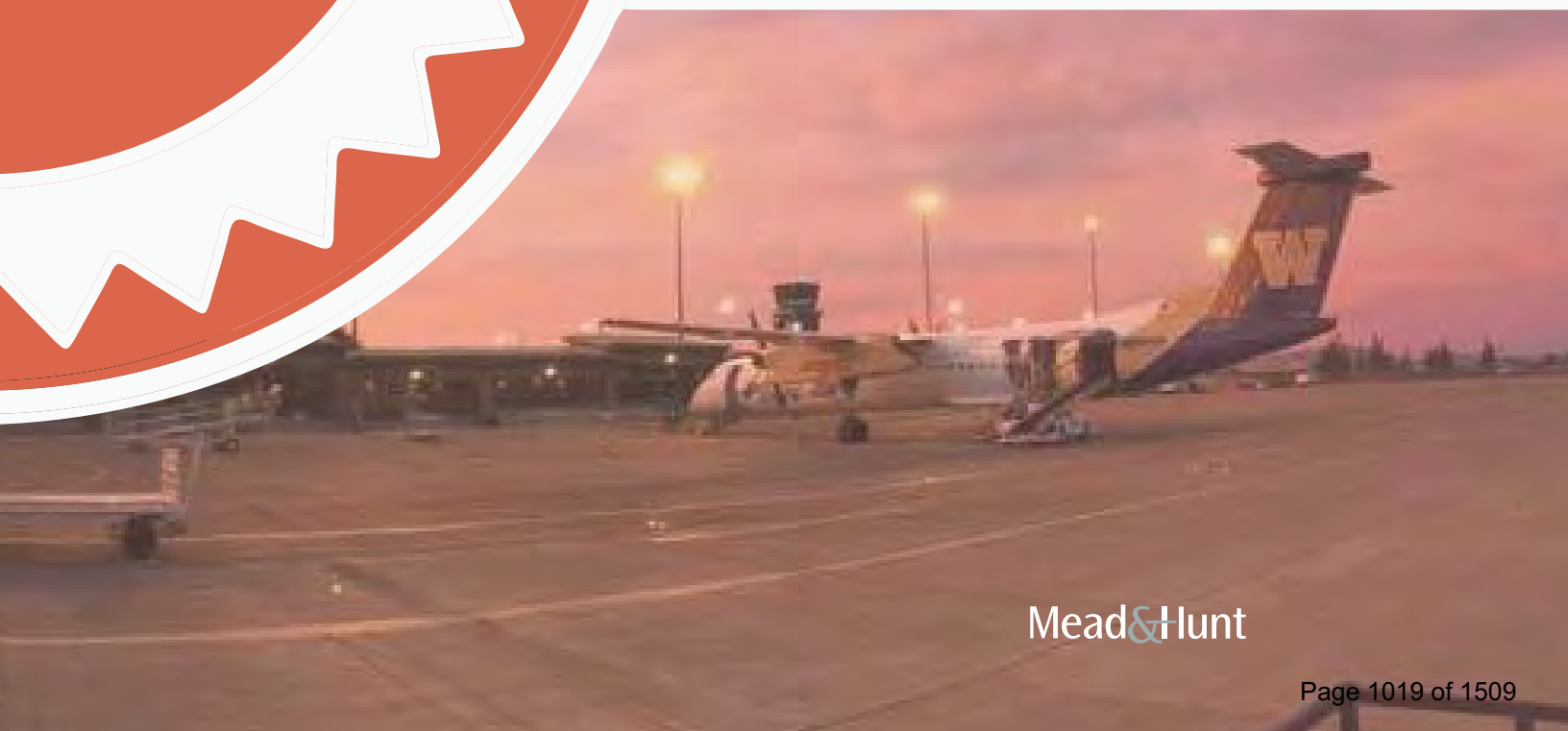
Functional Classification
Redmond, Oregon

Figure
X

Coordinate System: NAD 1983 Oregon Statewide Lambert Feet Intl



**REDMOND MUNICIPAL
AIRPORT MASTER PLAN
2018**





REDMOND MUNICIPAL AIRPORT MASTER PLAN

MARCH 2018

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Introduction Chapter

Chapter Overview	1
Study Introduction.....	1
Why is it Time for a Master Plan?.....	2
Study Goals and Process.....	3
Master Plan Goals / Central Questions of the Master Plan.....	3
The Planning Process and Timeline.....	3
Plan Participation	4
Agency Coordination	4
Airport Committee.....	4
Planning Advisory Committee	4
Key Technical Stakeholders	5
Public Outreach	5
SWOT Analysis	6

Chapter 1 – Airport Inventory

1.0	Airport Inventory.....	1
1.1	Introduction to the Inventory.....	1
1.1.1	Chapter Purpose and Organization	1
1.2	Airport Overview	3
1.2.1	Airport Location.....	3
1.2.2	Airport and Community History.....	3
1.2.3	Airport Property.....	3
1.2.4	Operational Overview	7
1.3	Airside Facilities	8
1.3.1	Runway System.....	8
1.3.2	Taxiway System.....	10
1.3.3	Airfield Design Standards	10
1.3.4	Aircraft Aprons	14
1.3.5	Fixed Base Operators.....	14
1.3.6	Aircraft Storage.....	15
1.3.7	Support Facilities	15
1.3.8	Pavement.....	19
1.3.9	Navigational Aids and Instrument Procedures	23
1.3.10	Climate – Wind and Weather Conditions	31
1.3.11	Airfield Marking and Lighting	34
1.3.12	Other Airside Facilities.....	37
1.4	Landside Facilities.....	37
1.4.1	Airport Access and Vehicle Parking	37
1.4.2	Utilities	40
1.4.3	Non-Aviation Facilities	48
1.4.4	On-Airport Zoning and Lease Restrictions	49

1.5	Terminal Building.....	49
1.5.1	Terminal Building	49
1.6	Aviation Activity	61
1.7	Aeronautical Setting	62
1.7.1	Commercial Service Airports	62
1.7.2	General Aviation Airports.....	62
1.8	Community Setting	66
1.8.1	Socioeconomic Data.....	66
1.9	Airport Financial Overview & Economic Contribution	67
1.9.1	Historical Financial Information	67
1.9.2	Airport Economic Impacts.....	68
1.10	Environmental Conditions	69
1.10.1	Air Quality	69
1.10.2	Compatible Land Use	69
1.10.3	Historical, Architectural, Archaeological, and Cultural Resources	70
1.10.4	Section 4(f) Property.....	74
1.10.5	Threatened and Endangered Species.....	76
1.10.6	Water Quality.....	76
1.10.7	Farmland.....	77
1.10.8	Critical Areas	78
1.10.9	Floodplains	78
1.10.10	Recycling Plan	78
1.11	Conclusion and Summary	79

Chapter 2 – Aviation Activity Forecasts

2.0	Forecast Summary.....	1
2.1	Introduction to Forecasts.....	2
2.2	Community Profile	6
2.2.1	Population.....	6
2.2.2	Employment and Economic Development	10
2.2.3	Gross Regional Product	13
2.2.4	United States Forest Service.....	13
2.2.5	Tourism.....	14
2.2.6	Regional Airports	15
2.2.7	Catchment Areas and Competition.....	17
2.3	Aviation Activity Profile	22
2.3.1	Airline Service.....	22
2.3.2	General Aviation	32
2.3.3	Military	38
2.3.4	FAA TAF	39
2.4	Scheduled Service Forecasts	41
2.4.1	Passenger Enplanements	41

2.4.2	Air Cargo.....	47
2.4.3	Commercial Operations.....	49
2.5	General Aviation Forecasts.....	52
2.5.1	Itinerant General Aviation Operation.....	52
2.5.2	Local Operations.....	56
2.5.3	Based Aircraft.....	59
2.6	Peak Forecasts and Critical Aircraft.....	62
2.6.1	Peak Period Forecasts.....	62
2.6.2	Critical Aircraft.....	62
2.7	Forecast Summary.....	64

Chapter 3 – Facility Requirements

3.0	Facility Requirements.....	1
3.1	Introduction to Facility Requirements.....	1
3.2	Airside Facility Requirements.....	3
3.2.1	Airfield Capacity.....	3
3.2.2	Airfield Design.....	5
3.2.3	Runway System.....	10
3.2.4	Taxiway System.....	29
3.2.5	General Aviation Facilities.....	35
3.3	Landside Facility Requirements.....	40
3.3.1	Passenger Terminal Roadway.....	40
3.3.2	Passenger Terminal Parking Area – Public Parking.....	40
3.3.3	Rental Car Facilities.....	42
3.3.4	Non-Aviation Revenue Development.....	43
3.4	Terminal Area Facilities.....	45
3.4.1	Airport Activity.....	45
3.4.2	Passenger Terminal Building.....	46
3.4.3	Gate Capacity Requirements.....	49
3.4.4	Terminal Building Development.....	51
3.4.5	Conclusions and Recommendations.....	53
3.5	Support Facility Requirements.....	53
3.5.1	Fixed Base Operator (FBO).....	53
3.5.2	United States Forest Service (USFS).....	53
3.5.3	Cargo Facilities.....	53
3.5.4	Air Support and Maintenance Facilities.....	54
3.5.5	Conclusions and Recommendations.....	56
3.6	Facility Requirements Summary.....	57

Chapter 4 – Development Alternatives

Chapter Summary.....	1
----------------------	---

4.0	Introduction	2
4.1	Airport Development Objectives.....	3
4.1.1	Airside Planning.....	4
4.1.2	Landside Planning	4
4.2	Alternative Development Process	5
4.2.1	Airport Master Plan Advisory Committee Input	5
4.3	Evaluation Categories	6
4.3.1	Operational Capabilities	6
4.3.2	Performance Requirements Benchmarks	6
4.3.3	Land Use Compatibility.....	6
4.3.4	Environmental Impacts	7
4.3.5	Stakeholder Feedback.....	8
4.3.6	Constructability	8
4.3.7	Financial Costs/Impacts	8
4.4	Evaluation Process.....	9
4.5	Airport Development Alternatives.....	10
4.5.1	Runway Alternatives.....	10
4.5.2	Taxiway Alternatives.....	24
4.5.3	Airport Vehicle Parking Alternatives	29
4.5.4	General Aviation Development Alternatives	39
4.5.5	Aviation Support Facilities Alternatives	43
4.5.6	Passenger Terminal Alternatives.....	55
4.5.7	Non-Aeronautical Development Alternatives.....	65
4.5.8	Aircraft Rescue & Fire Fighting Building Alternatives.....	72
4.5.9	Northeast Passenger Terminal Apron Reconstruction Alternative	77
4.6	Alternatives Summary	79
4.6.1	Preferred Development Concept.....	80

Chapter 5 – Financial Feasibility

5.0	Financial Feasibility.....	1
5.1	Approach to Capital Planning.....	1
5.1.1	Project Phasing.....	1
5.1.2	Project Costs	2
5.1.3	Funding Participation and Commitment	2
5.1.4	Airport Funds	5
5.2	Capital Improvement Plan	7
5.2.1	Near-term CIP (FY2019-FY2023).....	8
5.2.2	Mid-term CIP (FY2024-FY-2028)	12
5.2.3	Long-term CIP (FY2029-FY2038)	15
5.3	Chapter Summary	19

Appendices

Appendix A – ALP and Checklist

Appendix B – Supplemental Forecast Information

Appendix C – Recycling Plan

Appendix D – Implementation Guide

Appendix E – Coordination and Outreach Summary

Appendix F – Landside Development

Appendix G – Noise Inputs

Chapter Overview

The City of Redmond (City) initiated an update to the Airport Master Plan (“Plan”) to assess the facility and service needs of the Redmond Municipal Airport (“the Airport”) throughout the next 20 years. The Plan serves as a roadmap for bringing projects, people, and funding together in a coordinated manner, and provides strategic direction regarding the Airport’s 20-year capital development plan and investment of resources.

The Plan is conducted in accordance with Federal Aviation Administration (FAA) guidance, as prescribed by grant assurances and mandated by regulatory standards. Conformance with FAA standards enables the City of Redmond to apply for federal and state funding in order to support the maintenance, expansion, and upgrade of airport facilities as demand warrants and funding is available.

Study Introduction

The Airport is owned by the City of Redmond, Oregon. The City of Redmond is a key stakeholder in the Plan. The Aviation Program Manager, Nettice Honn, is the daily project manager for the City. The City’s planning and engineering departments are represented on the Planning Advisory Committee (PAC).

The Plan evaluates the Airport’s needs over a 20-year planning period for airfield, airspace, terminal area, and landside facilities. The goal is to document the orderly development of Airport facilities essential to meeting City needs, in accordance with FAA standards, and in a manner complementary with community interests. The Plan results in a 20-year development strategy envisioned by the City, reflective of the updated Airport Capital Improvement Program (CIP), and graphically depicted by the Airport Layout Plan (ALP) drawings. The approved Plan allows the City to satisfy FAA assurances, and seek project funding eligible under the respective federal and state airport aid program.

The Master Plan will have the following core components, in accordance with FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*:

- 1: Study Design
- 2: Project Management
- 3: Stakeholder Coordination and Outreach
- 4: Airports Geographic Information Systems
- 5: Airport Inventory
- 6: Demand Forecasts
- 7: Facility Requirements
- 8: Improvement Alternatives
- 9: Financial Feasibility
- 10: Implementation Plan
- 11: Airport Layout Plan
- 12: Documentation



Why is it Time for a Master Plan?

The Airport Master Plan was last updated in 2005, with the ALP drawings last revised in November 2013. Since the 2005 Master Plan, the FAA has updated airfield design standards and aviation activity trends have changed. The 2005 Master Plan does not include important developments as envisioned by the City. This Plan is funded by the City with a grant from the FAA Airport Improvement Program (AIP).

Airport master plans are generally updated every 10 years, depending on the planning outlook and complexity of the airport. The aviation market has seen major changes since 2005, with fuel prices increasing, Next Generation navigation technologies becoming commonplace, the demand for pilots growing worldwide, the accelerated development of unmanned aerial systems, and new FAA policies on airport development. The assumptions and facts that formed the basis for recommendations in the 2005 Master Plan are in need of an update to reflect an evolving marketplace.

The changes in the community around Redmond reinforce the need for a new master plan to reexamine growth projections and future facility needs. The Airport is centrally-located in Central Oregon, an area that has been experiencing unprecedented growth in population and business interests. The region's physical location on the east side of the Cascade Mountains contributes to the favorable weather experienced year round. This is a major factor in the attractiveness to both young families and those looking to retire. These growth patterns will be evaluated in the Plan and included in all facility design and analysis for the Airport's 20-year plan.



Study Goals and Process

Master Plan Goals / Central Questions of the Master Plan

The core questions for this Plan include the following:

- ✓ How will Central Oregon's growth continue in the future, and what will the impact be on aviation activity?
- ✓ What role will General Aviation (GA) and United States Forest Service (USFS) activities play in the future?
- ✓ Is a runway extension justified, and if so, how long should it be, and in what direction?
- ✓ What is the viability of runway and terminal improvements previously depicted on the ALP?
- ✓ How can the passenger terminal and associated facilities accommodate continued passenger growth and additional carriers?
- ✓ What are the opportunities for increased airport revenue generation?
- ✓ How much property will be needed to satisfy the demand for future aviation use?
- ✓ What future changes in critical aircraft should the Airport plan for?
- ✓ Are aviation facilities adequate to meet the needs of the growing community?

The Planning Process and Timeline

FIGURE I-1: PROJECT TIMELINE & ROADMAP



Plan Participation

As a strategic visioning process, the Plan is structured to be responsive to Airport needs while being inclusive of broader community considerations. This approach builds stakeholder support for Plan recommendations and facilitates acceptance. The Plan's public involvement program is targeted to engage key Airport stakeholders (City and County elected officials, community leaders, on- and off-Airport stakeholders), address comments, and actively encourage public participation.

Agency Coordination

The FAA Seattle Airport District Office (ADO) is the primary external reviewing agency for this Plan. A representative from the Seattle ADO will be provided Plan deliverables and invited to attend PAC and public meetings. A visit will be made to the Seattle ADO two times during the Plan development to review key deliverables since the FAA is not always able to travel to Airport events.

The Oregon Department of Aviation (ODA) is a key stakeholder in the Plan. The Consultant and the Airport will keep ODA updated on Plan progress through routine communication, including scheduled teleconferences, and transmittal of Plan chapters.

Airport Committee

The purpose of the Airport Committee is to advise the City Council regarding issues that concern the development of the Airport. The Airport Committee supported Plan visioning, provided feedback on the Plan elements at key milestones, and will be essential to the Airport's ability to move forward with Plan recommendations.

Planning Advisory Committee

The PAC consists of aviation and non-aviation constituents selected to provide well-rounded Plan perspectives. The PAC serves in an advisory capacity to collectively review Plan recommendations and provide feedback to the Airport and Consultant. PAC input will be used to guide Plan developments. The PAC consists of members representing the following interests:

- ✓ USFS
- ✓ Redmond Economic Development, Inc.
- ✓ Redmond Chamber of Commerce
- ✓ Airport Tenant (GA Representative)
- ✓ Deschutes County
- ✓ City of Redmond Engineering Dept.
- ✓ City of Redmond Planning Division



- ✓ City of Bend
- ✓ Prineville (S39) Airport Management

The Airport project manager serves as an ex-officio member of the PAC. The FAA and ODA are informed of PAC meetings and invited to attend in an observer role.

Key Technical Stakeholders

While the PAC will provide a continuous sounding board throughout the Plan, there are some stakeholders that are expected to be interested in specific Plan elements and disinterested in others. The Consultant will meet with these stakeholders to collect their feedback on Plan elements that are of interest to them. These include:

Plan Element	Key Technical Stakeholders
Airport Inventory	Control Tower Law enforcement Passenger and Cargo Airlines Transportation Security Administration (TSA) Aircraft rescue and firefighting (ARFF) Businesses on airport property Airport hangar tenants
Demand Forecasts	Passenger and cargo airlines Control tower
Improvement Alternatives	Control tower TSA ARFF Deschutes County

Also, the City of Redmond is completing a Comprehensive Plan update and roadway engineering projects in the vicinity of the Airport concurrent with the Airport Master Plan. Close coordination between the Airport and community planning and development projects were pursued to help efforts of both organizations support common goals.

Public Outreach

This public involvement process is used to inform, educate, and solicit feedback from the public regarding the Plan process, major findings, and conclusions. Conducting public outreach meetings in an "open house" format provides the general public the opportunity to interact with the Airport and Consultant, ask questions, communicate concerns, and provide feedback.

The two (2) public meetings occur at the following Plan milestones.



- ✓ Facility Requirements and Initial Improvement Alternatives
- ✓ Refined Alternatives and Preliminary Capital Improvement Plan

A summary of public involvement is included as a Plan appendix.

SWOT Analysis

As part of the strategic planning process, a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was conducted with the PAC to determine the appropriate strategic visions for the Airport, and specific goals and objectives to be addressed throughout the Plan. SWOT is a process for synchronizing strategic decision-making factors, and helps categorize the Airport's internal and external characteristics, qualities, and merits. When compiled, the SWOT factors help formulate Plan goals, provide the basis to pragmatically assess recommendations, and guide the Plan's overall developmental policy. The following SWOT factors were identified by the Planning Advisory Committee during the project kick-off meeting held November 5, 2016.

SWOT TABLE

		Helpful To Achieving the Objective	Harmful To Achieving the Objective
Internal Origin	Attributes Within Airport Influence	<u>S</u> trengths	<u>W</u> eaknesses
External Origin	Attributes Outside of Airport Influence	<u>O</u> pportunities	<u>T</u> hreats

<u>Strengths:</u>	characteristics that provide an advantage over others.
<u>Weaknesses:</u>	characteristics that create a disadvantage compared to others.
<u>Opportunities</u>	outside potential that the Airport could capitalize on.
<u>Threats:</u>	outside risks that could be detrimental to the Airport.



Strengths:

- ✓ Runway wind coverage and physical access
- ✓ Runway length
- ✓ Central location
- ✓ ARFF presence
- ✓ New terminal
- ✓ Security
- ✓ Business and tourist economy
- ✓ Size of Airport-owned property
- ✓ Frequency of flights
- ✓ Air Traffic Control Tower presence
- ✓ FAA grant assurances in place to keep the Airport intact

Opportunities:

- ✓ Business and industry diversity in the area
- ✓ Hotel availability
- ✓ Transportation network companies (Uber)
- ✓ Transportation systems/multi-use path
- ✓ Terminal – Jet Bridges
- ✓ East bound flights
- ✓ Additional connections
- ✓ Time of flights (more at night)
- ✓ Emergency preparedness
- ✓ Airport land owned north of airfield (golf course area)
- ✓ Airport name/branding
- ✓ Improving access to the airfield particularly on the north side

Weakness:

- ✓ TSA and security requirements to adhere to
- ✓ Limited infrastructure availability
- ✓ USFS airside expansion potential limited by lack of available land adjacent to current taxiways

Threats:

- ✓ Not isolated from national/international threats
- ✓ Availability of skilled workforce or higher education opportunities
- ✓ Lack of FBO maintenance technicians and training
- ✓ BLM and other open lands where transient population tends to gravitate
- ✓ GA competition in the region – users could go elsewhere
- ✓ Cascadia earthquake
- ✓ Could overshoot growth estimates and overbuild



1.0 AIRPORT INVENTORY

This Inventory Chapter documents 2016 conditions at the Redmond Municipal Airport (the Airport) and provides a foundation for the overall planning analysis in the subsequent chapters of the RDM Master Plan. The Inventory Chapter includes an overview of environmental conditions and land uses at and surrounding the Airport to provide a basis for evaluating planned improvements.

1.1 INTRODUCTION TO THE INVENTORY

This section summarizes the purpose and organization of this chapter, and defines the key elements that are included in the investigation.

1.1.1 CHAPTER PURPOSE AND ORGANIZATION

The Inventory Chapter looks at the physical layout of the Airport and documents 2016 conditions in terms of airfield design standards and aviation activity. The Master Plan does not address management policies and procedures, staffing or operational rules and regulations. These topics are addressed in other airport documents.

The chapter begins with an overview of the Airport that covers location, history, role in the community, property interests, and the components of airport operation. The Airport is a complex operation with three major facility areas: airside, landside, and the terminal building. The Inventory Chapter documents each of these three areas in terms of use, design, and condition.

- ✓ Airside facilities are those areas that are restricted from general public access – sometimes called “inside the fence.” This includes runways and taxiways, facilities for general aviation parking and maintenance, air cargo and other private business facilities with direct access to the runway, airport safety and maintenance facilities and the area used by the United States Forest Service (USFS).
- ✓ Landside facilities are those that support airport activities without direct access to the airfield. They include internal roadways, parking areas, and non-aeronautical development areas.
- ✓ The terminal building provides a transition between the airside and landside areas for commercial airline passengers and provides spaces for the traveling public, airline and airport administration, and the Transportation Security Administration (TSA).

The chapter will cover airport activity and design standards, which will be used in later plan chapters to address the need for improvements, improvements that may be recommended, and as a basis for design alternatives.



The chapter looks beyond the boundaries of the Airport to consider surrounding land uses that are subject to aircraft overflight, and the catchment area from where the Airport draws its passengers and users. The Airport serves the businesses and residents of the City of Redmond, the nearby City of Bend, and Deschutes, Crook, and Jefferson counties. The community around the Airport drives the demand for commercial air service, general aviation, and air cargo. Other airports serving the region are documented as they impact demand at the Airport.

Environmental factors are inventoried as they influence aircraft flight. Weather factors, such as temperature and wind direction, impact aircraft performance and drive facility design considerations. Environmental conditions such as wetlands, air quality, and aircraft noise are documented so future development can be evaluated in terms of potential environmental impacts.

Information was collected in several ways, including a site visit to the Airport in October 2016; review of documents and records provided by the Airport, the City of Redmond, the FAA, and other public agencies; and interviews with the Airport tenants. Results are presented in the following sections:

- ✓ Airport Overview
- ✓ Airside Facilities
- ✓ Landside Facilities
- ✓ Terminal Building
- ✓ Aeronautical Setting
- ✓ Community Setting
- ✓ Aviation Activity
- ✓ Airport Economic & Financial Conditions
- ✓ Environmental Conditions



1.2 AIRPORT OVERVIEW

This section gives an overview of the Airport that covers location, history, role in the community, property interests, and the components of airport operation.

1.2.1 AIRPORT LOCATION

The Airport is in central Oregon's high desert just east of the Cascade mountain range. The Airport is the only commercial service airport in the region, located 150 miles from Eugene to the west, 150 miles from Portland to the northwest, and 220 miles from Pendleton to the northeast. The Airport is located in Deschutes County, in the City of Redmond. Redmond's location has been important to its growth and prosperity in terms of the area's population and economy. Redmond has been the hub of the local transportation network since the railroad arrived in 1911. Today, Redmond's location at the intersection of Oregon's Highways 126 and 97 provides driving connections in four directions including to Interstate 5 to the west and Interstate 84 to the north, as shown in **Figure 1-1**.

1.2.2 AIRPORT AND COMMUNITY HISTORY

The first runways were constructed in 1929 with the support of Redmond Ray Johnson American Legion Post and Redmond Commercial Club, which has since evolved into the Redmond Chamber of Commerce. The Works Progress Administration improved the Airport during the 1930s, and during World War II, the US Army Air Corps used the Airport for training B-17 and P-38 pilots. The first commercial flight at the Airport was in 1946. After its service during the war, the Airport was sold to the City of Redmond.

1.2.3 AIRPORT PROPERTY

Airport property includes 2,518 acres surrounding two runways oriented in an "X" configuration. The passenger terminal area is southwest of the runway intersection. Aviation uses have been developed on the west and north side of the Airport along the major access routes of SE Airport Way, SE Veterans Way, and Highway 126. Property uses and development areas are shown on **Figure 1-2**, and key airport facilities are shown in **Figure 1-3**.





Figure 1-1
REDMOND LOCATION MAP

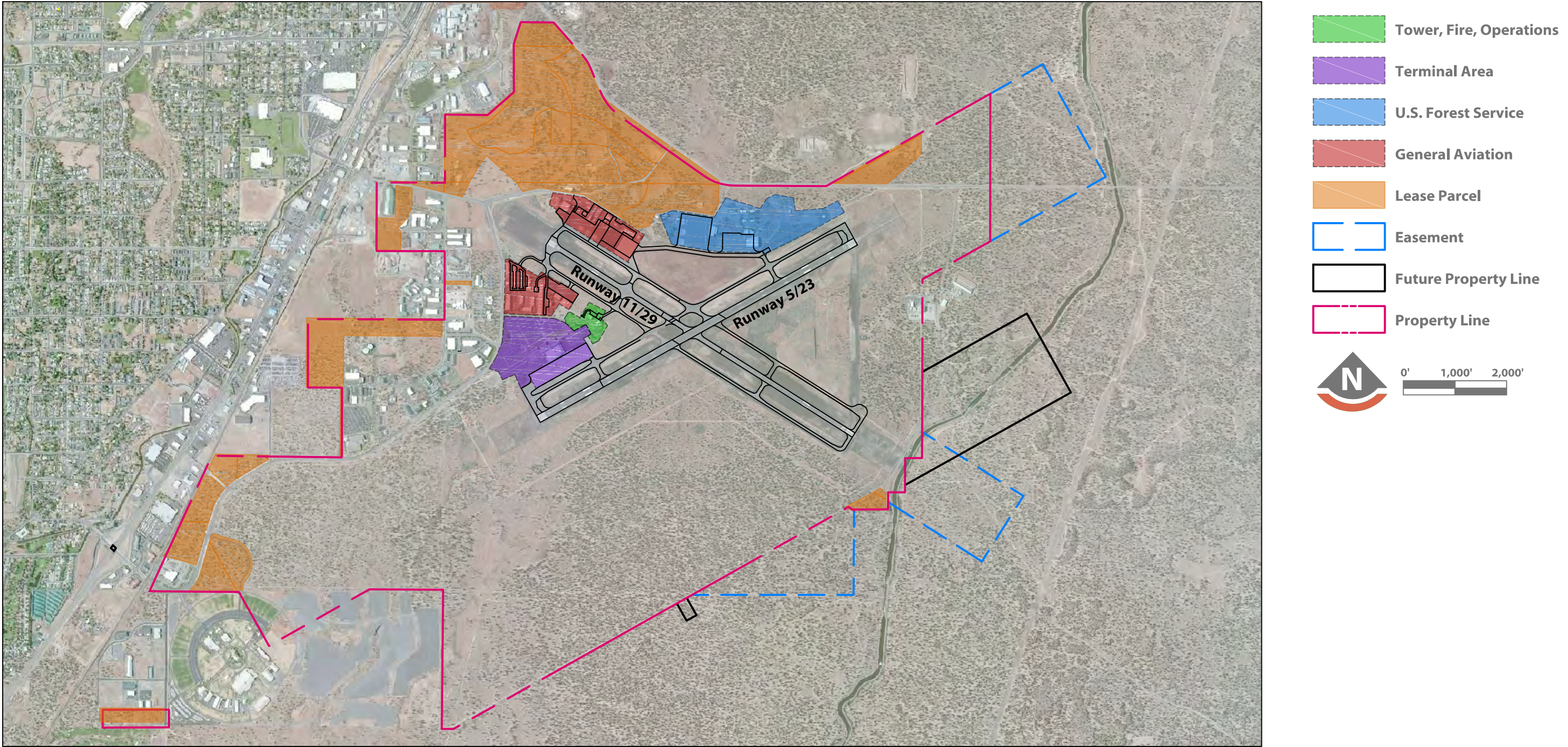


Figure 1-2
Property Map

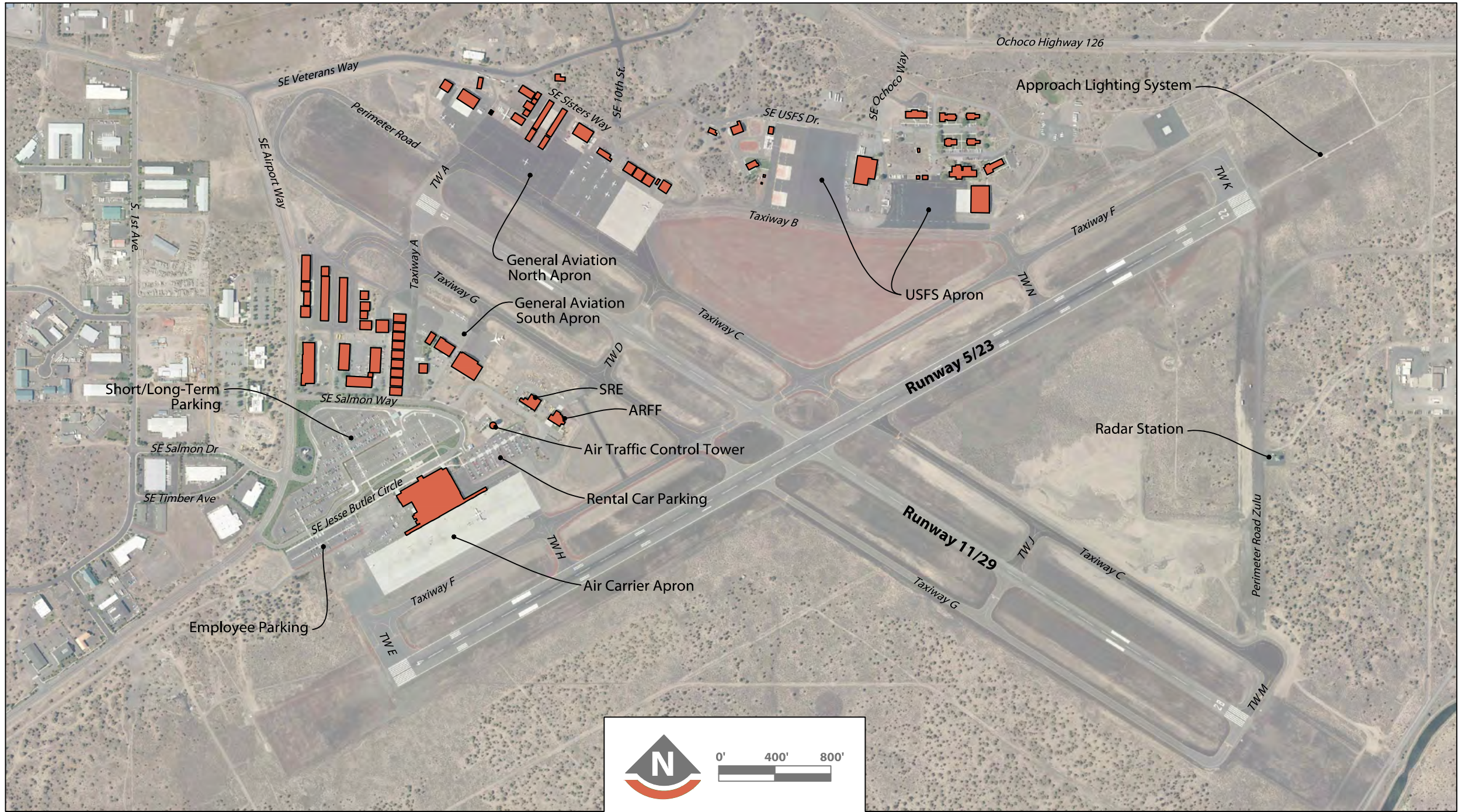


Figure 1-3
AIRPORT FACILITIES

1.2.4 OPERATIONAL OVERVIEW

MANAGEMENT

The Airport is owned by the City of Redmond. The Airport Director reports to the City Manager, and City employees are responsible for daily operations, programs, and services. City Council members, elected by the citizens of Redmond, are the City's policy makers. The City established an Airport Committee in 1991 to act in an advisory role to the City Council on airport-related matters. The Committee is composed of nine members: five appointed by Redmond; one appointed by the City of Bend; one appointed by Deschutes County; one appointed by Jefferson County; and one appointed by Crook County. Redmond recently instituted an Ex-Officio Youth member to help foster interest in aviation for young adults.

FUNCTIONAL CLASSIFICATIONS

The Airport is a public-use facility supporting commercial, general aviation, military, and USFS users. The Federal Aviation Administration (FAA) National Plan of Integrated Airport Systems (NPIAS) classifies the Airport as a non-hub primary commercial service airport. The NPIAS is updated every two years and uses predetermined evaluation criteria including commercial service enplanements, proximity to other airports, and number of based aircraft to identify airports that are of importance to the national air transportation system. Airports that are included in the NPIAS are eligible for FAA Airport Improvement Program (AIP) funding. Classification as a non-hub airport is based on the Airport having more than 10,000 annual passenger enplanements, but less than 0.05 percent of total national commercial passenger enplanements.

Under the Code of Federal Regulations (CFR), the Airport is certified as a Class I FAA Part 139 facility, which means that the Airport maintains facilities intended to serve scheduled passenger aircraft with 30 or more passenger seats.

The Oregon Department of Aviation classifies the Airport as a Category I - Commercial Service Airport. Airports in this category have scheduled commercial air carrier service. The Airport Reference Code (ARC), described in greater detail in **Section 1.3.3**, is C-III, which means that facilities are designed for medium-sized commercial aircraft like the Boeing 737 and Airbus A320. **Table 1-1** describes key facility attributes.

Table 1-1. Airport Data	
Airport Owner	City of Redmond
NPIAS Airport Category	Non-Hub
Airport Reference Code	C-III
Airport Acreage	2,518 acres
Airport Reference Point Coordinates	N 44° 15.24' W 121° 08.99'
Airport Elevation	3080 feet Above Mean Sea Level (AMSL)
Airport Traffic Control Tower	Open 14 hours daily (0500-1900 local time)
<i>Sources: FAA Airport Master Record (Form 5010), Airport Website, Airport Directory, NPIAS.</i>	



1.3 AIRSIDE FACILITIES

“Airside” is a collective term for those areas of the Airport that are accessible to aircraft including runways, taxiways, aprons, and hangar areas. Facilities that directly support aviation activity include:

- ✓ Pavement: runways, taxiways and aprons
- ✓ Structures: aircraft storage and maintenance hangars, fixed base operators (FBOs), fuel storage, snow removal equipment (SRE) storage, and an aircraft rescue and firefighting facility (ARFF)
- ✓ Navigation aids: airfield and approach lighting, weather monitoring systems, radio beacons
- ✓ Airfield signage and markings: (indicators for precision and non-precision instrument runways)
- ✓ Airport traffic control tower (ATCT)
- ✓ Terminal building: Passenger support and services and administrative areas
- ✓ Safety areas: Property set aside to comply with FAA-mandated setbacks and clear zones

1.3.1 RUNWAY SYSTEM

Runways are numbered using a system that assigns a number to each runway end based on its magnetic alignment. The Airport’s primary runway, Runway 5-23, is aligned in a northeast/southwest fashion and the crosswind runway, Runway 11-29, is aligned in a northwest/southeast fashion.

RUNWAY 5-23

Runway 5-23 is 7,038 feet long and 150 feet wide.

The runway has an asphalt surface that is transverse-grooved to improve aircraft braking action, reduce hydroplaning, and improve directional control for aircraft when the pavement is wet and icy. The runway was reconstructed in 2016 and is in excellent condition. Runway 5-23 is served by a full-length parallel taxiway on the west side. The runway to parallel taxiway separation is 400 feet, which meets C-III design standards.

Runway 5-23 is a precision instrument runway with high-intensity runway lights (HIRL) and medium-intensity approach lighting system with runway alignment indicator lights (MALSR). These lights provide pilots with visual guidance for landings at night and during poor weather conditions.

Precision instrument runway:

A runway end having an instrument approach procedure that provides course and vertical path guidance conforming to Instrument Landing System (ILS) or Microwave Landing System (MLS) precision approach standards.

Non-precision instrument runway:

A runway end having an instrument approach procedure that provides course guidance without vertical path guidance.



RUNWAY 11-29

Runway 11-29 is 7,006 feet long and 100 feet wide. The runway has an asphalt surface and is transverse-grooved. Runway 11-29 is served by two full-length parallel taxiways on the north and south sides. The runway to parallel taxiway separation is 400 feet, which meets B-III design standards.

Runway 11-29 is a non-precision instrument runway with medium-intensity runway lights (MIRL).

Table 1-2 presents data for Runway 5-23 and **Table 1-3** presents data for Runway 11-29. NAVAIDs are defined in **Sections 1.3.6 and 1.3.7**.

Table 1-2. Runway 5-23 Data	
Dimensions	Length: 7,038 feet, Width: 150 feet
Bearing	060/240 (True)
Effective Gradient	0.3%
Weight Bearing Capacity	Single-wheel: 68,000 lbs., Double-wheel: 110,000 lbs.
Surface	Asphalt-grooved. Good condition.
Markings	Precision instrument approach. Good condition
Lighting	High-Intensity Runway Edge Lights Runway End Identifier Lights (REIL) – Runway End 05 Visual Approach Slope Indicator (VASI) – Runway End 05 Precision Approach Path Indicator (PAPI) – Runway End 23 1,400 foot MALSR – Runway End 23
Signage	Distance To Go Signs
Sources: FAA Airport Master Record (Form 5010), Airport website.	

Table 1-3. Runway 11-29 Data	
Dimensions	Length: 7,006 feet, Width: 100 feet
Bearing	122/302 (True)
Effective Gradient	0.5%
Weight Bearing Capacity	Single-wheel: 28,000 lbs., Double-wheel: 40,000 lbs.
Surface	Asphalt-grooved. Good condition.
Markings	Non-precision instrument approach. Good condition
Lighting	Medium Intensity Runway Edge Lights REIL VASI – Runway End 11 PAPI – Runway End 29
Signage	Distance to Go Signs
Sources: FAA Airport Master Record (Form 5010), Airport website.	



HELIPAD

The Airport has one helipad, which is used by the USFS and not available for public use. The helipad is 48 feet x 48 feet and has a concrete surface. Military and GA helicopters land on the runways and hover taxi to the FBO aprons to park.

1.3.2 TAXIWAY SYSTEM

The Airport has an extensive system of 12 asphalt taxiways that provides access between the runways and aircraft parking and storage facilities. Taxiways C, F, and G are parallel to the runways and the rest are connector taxiways. The parallel taxiways are 50 feet wide and the connector taxiways are 75 feet wide. Taxiway C and Taxiway G west of Runway 5-23 were reconstructed in 2011 and are in excellent condition. Taxiway C east of Runway 5-23 was constructed in 2013.

There are two areas on the airfield that the FAA has labeled as potential “hot spots,” which is defined in FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design* (AC-13A) as “a location on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary.” These two areas are the intersection of Taxiways F and G, and the intersection of Taxiways C and F.

Parallel taxiways:

Taxiways that run alongside runways.

Connector taxiways:

All other taxiways that connect the aircraft to all facilities.

Hot spots:

Areas where incidents are more likely to occur because of airfield geometry.

The airfield’s original design was in compliance with FAA standards of the time; however, FAA standards have since changed. Some existing taxiway connectors do not meet FAA guidance defined in AC-13A. These standards seek to promote safer operations by simplifying airfield geometry, and reducing the risk that a pilot will accidentally taxi onto a runway. Examples of non-standard conditions are Taxiway A’s direct access from the North General Aviation Apron to Runway 11-29, and Taxiway H and E’s direct access from the Air Carrier Apron to Runway 5-23. As these taxiways are reconstructed, they will need to be built to the latest design standards.

1.3.3 AIRFIELD DESIGN STANDARDS

The Airport is required to maintain facilities in line with FAA standards as part of an agreement for accepting FAA grant money. FAA design standards for runways are determined by the FAA coding system called the Runway Design Code (RDC), shown in **Table 1-4**. The RDC is made up of the aircraft approach category (AAC), the airplane design group (ADG), and the runway approach visibility minimums. The most demanding AAC and ADG at an airport sets the ARC. The FAA codes taxiways using a standard called the Taxiway Design group (TDG).



RUNWAY CLASSIFICATION AND DESIGN

The design aircraft is an aircraft that uses an airport on a regular basis, which the FAA defines as more than 500 operations per year. The Bombardier Q400 (operated by Alaska Airlines) is the most demanding aircraft that exceeds 500 annual operations. The Q400 has an approach speed of 120 knots, a wingspan of 93.3 feet, and tail height 27.4 feet. Per AAC and ADG standards, the Q400 is classified as a B-III aircraft. **Table 1-4** depicts the Airport's RDC, as indicated in bold font.

Runway Design Code (RDC):

The FAA coding system comprised of three standards that determine the ARC: the Aircraft Approach Category, Airplane Design Group, and Approach Visibility Minimums.

Aircraft Approach Category (AAC):

This first standard is based on the approach speed (in knots) of the design aircraft.

Airplane Design Group (ADG):

This second standard is based on the wingspan and the tail height (in feet) of the design aircraft.

Approach Visibility Minimums:

These are based on runway visual range (RVR), the approximate visibility (in feet) as measured by the RVR light transmission/reception equipment or equivalent weather observer report measurements. The depicted numerical value for RVR relates to runway visibility minimums represented in feet or forward visibility that have statute mile equivalents (4000 RVR = $\frac{3}{4}$ mile).

Table 1-4. Runway Design Code System

Aircraft Approach Category (AAC)		
<u>AAC</u>	<u>Approach Speed</u>	
A	Approach Speed less than 91 knots	
B	Approach speed 91 knots or more but less than 121 knots	
C	Approach speed 121 knots or more but less than 141 knots	
D	Approach speed 141 knots or more but less than 166 knots	
E	Approach speed 166 knots or more	
Airplane Design Group (ADG)		
<u>Group Number</u>	<u>Wingspan (in feet)</u>	<u>Tail Height (in feet)</u>
I	< 49'	< 20'
II	49' - < 79'	20' - < 30'
III	79' - < 118'	30' - < 45'
IV	118' - < 171'	45' - < 60'
V	171' - < 214'	60' - < 66'
VI	214' - < 262'	66' - < 80'
Approach Visibility Minimums		
<u>RVR (ft.)</u>	<u>Flight Visibility Category (statue miles)</u>	
VIS	Runways designed for visual approach use only	
5000	Not lower than 1 mile	
4000	Lower than 1 mile but not lower than ¾ mile	
2400	Lower than ¾ mile but not lower than ½ mile	
1600	Lower than ½ mile but not lower than ¼ mile	
1200	Lower than ¼ mile	

Source: FAA AC 150/5300-13A Airport Design.



RUNWAY SAFETY AREAS

The FAA defines the Runway Safety Area (RSA) as a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an aircraft undershoot, overshoot, or excursion from the runway. The runways at the Airport each have different RSA design standards. Runway 5-23 is designed to C-III standards, which is the Airport Reference Code as of 2016 and the standard needed for commercial aircraft such as the Boeing 737. Runway 11-29 is designed to B-III standards, suitable for handling aircraft with slower approach speeds. **Table 1-5** depicts runway RSA dimensions.

Table 1-5. Runway Safety Areas

	5-23	11-29
Runway Design Standard	C-III	B-III
Width	500'	400'
Length	9,038'	8,206
Length Beyond Runway Ends	1,000'	600'

RUNWAY PROTECTION ZONES

The Runway Protection Zone (RPZ) is a trapezoidal area off the end of the runway. This area is designated to enhance safety for aircraft operations and for people and objects on the ground. The FAA recommends that incompatible land uses, objects, and activities be located outside of the RPZ. The FAA has issued a Memo titled *Interim Guidance on Land Uses Within a Runway Protection Zone* to help airport sponsors understand what land uses are and are not compatible within the RPZ. The FAA recommends that an airport operator maintain full control of an RPZ, ideally through fee simple property acquisition. If this is not feasible, land use control may be achieved through the use easements. Highway 126 goes through the RPZ at the approach end of Runway 23. Veterans Way and Airport Way pass through the RPZ at the Runway 11 approach end. Since these roads are existing features, current FAA guidance does not require the roads to be moved. Actions that would introduce new incompatible land uses to the RPZ, either by airport or neighboring jurisdiction action, require coordination with FAA Headquarters. **Table 1-6** depicts RPZ standards for the Airport.

Runway Protection Zone (RPZ):

A trapezoid-shaped area off the end of each runway defined by the FAA as a zone to enhance the protection of people and property on the ground.

Table 1-6. Runway Protection Zone Dimensions for Runway Ends

	Length (ft.)	Inner Width (ft.)	Outer Width (ft.)	Acreage
5	1,700	500	1,010	29.465
23	2,500	1,000	1,750	78.914
11	1,700	500	1,010	29.465
29	1,700	500	1,010	29.465

Source: Airport ALP, AC-13A



TAXIWAY DESIGN AND STANDARDS

The TDG determines taxiway design standards. The TDG relates to the undercarriage dimensions of aircraft, based on the overall Main Gear Width and the Cockpit to Main Gear Distance. TDG also determines the taxiway edge safety margin and shoulder width of taxiways. Taxiway protection is determined by the ADG of the design aircraft. The ADG of an aircraft determines the taxiway protection areas, taxiway separation, and required wingtip clearance for aircraft using the taxiways. The TDG and ADG are determined by critical aircraft, the Q400. The Q400 has a TDG of three and ADG of III. **Table 1-7** depicts TDG three and ADG III standards.

Table 1-7. TDG 3 And ADG III Taxiway Standards	
Taxiway Width	50'
Taxiway Edge Safety Margin	10'
Taxiway Shoulder Width	20'
ADG III Standards	
<u>Taxiway Protection</u>	
Taxiway Safety Area (TSA)	118'
Taxiway Object Free Area (OFA)	186'
Taxilane OFA	162'
<u>Taxiway Separation</u>	
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	152'
Taxiway Centerline to Fixed or Movable Object	93'
Taxilane Centerline to Parallel Taxilane Centerline	140'
Taxilane Centerline to Fixed or Movable Object	81'
<u>Wingtip Clearance</u>	
Taxiway Wingtip Clearance	34'
Taxilane Wingtip Clearance	27'
<i>Source: AC-13A</i>	



1.3.4 AIRCRAFT APRONS

The Airport has four apron areas: the Air Carrier Apron, General Aviation North Apron, General Aviation South Apron, and the USFS Apron. The aprons serve the landside facilities including the passenger terminal building, the general aviation hangar facilities and FBOs, cargo facilities, and the USFS.

The Airport's aprons locations, sizes, and surface pavements are listed below:

- ✓ Air Carrier Apron, west of the runway intersection (378,675 square feet; concrete)
- ✓ General Aviation North Apron, northwest of the runway intersection (672,003 square feet; asphalt and concrete)
- ✓ General Aviation South Apron, north of the Air Carrier Apron and west of the runway intersection (110,475 square feet; asphalt)
- ✓ USFS, north of the runway intersection (473,175 square feet; asphalt and concrete)

1.3.5 FIXED BASE OPERATORS

FBOs support a wide range of GA aeronautical activities, providing services to aircraft and to pilots, the traveling public, and the airlines. There is one FBO at the Airport. The FBO is located on the North GA Apron, and on the South GA Apron. The FBO offers full service operations which include the following services:

- | | |
|---------------------------------------|--|
| ✓ Aircraft ground handling | ✓ Catering |
| ✓ Aircraft parking (ramp or tiedown) | ✓ Rental cars |
| ✓ Fuel (100LL and Jet A) | ✓ Courtesy cars (free for pilots to use in the local area) |
| ✓ Hangars | ✓ Public telephone |
| ✓ Nitrogen | ✓ Computerized weather |
| ✓ GPU/Power cart | ✓ Flight planning facilities |
| ✓ Passenger terminal and lounge | ✓ Internet access |
| ✓ Aerial tours/aerial sightseeing | ✓ Restrooms |
| ✓ Aircraft charters | ✓ De-ice truck and De-ice Cart (type 1) |
| ✓ Aircraft maintenance | |
| ✓ Aircraft cleaning/washing/detailing | |
| ✓ Aircraft parts | |



1.3.6 AIRCRAFT STORAGE

HANGARS

The Airport has box hangars and T-hangars on the north and south aprons. T-hangars store one aircraft while box hangars can accommodate multiple aircraft. Aircraft have direct access to Taxiway G for the south apron and Taxiway C for the north apron. Both taxiways are parallel to Runway 11-29 and have access to Runway 05-23. **Figures 1-4 and 1-5** show examples of hangars at the Airport. **Figure 1-6** shows the airport building layout.

Figure 1-4. Box Hangars



Figure 1-5. T-Hangars



1.3.7 SUPPORT FACILITIES

MAINTENANCE AND SNOW REMOVAL

The Airport has one support facility that houses airport maintenance and Snow Removal Equipment (SRE). The facility is located next to the ARFF and its bays face Taxiway G for quick access. The three storage bays contain plows and other SRE. The storage bay section of the building is approximately 85 feet by 45 feet. The Airport owns and operates the following SRE equipment:

- ✓ One 1995 Oshkosh model "HB" all wheel drive
- ✓ One 1976 Huber Grader, with a 12' reversible blade
- ✓ One 1985 Case Front End Loader
- ✓ One 2006 Cat Front End Loader
- ✓ Two 20' Pro-Tec snow pushers to attach to a front end loader
- ✓ One 12" Pro-Tec snow pusher to attach to a front end loader
- ✓ One 22' reversible ramp plow
- ✓ One 2000 Oshkosh model "P" series six wheel, all steer, all wheel drive truck
- ✓ Two Bowmonk AFM2 Airfield Friction Meter Mark 3.
- ✓ One 1984 Oshkosh model WT-2206 all wheel drive with a 2009 slide in power plant and 20" rotary broom.
- ✓ One 2007 Ford F-550 deicing unit.
- ✓ One 2014 Wausau SnoDozer 3131



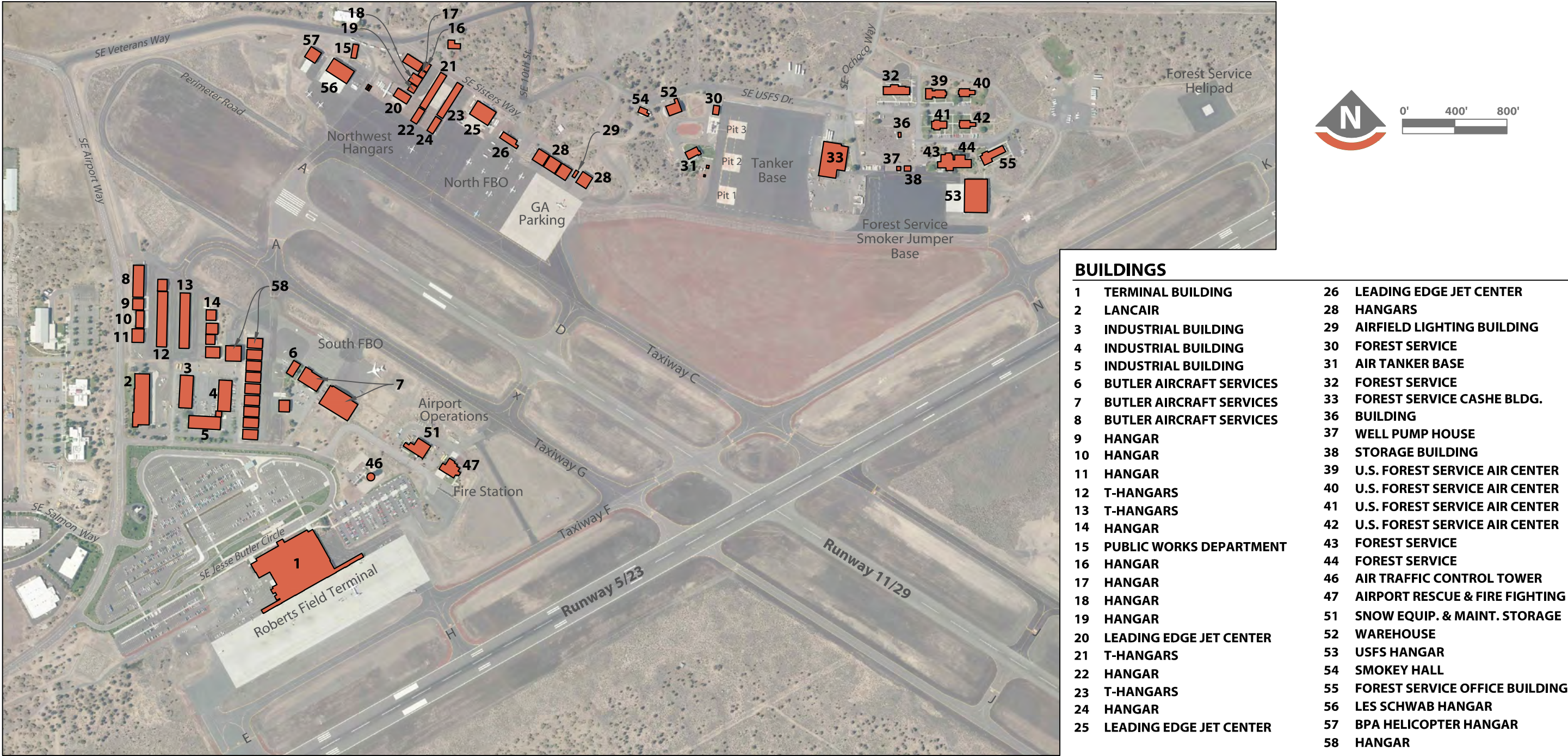


Figure 1-6
HANGAR BUILDING PLAN

Airport personnel maintain the airfield and Airport-owned buildings. **Figure 1-7** shows the support facility used for maintenance and SRE. The support facility is in good condition. There is space between the support facility and the ARFF for future expansion of either facility should it be necessary.

Figure 1-7. SRE and Maintenance Support Facility



AIRCRAFT RESCUE AND FIRE FIGHTING

The Airport is required to maintain ARFF under Federal Aviation Regulation (FAR) Part 139, which governs the operation of airports with scheduled or unscheduled passenger service by aircraft of more than 30 seats. The Airport is classified with an ARFF Index B designation which applies to airports serving only aircraft that are shorter than 126 feet. The Index B designation specifies equipment types that must be on hand to respond to an aircraft accident. The Airport's ARFF facility is centered between the passenger terminal and the south GA apron with access to Taxiway G. ARFF vehicles include two crash trucks, one ambulance, and a mass casualty incident vehicle. The City of Redmond staffs the ARFF station with one active duty fire fighter at all times.

FUEL FACILITIES

Fuel is offered by the FBO to GA, airlines, military, and USFS. Both 100 low-lead (LL) and Jet A fuel are available from the FBO via full service fuel trucks as shown in **Figure 1-8**, and self-service 100LL is available on the South GA Apron. A list of fuel tanks, their ownership, and fuel type are listed below.

- ✓ At SRE building, diesel fuel tank used for SRE and maintenance
- ✓ South GA Apron, four tanks. Two are 20,000 gallons with Jet A fuel. One 500-gallon 100 LL fuel.
- ✓ North GA Apron, seven tanks. One private use 20,000 gallon Jet A. Two are out of commission and will eventually be removed. Two are out of commission and can be brought back if needed. One is a 20,000-gallon Jet A tank and one 12,000-gallon 100LL tank.



Figure 1-8. Fuel Trucks

UNITED STATES FOREST SERVICE (USFS) REDMOND AIR CENTER

The USFS Redmond Air Center plays a major role in supporting firefighting efforts in Oregon, Alaska, and Washington. Operations depend on the severity of the fire season, which generally lasts from May to October, so the number of operations varies annually. The base typically experiences approximately 780-800 operations per season.

Aircraft operating in and out of the base include C130s, RJ 85s, King Airs, and Sherpas (A and B versions). The USFS has also acquired 16 C130s (H/Q models) that are expected to arrive once reconstruction of Taxiway B is complete in 2017. The base has two aprons capable of accommodating the C130s. The station has an air tanker base on their leased property; hosts training for firefighting and prevention; and processes firefighters and sends them to incidents throughout the service region.

The FBO services the USFS base. The base has and will continue to be visited by traffic from other governmental organizations. Previous visitors include politicians, the Federal Bureau of Investigation, and Air Force One. The base is classified as a hub of operations, incident support base and critical asset for the Federal Emergency Management Agency (FEMA) and related emergency efforts in the event of a large scale natural disaster in the Pacific Northwest, such as an earthquake in the Cascadia subduction zone.

The USFS is planning for an expansion of its facilities to include a visitor center and fire cache on the leased property. The major improvements the base facility needs are improvements to the old roads that lead to the station and the utilities.



1.3.8 PAVEMENT

Pavement management reports are periodically updated to assist airports in the ongoing maintenance of airfield pavements. An airport Pavement Management Program (PMP) assesses the relative condition of the pavement sections and identifies pavement repair and rehabilitation needs and guides capital planning.

Airfield pavements are assessed using a scale known as the Pavement Condition Index (PCI). The PCI inspection assesses the types, severities, and amounts of distress observed in the pavements through a visual inspection. The evaluation is quantified using a scale from 0 (failed) to 100 (new) with ratings applied to individual pavement sections, providing an overall condition report for the Airport. The condition is an indication of the needs for maintenance and/or repair that will be required over a seven-year period. The most recent PCI values at the Airport were calculated in August 2010, and have been updated to reflect construction that has occurred since.

PAVEMENT STRENGTH

An airfield's required pavement strength is determined by aircraft fleet mix. There are two pavement strength classifications, "Utility" and "Other than Utility." Utility pavements are capable of handling aircraft up to 12,500 pounds maximum gross weight (MGW), while Other than Utility pavements can handle aircraft over 12,500 pounds MGW. When the design aircraft exceeds 12,500 pounds as the case at the Airport, the Aircraft Classification Number (ACN)-Pavement Classification Number (PCN) method is used to calculate what the pavement is capable of accommodating.

The ACN-PCN method of determining pavement strength is intended to be used to report relative pavement strength, and not to be used for pavement design.

ACN:

The number that expresses the relative effect of an aircraft at a given configuration on a pavement structure for a specified standard of subgrade strength.

PCN:

A number that expresses the load-carrying capacity of a pavement for unrestricted operations.

Table 1-8 illustrates the standard ACN-PCN reporting format, as described in AC 150/5335-5, *Standardized Method of Reporting Airport Pavement Strength - PCN*.



Table 1-8. Standard ACN-PCN Reporting Format				
	Pavement Type	Subgrade Strength (CBR)	Tire Pressure (psi)	Method of Determination
Numerical Value	R - Rigid	A - High (≥ 13 CBR)	W – no limit	T – Technical Study
		B – Medium (>8 but < 13 CBR)	X – 182-254	
	F - Flexible	C – Low (>4 but ≤ 8 CBR)	Y – 74-181	U – Using Aircraft
		D – Ultralow (≤ 4 CBR)	Z – 0-73	
### / R or F / A, B, C, or D / W, X, Y, or Z / T or U				
Source: Airport Records				

Table 1-9 includes the 2016 published weight bearing capacities for Runway 5-23 and Runway 11-29.

Table 1-9. Published Weight Bearing Capacity			
Runway	Published Weight Bearing Capacity		
	Single Wheel (SW)	Dual Wheel (DW)	Dual Tandem Wheel (DTW)
Runway 05-23	68,000 lbs.	110,000 lbs.	200,000 lbs.
Runway 11-29	28,000 lbs.	40,000 lbs.	N/A
Source: Airport Records			

Table 1-10 includes the recommended weight bearing capacity for Runway 05-23 and Runway 11-29 after using the ACN-PCN method for evaluating pavements.

Table 1-10. Recommended Weight Bearing Capacity – ACN-PCN Method			
Runway	Recommended Weight Bearing Capacity		
	SW	DW	DTW
Runway 05-23	120,000 lbs.	250,000 lbs.	-
Runway 11-29	94,000 lbs.	150,000 lbs.	-
Source: Airport Records			



Other airfield pavements' weight bearing and PCNs are included in **Table 1-11**.

Table 1-11. Other Pavements' Weight Bearing Capacity			
Pavement	Weight Bearing Capacity		PCN
	SW	DW	
Taxiway A	68,000 lbs.	91,000 lbs.	26/F/C/X/T
Taxiway B	68,000 lbs.	91,000 lbs.	26/F/C/X/T
Taxiway C	74,000 lbs.	109,000 lbs.	28/F/A/X/U
Taxiway D	74,000 lbs.	109,000 lbs.	28/F/A/X/U
Taxiway E	120,000 lbs.	191,000 lbs.	54/F/C/X/T
Taxiway F	120,000 lbs.	191,000 lbs.	54/F/C/X/T
Taxiway G (East)	81,000 lbs.	121,000 lbs.	29/F/A/X/T
Taxiway G (West)	74,000 lbs.	109,000 lbs.	28/F/B/X/U
Taxiway H	120,000 lbs.	191,000 lbs.	54/F/C/X/T
Taxiway J (South)	81,000 lbs.	121,000 lbs.	29/F/A/X/T
Taxiway J (North)	74,000 lbs.	109,000 lbs.	28/F/B/X/U
Taxiway K	120,000 lbs.	191,000 lbs.	54/F/C/X/T
Taxiway M (South)	81,000 lbs.	121,000 lbs.	29/F/A/X/T
Taxiway M (North)	74,000 lbs.	109,000 lbs.	28/F/B/X/U
Taxiway N	120,000 lbs.	191,000 lbs.	54/F/C/X/T
Air Carrier Apron	76,000 lbs.	100,000 lbs.	29/F/C/X/U
GA North Apron	74,000 lbs.	109,000 lbs.	28/F/B/X/U
GA South Apron	23,000 lbs.	-	8/F/C/X/T
<i>Source: Airport Records</i>			



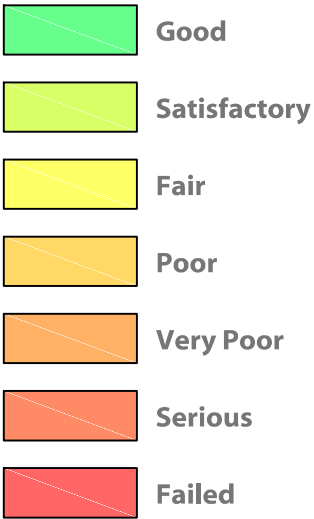


Figure 1-9 PCI Map

1.3.9 NAVIGATIONAL AIDS AND INSTRUMENT PROCEDURES

Aircraft taking off and landing at the Airport rely on instrument procedures, flight patterns, instrument and visual approach aids, and weather observation and communication for safe operations. This section describes these factors in greater detail.

INSTRUMENT PROCEDURES

Aircraft that use the Airport operate under both visual flight rules (VFR) and instrument flight rules (IFR). The Airport has established instrument approach (landing) and departure (take off) procedures that are provided by the ATCT to pilots as they arrive or depart the Airport. Instrument approach procedures are a series of predetermined maneuvers established by the FAA using electronic NAVAIDS. The procedures assist pilots in locating and landing at an airport during low visibility and cloud ceiling conditions. The eleven instrument approach procedures and one instrument departure procedure in effect at the Airport are summarized in **Table 1-12**.

Instrument Meteorological Conditions (IMC):

When visibility is poor and cloud ceilings are below a defined threshold, those are considered instrument meteorological conditions (IMC).

FAA regulations refer to flight relying on instruments as instrument flight rules (IFR), and IMC is occasionally referred to as “IFR conditions.”

When visibility and cloud ceiling are above IMC, pilots may elect to fly using IFR or visual flight rules (VFR), which is where the pilot uses visual cues to safely operate the aircraft.



Table 1-12. Instrument Approach & Departure Procedures		
Approach Procedures	Visibility (Nautical Miles, NM)	Descent Minimums (Feet)
ILS OR LOC RWY 23	½	200
RNAV (RNP) Z RWY 05	7/8	276
RNAV (RNP) Z RWY 23	½	250
RNAV (GPS) RWY 11	7/8	250
RNAV (GPS) Y RWY 05	¾	250
RNAV (GPS) Y RWY 23	½	200
RNAV (GPS) Y RWY 29	1	480
RNAV (GPS) Z RWY 29	1	286
VOR/DME RWY 23	1 ¼	935
VOR-A	1	580
JUNIPER VISUAL RWY 23	Visual	Visual
Departure Procedure	Takeoff Minimums	
REDMOND THREE		
✓ RWY 5	Minimum climb of 390 feet per nautical mile (NM) to 13000	
✓ RWY 11	Minimum climb of 406 feet per NM to 13000	
✓ RWY 23	Minimum climb of 356 feet per NM to 13000	
✓ RWY 29	Minimum climb of 358 feet per NM to 13000	

In addition to the published instrument procedures, airlines generally have their own instrument procedures that are tailored to their operations specifications, aircraft types, and levels of crew certification. Airline-specific instrument procedures are proprietary and not used by the public, therefore, they are not included in the Inventory Chapter.

FLIGHT PATTERNS

Flight patterns at the Airport are depicted in **Figure 1-10** (Arrival), **Figure 1-11** (Departure), and **Figure 1-12** (Local). Arrival and departure routes show the typical flight patterns aircraft use when approaching or departing the Airport. Local patterns represent operations that occur around the Airport such as touch and go operations. The tracks shown in the figures represent the majority of flight patterns at the Airport. Weather, wind, ATCT direction, and pilot preference determine flight tracks and which runway end aircraft can use for arrivals and departures. .

Touch and Go

An aircraft maneuver where an aircraft lands, slows, then accelerates and takes off without leaving the runway. It is counted as two operations.



INSTRUMENT AND VISUAL APPROACH AIDS

NAVAIDs are visual and electronic guides that assist pilot navigation. Visual NAVAIDs include lights and wind indicators that can be seen through aircraft windows. Reliance on sight limits the utility of visual NAVAIDs when visibility is poor and at great distances. Electronic NAVAIDs are acquired by instruments onboard aircraft and help pilots navigate and land when it is not possible to do so through visual cues alone. Electronic NAVAIDs include terrestrial antennae that use radio frequencies and satellites that use the global positioning system (GPS). NAVAIDs can be used during all flight conditions and must be used when visibility and cloud ceilings are low enough to be considered instrument meteorological conditions (IMC). NAVAIDs for the Airport are listed in **Table 1-13**, and described in more detail in the section that follows.

- ✓ GPS: A satellite based navigational system
- ✓ MALSR: Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
- ✓ ILS: Instrument Landing System – ground based landing system
- ✓ REIL: Runway End Identifier Lights
- ✓ NDB: Non-Directional Beacon
- ✓ PAPI: Precision Approach Path Indicator
- ✓ VOR/DME: a VHF omnidirectional range (VOR) and distance measuring equipment (DME)

Table 1-13. Navigational Aids Summary by Runway	
5-23	11-29
high intensity runway edge lights	medium intensity runway edge lights
Runway End 5	Runway End 11
REIL	REIL
VASI	VASI
Runway End 23	VOR A (Category A)
PAPI	GPS overlay
1,400 foot MALSR	Runway End 29
ILS	REIL
NDB	PAPI
VOR/DME	GPS
<i>Source: FAA Airport Facility Directory</i>	

The Airport is equipped with two wind cones, which provide pilots with an indication of wind direction and speed. One wind cone is located next to the intersection of Taxiways F and G and is lighted. The second wind cone is located between the GA north apron and Runway 11-29 and is not lighted.



AIR TRAFFIC CONTROL AND COMMUNICATIONS

FAA's Air Traffic Services division manages the National Airspace System (NAS) using a series of control centers that have control or authority over different segments of aircraft travel:

- ✓ Airport Traffic Control Tower (ATCT)
 - May be run by FAA, or Contractor (The RDM ATCT is run by SERCO)
 - The vicinity of the airport
- ✓ Terminal Radar Approach Control facilities (TRACON)
 - Multiple airports (The Airport approach/departure control is operated by Seattle Center)
- ✓ Air Route Traffic Control Centers (ARTCC)
 - Regional area (The Airport controlled by Seattle Center)
 - Controls aircraft en-route

Airspace administered by the FAA is classified as either “controlled” or “uncontrolled,” and defined as one of six classifications. Airspace designated as Class A, B, C, D, and E is controlled airspace, and Class G airspace is uncontrolled airspace. Class F airspace is not used in the United States. **Figure 1-13** depicts the airspace and aeronautical setting surrounding the Airport.



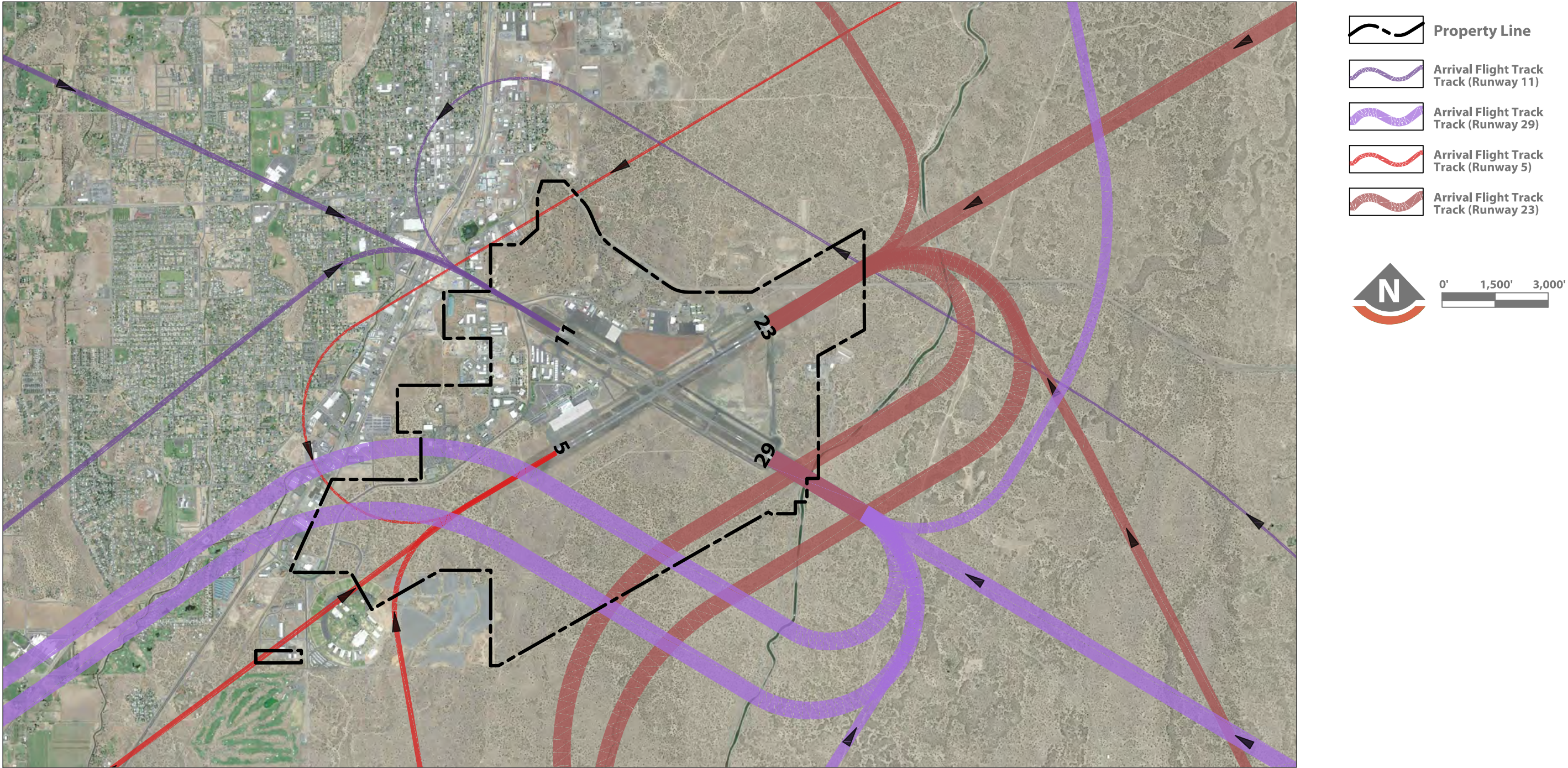


Figure 1-10
ARRIVAL FLIGHT PATTERNS

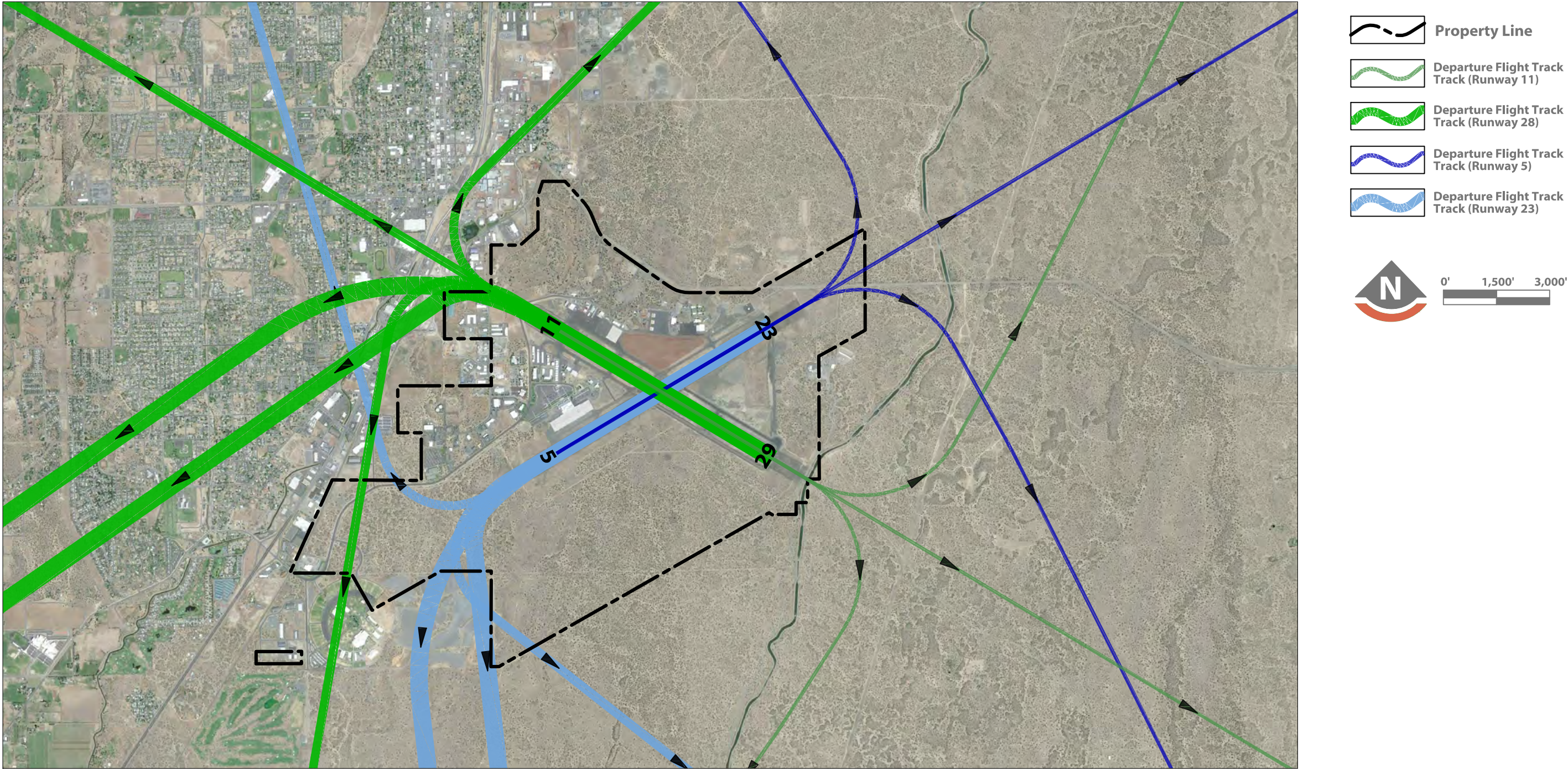


Figure 1-11
DEPARTURE FLIGHT PATTERNS



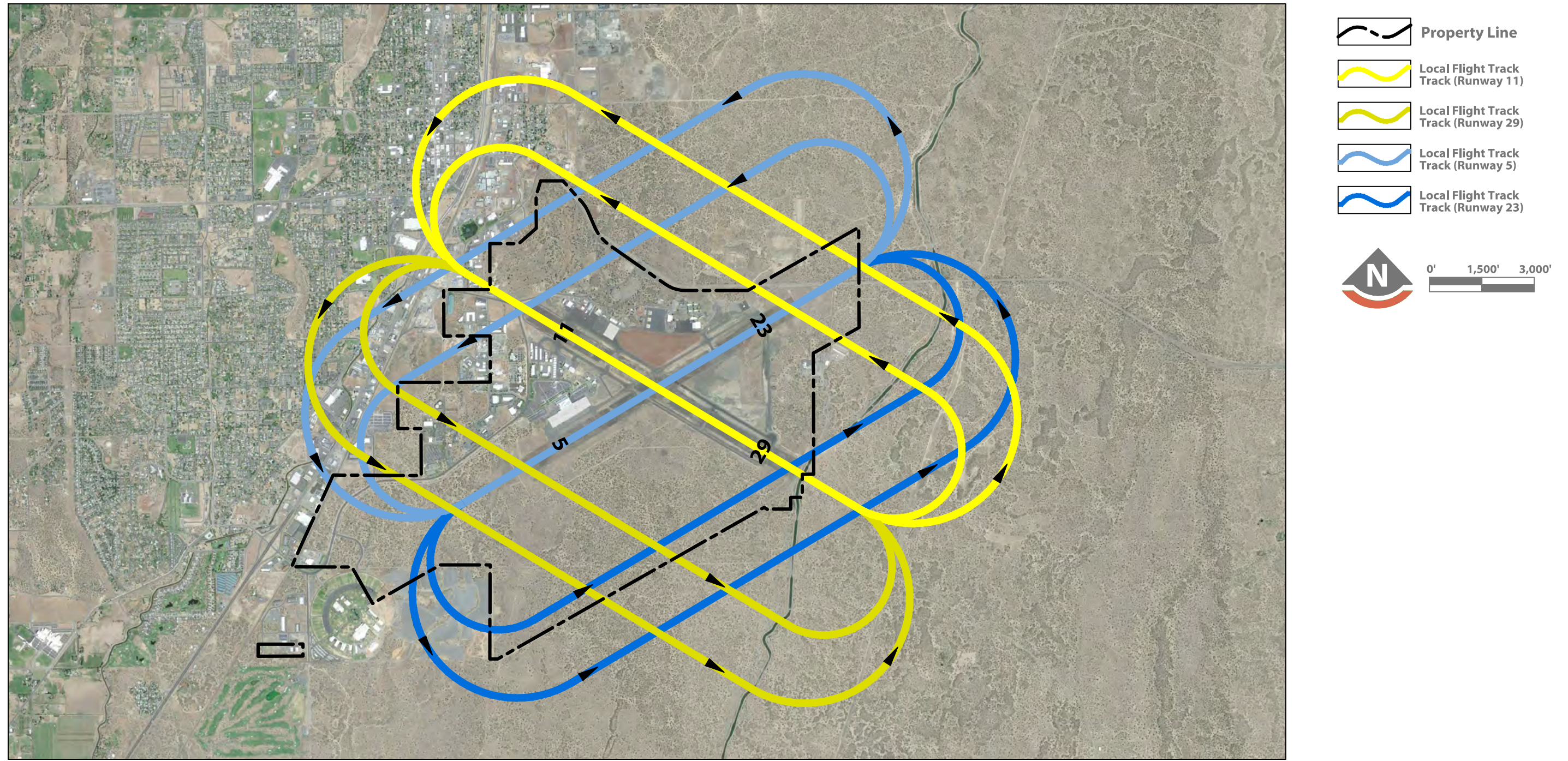


Figure 1-12
LOCAL FLIGHT PATTERNS

Page 1062 of 1509

The ATCT, located just to the northeast of the terminal, is a contract tower run by a private company. It is not owned by the FAA and the staff are not FAA employees. The airspace around The Airport is Class D airspace when the ATCT is in service. When the ATCT is not in service, the Airport operates under a Class E airspace designation. IFR operations in vicinity of the Airport are in contact with the Seattle ARTCC, which provides pilots with altitude, aircraft separation, and route guidance.

Pilots flying to the Airport are able to gather information about the Airport from a variety of information sources. The McMinnville Flight Service Station (FSS), another part of FAA's Air Traffic system, provides pilots with pre-flight briefings, assistance with opening and closing flight plans, pilot reports, weather reports, and notices to airmen. Weather information at RDM is broadcast by the automated surface observation system (ASOS).

1.3.10 CLIMATE – WIND AND WEATHER CONDITIONS

WIND

Wind observation data comes from the ASOS. The wind rose shows that prevailing winds come from the northwest and the south-south east. **Figure 1-14** illustrates the all-weather wind rose for the Airport. Inner circle increments that expand outwards represent the total number of observations. Numbers on the outside of the circle from 0 to 36 represent the direction from which the wind is prevailing. Colors represent the speed of the wind in knots. Colors will stretch out towards the edge of the circle for directions from which the wind is prevailing during observations. The observations occurred between 2006 and 2015.

Wind data is vital for aircraft operations. Aircraft performance is enhanced when taking off and landing into the wind, and there are limits to how much crosswind and tailwind aircraft can handle. Wind direction and speed information helps pilots and air traffic control select the most appropriate runway for operation.

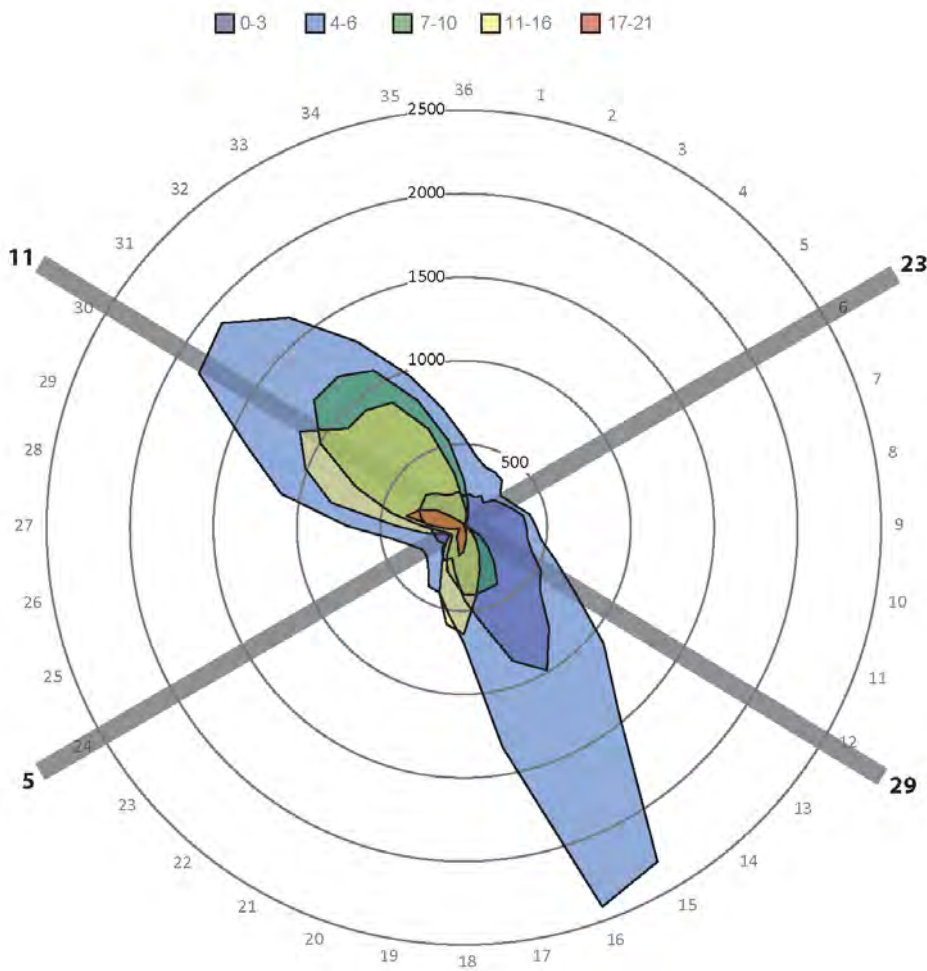
FAA standards for crosswind coverage are one of several factors that go into determining how many runways are needed, and what direction they should face. FAA standards state that runways should provide at least 95-percent coverage for aircraft that are expected to use the airport at least 500 times per year. Crosswind runways may be employed to improve wind coverage throughout the year and meet FAA criteria. The allowable crosswind component for each Runway Design Code is included in the **Table 1-14** below:



Table 1-14. Crosswind Component	
Runway Design Code	Allowable Crosswind Component
A-I and B-I*	10.5 knots
A-II and B-II	13 knots
A-III, B-III, C-I through C-III, D-I through D-III	16 knots
A-IV and B-IV, C-IV through C-VI, D-IV through D-VI	20 knots
E-I through E-VI	20 knots

*Includes A-I and B-I small aircraft

Figure 1-14. All Weather Wind Rose



Source: FAA Airports Wind Rose Generator.



WEATHER

In addition to wind, temperature and precipitation affect aircraft operation. For example, high temperatures can increase required takeoff distance, which could alter takeoff power settings and require payload reduction. Precipitation can negatively impact braking during landing. The frequency and amount of snow influences the type and number of SRE necessary, which has equipment and material storage implications. Weather data comes from the ASOS at the Airport to provide an idea of the local climate in the area. Key weather conditions are listed in **Table 1-15** below.

Table 1-15. Weather Conditions		
Average Annual Temperature	Maximum	62.1° F
	Minimum	32.7° F
	Average Hottest Month	July: 85.5° F
	Average Coldest Month	January: 22.2° F
Precipitation	Average Annual Total	8.64 Inches
	Average Monthly Maximum	January/December: 1.60 Inches
Snowfall	Average Annual Total	19.7 Inches
Source: Western Regional Climate Center, Redmond ASOS Station Data 1948 – 2016.		

WEATHER OBSERVATION AND COMMUNICATION

Information about weather conditions is important to pilots as they make navigation decisions. The weather system in place at The Airport is an Automated Surface Observing System (ASOS). The monitoring units in this system are operated jointly by the National Weather Service, the FAA, and the Department of Defense.

When the ATCT is closed, there are communication systems in place to help pilots communicate with each other and gather information about the conditions at the airport and in the surrounding area. These include:

- ✓ Common Traffic Advisory Frequency (CTAF): A radio frequency, specific to each airport, used for communication between pilots operating at, and in the vicinity of, an Airport. The frequency for The Airport is 124.5. The CTAF is used during hours that the ATCT is closed.



- ✓ **Universal Communication (UNICOM) station:** An air-to-ground communication facility. The frequency for The Airport is 122.95. A pilot might use a UNICOM to communicate fuel needs or other requests to a FBO.
- ✓ **Automatic terminal information service (ATIS):** A continuous broadcast of recorded information, such as weather, active runways, available approaches and NOTAMS information, on a frequency specific to each airport. The frequency for The Airport is 119.025.

1.3.11 AIRFIELD MARKING AND LIGHTING

Airfield marking and lighting enhance pilot situational awareness and wayfinding. FAA guidance for airfield markings is defined in AC 150/5340-1, *Standards for Airport Markings* and AC 150/3540-30H *Design and Installation Details for Airport Visual Aids*. This section describes these elements.

RUNWAY MARKINGS

Runway markings are white in color and schematics depend on the approach category of the runway. The markings include the runway end designator, centerline, a threshold bar, aiming point, touchdown zone, and runway edge markings. Runway 05-23 is marked with precision instrument runway (PIR) markings and Runway 11-29 is marked with non-precision instrument runway (NPI) markings.

Table 1-16 lists the runway markings for Runway 05-23 and 11-29.

Table 1-16. Runway Markings		
Marking	Runway 05-23 (PIR)	Runway 11-29 (NPI)
Runway end designator	X	X
Centerline	X	X

Runway end designator:

Numbers that identify the magnetic heading of a runway.

Centerline:

Dashed markings that denote the center of the runway.

Threshold bar:

Denotes the beginning of the runway available for landing.

Aiming point:

Provides a visual aiming point for landing operations.

Touchdown zone:

For landing operations, identifies the touchdown zone along a precision runway in 500-foot increments.

Runway edge markings:

Provide enhanced visual contrast between the runway edge and the surrounding terrain or runway shoulders and delineates the width of the suitable paved area for runway operations.



Threshold bar	X	X
Aiming point	X	X
Touchdown zone	X	
Runway edge markings	X	
<i>Source: Airport Pavement and Marking Plan</i>		

TAXIWAY MARKINGS

Taxiway markings consist of yellow centerline and enhanced centerline markings, and hold position signs painted with white inscriptions on red backgrounds.

RUNWAY LIGHTING

Centerline:

Continuous markings that denote the center of the taxiway.

Enhanced centerline:

Additional dashed markings on both sides of the centerline to provide visual cues of an upcoming runway hold position.



Runway 05-23 has high-intensity runway edge lighting (HIRL), consistent with the runway's precision instrument approach capability. Runway 05 is equipped with a four-box visual approach slope indicator (VASI). Runway 23 is equipped with a four-box precision approach path indicator (PAPI).

Runway 11-29 has MIRL. Runway 11 is equipped with a four-box VASI and Runway 29 is equipped with a four-box PAPI. Both runway ends are equipped with REIL, where the pilot sees all red lights when the approach is too low, all white lights when the approach is too high, and both red and white lights when on the appropriate glide path.

TAXIWAY LIGHTING

The taxiways at the Airport are equipped with blue medium-intensity taxiway edge lighting.

OTHER LIGHTING

The Airport has a rotating beacon mounted on a tower support on the north side of the airfield. Rotating beacons are used to indicate the location of an airport to pilots flying at night or during reduced visibility. The beacon provides sequenced white and green flashing lights that rotate 360 degrees.

The Airport has a lighted wind cone located on the west corner of the Taxiway G and Taxiway F intersection.

Additional overhead lighting is located in the terminal area, aircraft parking aprons, and in the hangar areas. There are red obstruction lights mounted on the top of several airport structures and on near-airport obstructions including street lights.

HIRL/MIRL:

High/Medium Intensity Runway Lights include white edge lights (with amber lights near the runway ends to indicate runway remaining) and runway threshold lights. The threshold fixtures have split lenses (green/red) indicating the beginning (green) and end (red) of the runway.

REIL:

Runway End Identifier Lights are two synchronized unidirectional flashing lights that help to identify the runway when it is less distinct from its surroundings or during periods of low visibility.

VASI:

VASI project a beam of light having a white segment in the upper part of the beam and red segment in the lower part of the beam. VASIs perform a function similar to the PAPI.

PAPI:

PAPI project light along a standard glide path to a runway end, with red and white colored lights indicating the aircraft's vertical position (above, below, or on glide path) relative to the defined glide path.



1.3.12 OTHER AIRSIDE FACILITIES

Fencing and gates and service roads are airside facilities that fall outside of these previous categories are briefly discussed in this section.

FENCING AND GATES

The Airport has perimeter chain-link fencing with barbwire around the airfield perimeter to help prevent unauthorized access. Security gates provide access to the FBO, GA hangars, USFS, and controlled movement areas of the airfield.

SERVICE ROADS

The Airport has a system of service roads that extend around the property perimeter to provide access to the various NAVAIDs and weather system and to transition between landside facilities.

The air carrier apron has a white painted two-lane vehicle service road along the northwest side of the apron that provides access the terminal building. A paved vehicle service road extends from the south side of Taxiway A around the Runway 11 end to the north side of Taxiway A. An additional paved service road connects the ARFF station to Taxiway F.

The Airport has a gravel perimeter road that follows the perimeter fence around the Airport operations area. Additional gravel vehicle service roads provide access to the runway approach lighting systems, NAVAIDs, weather observation system, and the airport surveillance radar.

1.4 LANDSIDE FACILITIES

1.4.1 AIRPORT ACCESS AND VEHICLE PARKING

LOCAL ROAD NETWORK

The Airport is served by local two-lane, paved roads referred to as the local road network. Airport Way, which is the main road serving the Airport, intersects Highway 97 south of the Airport at the Deschutes County Fairgrounds. Airport Way connects with Veterans Way near the northwest corner of the Airport. Veterans Way connects to Highway 97 approximately one-half mile west of the Airport and is the Airport's main access point.

VEHICLE CIRCULATION FOR NON-AVIATION FACILITIES

The primary roads serving the Airport include Airport Way and Veterans Way runs along the west side of the Airport. Additionally, a network of paved local streets serves the nearby non-aviation uses. **Table 1-17** summarizes the Airport roadways, organized by classification.



Table 1-17. Airport Roadways By Classification		
Roadway Classification	Roadway Name	Airport Development Area
Major Arterial	OR Highway 126 (Ochoco Highway)	North Development Parcel North Business Park USFS Campus
Minor Arterial	19th Street	Fairgrounds Industrial Subarea
Minor Arterial	Airport Way	Airport Way Subarea Fairgrounds Industrial Subarea South Apron Side GA Subarea West Business Park
Minor Arterial	Veterans Way	North Business Park North Development Parcel West Business Park
Major Collector	Salmon Drive	West Business Park
Major Collector	Veterans Way	North Business Park
Local Street	1st Street	West Business Park
Local Street	2nd Court	West Business Park
Local Street	4th Street	West Business Park
Local Street	6th Street	South Apron Side GA Subarea West Business Park
Local Street	10th Street	North Business Park
Local Street	21st Street	Fairgrounds Industrial Subarea
Local Street	23rd Street	Fairgrounds Industrial Subarea
Local Street	Badger Avenue	Fairgrounds Industrial Subarea
Local Street	College Way	West Business Park
Local Street	Deerhound Avenue	Fairgrounds Industrial Subarea
Local Street	Mt. Hood Drive	Airport Way Subarea
Local Street	Lake Road	North Development Parcel
Local Street	Ochoco Way	USFS Campus
Local Street	Pumice Avenue	West Business Park
Local Street	Reindeer Avenue	West Business Park
Local Street	Salmon Avenue	South Apron Side GA Subarea West Business Park
Local Street	Sisters Way	North Business Park USFS Campus
Local Street	Tamarack Court	West Business Park
Local Street	Timber Avenue	West Business Park
Local Street	Umatilla Avenue	West Business Park
Local Street	USFS Drive	USFS Campus
Local Street	Wickiup Avenue	Airport Way Subarea

The intersection at Veterans Way and Airport Way is planned to be realigned as part of a separate project. Preliminary designs by the City of Redmond propose a new roundabout near the intersection of 1st Street and Veterans Way to provide expanded access and service to the North Development Parcel.



AUTOMOBILE PARKING FOR NON-AVIATION FACILITIES

Parking requirements for non-aviation uses at the Airport are defined by the City of Redmond Development Code, Section 8.0500. The City requires developments to provide a minimum number of parking spaces based on land use and specifies the dimensions of the standard parking and compact parking spaces as well as the width of the aisles.

TERMINAL AREA AUTO PARKING AND GROUND TRANSPORTATION

The passengers departing from the Airport have multiple options to access the terminal building. They may use the public parking lot for their private vehicles, can be dropped off at the curb by personal vehicles, or be delivered by taxis or shuttles. The employees have a separate parking area near the terminal separate from the passenger lot and the Airport vendors also have assigned parking separate from employee parking.

The long and short term parking lot (combined facility) accommodates 1,083 vehicles at a rate of \$1.00 for each half hour, up to a daily maximum of \$10.00. The seventh day is free.

The employee parking lot accommodates 189 vehicles and the vendor lot can accommodate 6 vehicles in marked parking stalls. The vendor lot can accommodate more vehicles besides the marked parking stalls.

GENERAL AVIATION AND OTHER FACILITIES AUTO PARKING

Table 1-18 lists the various aviation related parking areas at the Airport and provides a breakdown of the vehicle parking spaces by standard and the Americans with Disabilities Act (ADA) compliant spaces.

Table 1-18. Vehicle Parking			
Location Identifier	Facility	Parking Spaces	
		Standard	ADA
1	FAA Airport Traffic Control Tower	8	1
2	South Apron Private Hangar – RDD Enterprises	21	2
3	Aircraft Rescue and Firefighting (ARFF)	10	2
4	Snow Removal Equipment (SRE)	3	1
5	South GA Apron FBO Building #1	35	1
6	South GA Apron FBO Building #2	6	0
7	Public Works Department	15	1
8	North GA Apron FBO	15	0
9	North Apron Private Hangars – BPA and Les Schwab	28	3
10	USFS	228	6



1.4.2 UTILITIES

Utilities are significant elements in the immediate and long-range planning for the Airport. The Airport's location on the eastern edge of the City of Redmond city limits is in a generally commercial and light industrial region. The Airport currently holds several property interests both adjoining the Airport facility and in the surrounding vicinity. To consider these properties for future expansions would require analysis of the existing utilities and the potential of utility enhancements. This section of the report addresses the location, size, and general feasibility of using existing Airport property utilities for new airport development alternatives.

Figure 1-15 identifies development areas the Airport is considering for future development alternatives:

- ✓ USFS Campus: The northern area servicing the Redmond Air Center and Forest Service operations adjacent to Taxiway B.
- ✓ North Side GA: The apron, FBO, and hangars along the north side of the Airport, accessed by and south of SW Sisters Avenue.
- ✓ North Business Park: The area south of Hwy 126 and north of SW Sisters Avenue characterized by rocky juniper and sage terrain with sparse existing development.
- ✓ North Development Parcel: The old Redmond golf course land bound on the northwest by SE Lake Road, on the northeast, by Hwy 126, and to the south, by Veterans Way.
- ✓ South Side GA: The hangars, FBO, and businesses bound to the west by Airport Way, to the south, by Salmon Avenue, and accessing the Airport by Taxiways A and G.
- ✓ Terminal: The terminal area.
- ✓ West Business Park: The commercial/light industrial area to the west of Airport Way in which the Airport holds several property interests.
- ✓ Airport Way Subarea: The area of land west of Airport Way and immediately north of the Deschutes County Fairgrounds.
- ✓ Fairgrounds Industrial Subarea: The area of land west of 19th Street and south of Airport Way.

The sub-areas identified for this report and designated for potential future expansion appear to have sufficient existing utilities in close proximity. The USFS Campus and potentially parts of the North Side GA are the exception. Most of the utilities in this area appear to be insufficient for future expansion because they were sized to serve only the area of the USFS Campus.

The following sections discuss each utility providing service on or in the vicinity of the Airport as depicted in **Figure 1-16 through 1-19**.



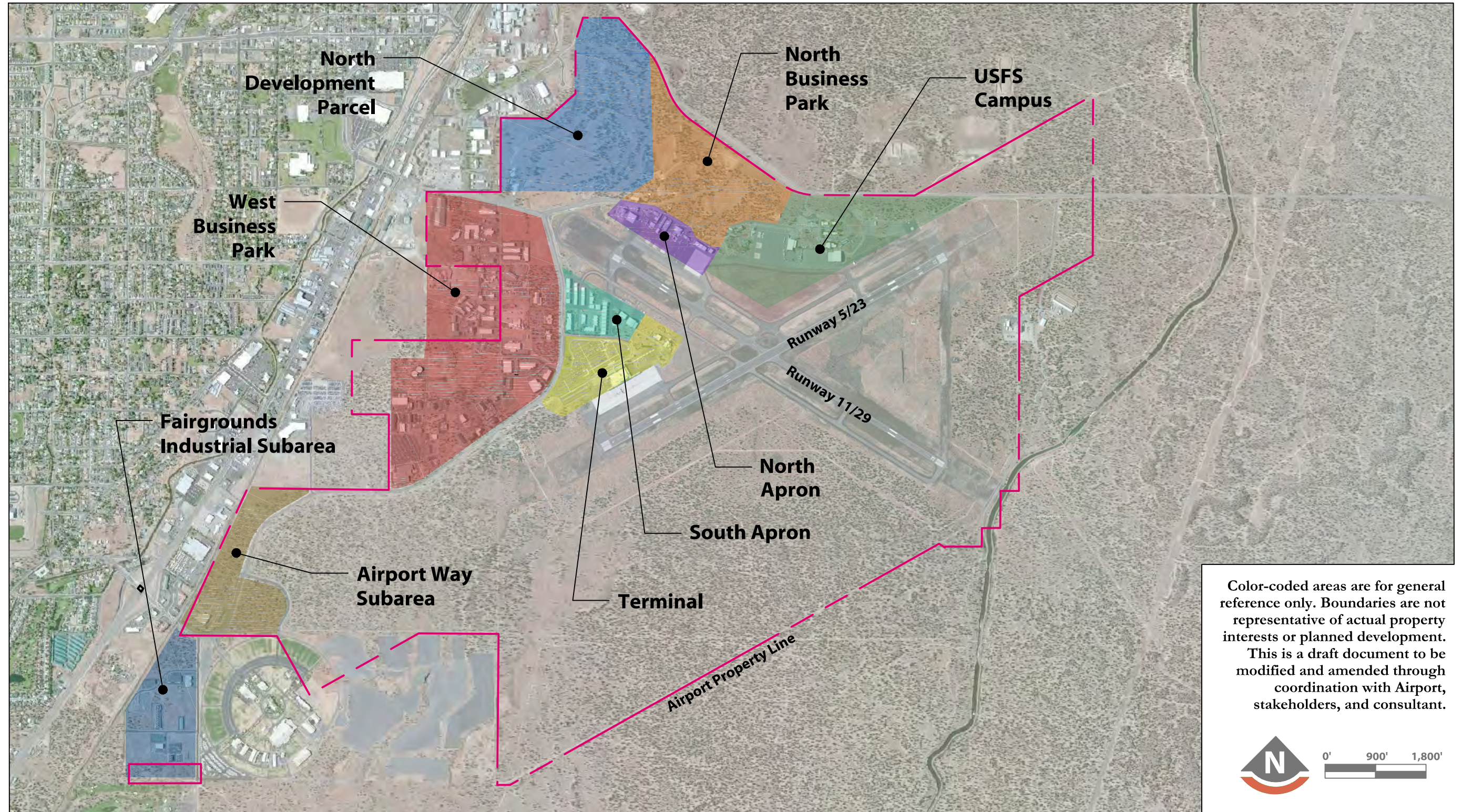


Figure 1-15
Development Areas



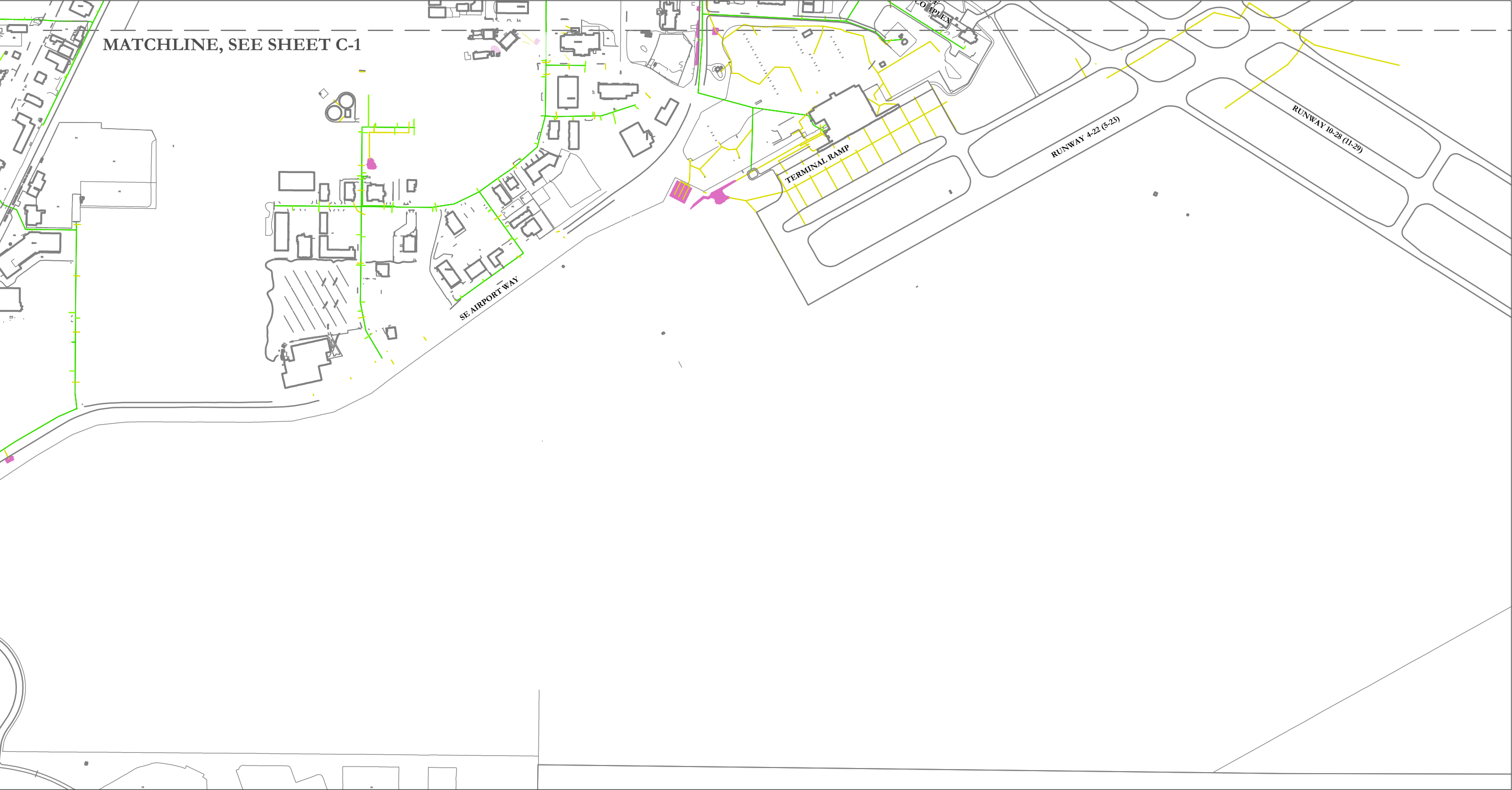
LEGEND:

- STORM PIPE
- SEWER MAIN
- SEWER LATERAL
- STORM DETENTION BASIN

Figure 1-16
EXISTING STORM AND SEWER
MAINS AND LATERALS



REDMOND MUNICIPAL
AIRPORT MASTER PLAN

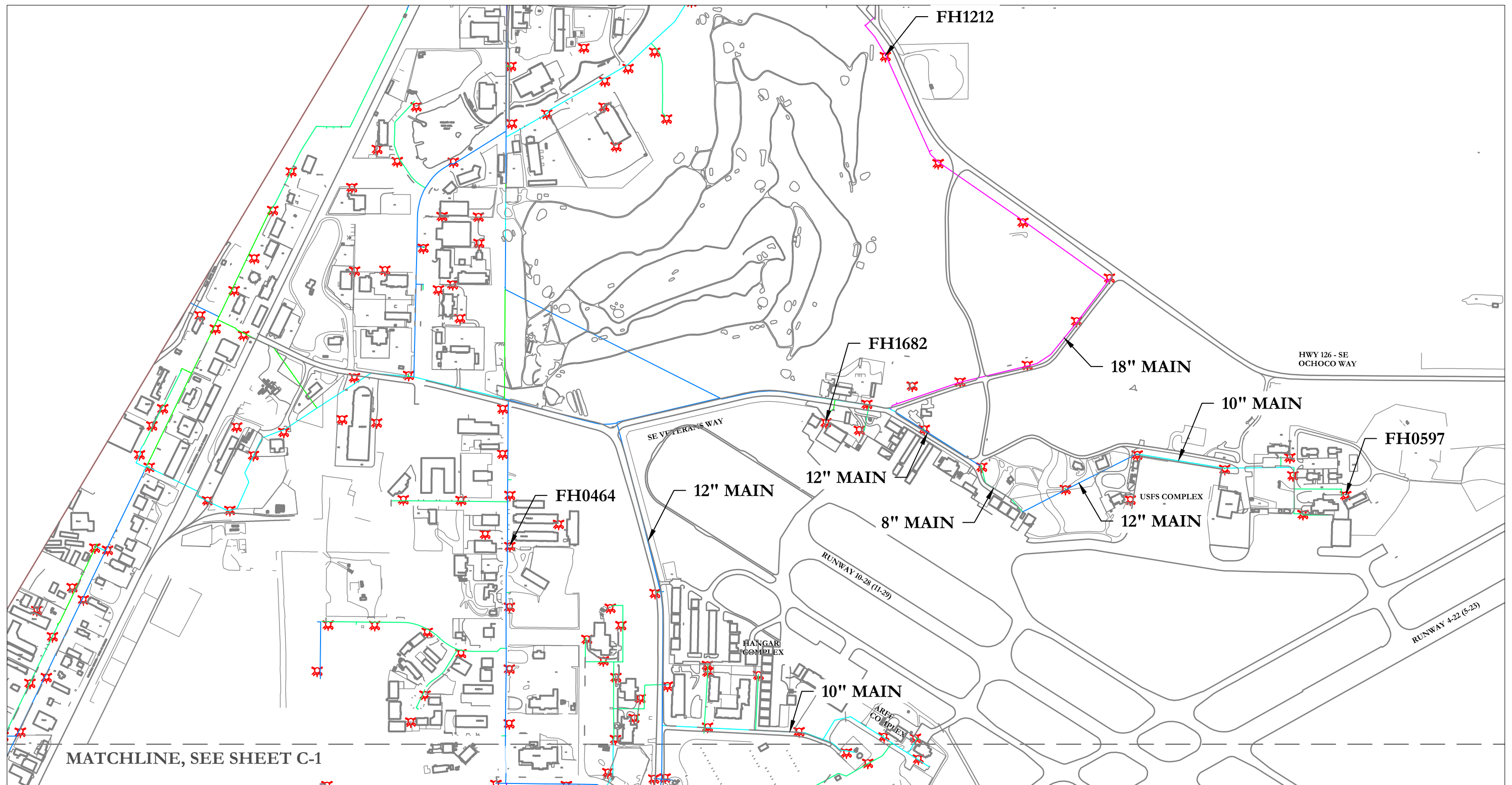


LEGEND:

-  STORM PIPE
-  SEWER MAIN
-  SEWER LATERAL
-  STORM DETENTION BASIN

Figure 1-17
EXISTING STORM AND SEWER
MAINS AND LATERALS

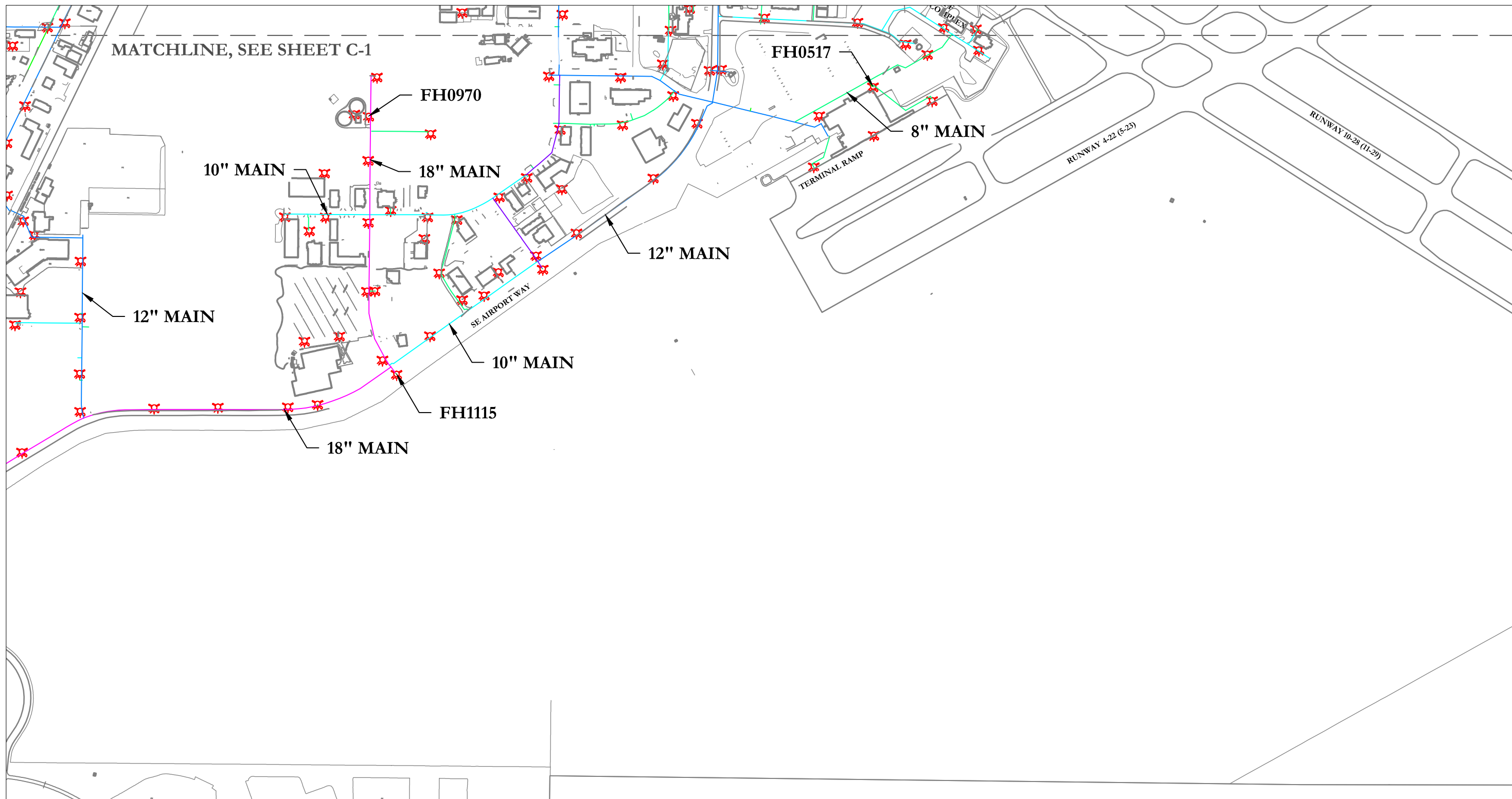




LEGEND:

	6" MAIN		14" MAIN
	8" MAIN		16" MAIN
	10" MAIN		18" MAIN
	12" MAIN		EXISTING HYDRANT

Figure 1-18
EXISTING WATER
MAINS AND LATERALS



LEGEND:

	6" MAIN		14" MAIN
	8" MAIN		16" MAIN
	10" MAIN		18" MAIN
	12" MAIN		EXISTING HYDRANT

Figure 1-19
EXISTING WATER
MAINS AND LATERALS

ELECTRIC

Pacific Power (PPL) provides electrical service to the Airport. Discussions with representatives of PPL for this report did not reveal imminent plans for expansion of services beyond the existing overhead and buried circuits servicing the Airport and its surrounding area. As of 2016, one circuit feeds the airport area. A second circuit around the fairground area may be able to be extended to airport, if needed. PPL's position is Airport load growth would drive any expansion. The suggestion is the 2016 level of electrical service in the vicinity of the Airport should suffice for some expansion alternatives, though development beyond the current reach of PPL's circuits would require extension. In the event of development plans proceeding, early coordination with PPL would be required to discuss load growth in a specific location. At that time, PPL would determine whether or not a system impact study is needed, along with a re-evaluation the system.

SEWER

The City of Redmond provides sanitary sewer service to the Airport and its surrounding areas. Redmond's Water Pollution Control Facility is located in the northwest corner of the City. **Figures 1-16 and 1-17** show the gravity mains that serve the areas considered for this report. Mains that follow Airport Way to Veterans Way heading northwest serve the West Business Park, Terminal, and South Side GA areas. A main that runs along Veterans Way and Sisters Avenue serves the North Side GA and abuts the southern edge of both the North Business Park and the North Development Parcel. Another main that originates at the USFS Campus before heading north to intersect Hwy 126 then runs northwest in parallel serves the northern edges of these two development areas. As with the water service at the USFS Campus, additional development adjacent to or requiring use of that area's sewer system would benefit from further analysis.

WATER

The City of Redmond provides water service to the Airport and its surroundings. All of Redmond's water is produced from subsurface wells, stored in reservoirs, and distributed throughout the city through its system of booster pump stations and pipes. The City's Public Works Department monitors, tests, and maintains this water system and stores utility inventory data on the department's Esri-based GIS mapping database. The development areas considered for this report except for the Fairgrounds Industrial Subarea are served by the City's Pressure Zone 2.

Discussion with the Public Works Department indicates that the areas on and around the Airport are adequately served with water for the needs. As depicted in **Figures 1-18 and 1-19**, a water system consisting of pipes ranging in diameter from 12-inches to 18-inches serves the majority of the development areas under consideration. An 18-inch main extends north along Airport Way until SW 6th Street where it extends to the street's terminus. This large-diameter main serves the Airport Way Subarea and the West Business Park.



A 12-inch main follows Airport Way from the intersection of Airport Way and 6th Street through the intersection with Veteran's Way. This 12-inch main and several 10-inch branches along their entire route effectively serve the Terminal area and the South Side GA area, and borders the southern edge of the North Development Parcel and the western edge of the North Side GA. An 18-inch main running parallel to Hwy 126 and angling south along Veterans Way serves the remainder of the North Development Parcel and the North Business Park. All of these areas are anticipated to accommodate development of future water demand.

The USFS Campus and potentially parts of the North Side GA are the exception to sufficiency of the 2016 service capacity for future expansion. An inconsistent series of pipes ranging between eight and 12 inches in diameter serves the USFS Campus. Fire hydrant flow testing performed by the City of Redmond Public Works Department in December 2016 confirmed that flows are approximately 1,100 gallons per minutes (gpm) for hydrants throughout the development areas under consideration. The USFS Campus, however, sees flows of approximately 850 gpm, which is insufficient for expansion of water demand without upgrades to the water infrastructure in this area as of 2016. The Public Works Department recognizes this area as one that most likely would require water infrastructure upgrades prior to any future expansion.

Table 1-19 summarizes the fire flows determined through hydrant testing for this report.

Table 1-19. RDM Fire Hydrant Flow Test Inventory			
Hydrant ID	Static Pressure (ft)	Flow (gpm)	Location
FH1212	58	1175	Hwy 126 (300' S of SE 9 th St.)
FH0597	50	856	USFS NE of Paraloft (Inside FS fence)
FH1682	55	1162	Les Schwab Hangar (Inside fence)
FH0464	69	1256	1842 SE 1 st St.
FH0517*	53	1300	Airport (N end of Terminal)
FH0970	60	1175	2551 SW 6 th St. (Innovation Park)
FH1115	56	1138	SW Airport Way & SW 6 th St.
FH1122	54	1175	SW Airport Way (400' NE of Mt. Hood Dr.)

*Test data from 2006, all other locations tested December 2016.

TELECOMMUNICATIONS

The Airport is adjacent to the commercial and light industrial operations of the West Business Park, thus the area is well-served by telecommunications and fiber optic providers. CenturyLink, Bend Broadband, and LSNetworks are the primary providers in the Redmond area, though several smaller providers are also available.



NATURAL GAS

Cascade Natural Gas serves the Redmond area. As of 2016, existing pressure mains run adjacent to each of the potential development areas being considered. The existing infrastructure, with extensions as needed, is considered capable of accommodating most future proposed development.

STORM DRAINAGE

Storm drainage on the Airport is contained within the Airport property. The majority of storm drainage, including that of the infield storm system, daylights to an open swale or regional low point, with two notable exceptions. Two large boulder-filled infiltration galleries accommodate storm drainage from the Terminal area and the South Side GA area. One of these is adjacent the north edge of the South Side GA area, and the other is at the southern tip of the Terminal area. These systems are considered to be fixed in their purpose, and not suited for future expansion.

The remaining development areas would likely be subject to the stormwater development requirements of the City of Redmond. These requirements draw largely from the Central Oregon Stormwater Manual (COSM), which outlines Best Management Practices for stormwater management. Given the basaltic subsurface conditions known to define Central Oregon, surface treatment of stormwater, such as swales and drainage basins, is a common management practice. Refer to **Figures 1-16** and **1-17** for locations of stormwater management facilities.

1.4.3 NON-AVIATION FACILITIES

The existing non-aviation developments owned by the Airport and adjacent to airport property are detailed in **Appendix A**. The information includes known projects in the planning and design stage that may impact the Airport. Airports often own non-aviation parcels as a way to promote development that is compatible with aircraft operations, and to diversify revenue. The non-aviation facilities are divided into the following subareas based on their location:

- ✓ North Development Parcel Subarea
- ✓ North Business Park Subarea
- ✓ South Side GA Subarea
- ✓ West Business Park Subarea
- ✓ Airport Way Subarea
- ✓ Fairgrounds Industrial Subarea



1.4.4 ON-AIRPORT ZONING AND LEASE RESTRICTIONS

Appendix A includes a detailed listing of City of Redmond Zoning designations which occur in the Airport vicinity. The zoning information includes the “zone description” and a listing of permitted uses.

1.5 TERMINAL BUILDING

The terminal building is a modern, well maintained facility built in 2009. With the passenger enplanement growth and the expansion of services since it was built, the terminal will need expansion and alteration for more efficient use and adaptability for future growth. This section describes the terminal facilities that exist in 2016. **Figures 1-20** through **1-25** show the terminal building floor plan by level.

1.5.1 TERMINAL BUILDING

TERMINAL BUILDING FUNCTIONAL COMPONENTS

PARKING / GROUND TRANSPORT

The passengers departing from the Airport have multiple options to access the terminal. They may use the public parking lot for their private vehicles, can be dropped off at the curb by personal vehicles, or be delivered by taxis or shuttles. The employees have a parking area near the terminal separate from the passenger lot, and the Airport vendors also have assigned parking separate from employee parking.

PRE-SECURE AREA

The pre-secure area of the terminal is that portion of the building that precedes the TSA screening. The pre-secure area is comprised of administration offices, airline ticketing and offices, baggage claim, meeter/greeter lounge, food and retail convenience store, rental car agencies, and restrooms.

ADMINISTRATION SPACE

The airport management space is comprised of a reception area, six offices and a conference room.

LAW ENFORCEMENT OFFICERS (LEO) AREAS

RAMS Specialized Security Service, Inc., who provides security for both pre-secure and secure areas, has an office adjacent to the security checkpoint. The City of Redmond Police Department also has an office in the terminal for officers to perform routine duties. While this police office is not staffed full-time, it allows officers to be nearby if needed for an emergency at the Airport.



TICKETING

There are ten ticketing counters, and each airline has dedicated counter(s) with separate queuing lines and ticketing kiosks. Passengers can check in at either the counter or kiosks; however, only the Alaska kiosks allow passengers to tag their own checked baggage. As of 2016, there are three unoccupied counters available. Airline offices and storage spaces serving the airlines are located directly behind the ticketing counters.

MEETER/GREETER LOUNGE

A meeter/greeter lounge immediately follows the inbound passengers' exit from the secure area. It is adjacent to baggage claim and the rental car counters. The waiting area provides seating and a children's play area.

BAGGAGE CLAIM

The baggage claim consists of two baggage carousels and an oversize baggage claim area. A dedicated inbound baggage drop off area on the exterior of the terminal building serves these carousels.

RENTAL CARS

RDM has five counters for six rental car agencies with an office behind each counter. The agencies keep the rental vehicles in a parking lot adjacent to the terminal. Renters access the rental lot via a marked walkway. The rental car agencies are:

- | | |
|----------|--------------|
| ✓ Alamo | ✓ Enterprise |
| ✓ Avis | ✓ Hertz |
| ✓ Budget | ✓ National |

CONCESSIONS

A single news and gifts concession space is located in the pre-secure area. The plumbing for this space supports beverage service, but no cooking or food preparation takes place as of 2016.

UNFINISHED SPACE

As of 2016, approximately 3,178 square feet of unfinished space is available for future tenant improvement located along the pre-secure central corridor area.

SECURE AREA

The two-story area beyond the TSA checkpoint is referred to as "secure," meaning passengers and employees have gone through TSA screening, or possess required credentials for access. The basement contains baggage screening, the TSA office suite, a maintenance shop, storage, and breakroom. The first floor houses a convenience store and holdroom for passengers, and the second floor contains a bar, restaurant, and



another holdroom. There are restrooms on both the first and second floors. Access to the second floor is provided by two sets of stairs and an elevator.

SECURITY CHECKPOINT

The TSA screening area bridges the pre-secure and secure areas. The TSA operation has two lanes for screening passengers in an area approximately 75 feet long and 40 feet wide. Typically, both lanes are in operation daily during peak screening times – from 7 to 8 a.m. and from 12-1 p.m. As of 2016, TSA does not implement a pre-check lane.

The space for TSA screening may need an expansion due to increasing passenger enplanements. There appears to be sufficient space to accommodate an adding an additional lane by opening the space to the east, but this would require the removal of the existing exit passageway. As modifications of TSA guidelines are updated periodically, any future design will have to be mindful of possible changes to current standards.

TSA ADMINISTRATIVE AREA

The TSA support areas are in need of expansion. The Airport was reclassified to a Category 2 airport by the TSA in March 2016, after surpassing 250,000 annual enplanements for the three previous fiscal years. The enhanced classification increases the budget for staff and equipment. An increase in staff would necessitate improvements in the training areas, locker room space, and offices.

BAGGAGE SCREENING

As of 2016, baggage screening is located in the basement. The baggage handling system takes baggage from behind the airline ticketing counters, through the TSA screening equipment in the basement, and back up to the baggage make-up area, defined in the next paragraph. Alterations or reconfigurations to this area to meet updated TSA guidelines need to be balanced against the available basement area.

BAGGAGE MAKE-UP

Baggage make-up is where the airlines retrieve screened baggage. The baggage make-up system is one, large carousel with tug access to four sides. Some congestion at the baggage make-up has been noted. Adding another belt for outbound baggage screening would reduce congestion, and that addition would necessitate a building expansion.

GATES

The Airport has six gates, Gates A-F, for departing passengers. Gates serviced by the airlines are listed below:

- | | |
|--------------|------------------|
| ✓ A – Alaska | ✓ D – Delta |
| ✓ B – Alaska | ✓ E – American |
| ✓ C – United | ✓ F – Unassigned |



HOLDROOMS

The holdrooms are the areas for passengers waiting to board their flights. The first floor area is a one-story space with a two-story circulation space leading to the second floor. The first floor contains seating with approximately 220 seats. The first floor holdroom area acts as a single space. Gate areas are loosely defined by their proximity to the airline gate kiosk. While this provides efficient use of the overall space, it makes it difficult to consolidate passengers with the airline they are flying.

The second floor holdroom has a high, vaulted ceiling with excellent daylighting and good views. There is ample space with approximately 50 chairs. No gates are directly associated with the second floor area.

PASSENGER BOARDING BRIDGES

All aircraft at the Airport are ground boarded, with no passenger boarding bridges (PBBs). Boarding bridges can facilitate passenger boarding and deplaning especially in conjunction with the anticipated airline fleet expansion. The addition of PBBs could make better use of the underutilized second floor holdroom and should lighten the first floor holdroom congestion. The second floor has the space to accommodate additional gates served by PBBs. Installing the PBBs at this location would require extensive modifications to the building. An exiting path likely containing escalators or additional elevators for deplaning passengers would need to be added to direct traffic to the secure exit.

INTERIOR PASSAGEWAY TO AIRCRAFT RAMP

Boarding passengers move through the holdroom gates to an enclosed passageway. The passageway contains access to eight ramp doors that open to the aircraft ramp. The passengers board the aircraft using movable stairs or ramps. Deplaning passengers enter the passageway from the exterior and proceed to a secure exit that leads to baggage claim, rental car counters and the meeter/greeter lounge.

CONCESSIONS

The first floor contains a small convenience store. There is inadequate storage/support space for this area, and the concessionaire has difficulty maintaining stock throughout the day. The second floor has a bar, restaurant and kitchen, with high chair seating at the bar, and table and chair seating near the serving area. As there are no gates on the second floor, the restaurant/bar area is removed from primary holdroom activity.

Existing retail areas could be expanded to provide a broader range of merchandise and facilitate customer movement within the stores, especially when customers enter with luggage. Concessions storage is limited, which leads to shortages and stock shortages during peak periods. There is a lack of cold storage for the food, and getting supplies through TSA screening is time-consuming. There is an opportunity for improved concession revenue with the addition of food service in the pre-secure area of the terminal. A coffee/sandwich shop would serve those waiting for passengers, as well as employees. Electrical and mechanical systems



need improvement to address issues related to the circuit breaker for the restaurant refrigerator, and the availability of hot water in the restaurant.

Figure 1-20. Second Level of Passenger Terminal



AIRLINE TICKETING OFFICES (ATO)

As of 2016, the space for offices and storage behind the ticket counters is at capacity. Some of the ATO space is used for storage. An expansion of this area is needed to ease current constrictions and provide for future growth.

GENERAL TERMINAL SYSTEMS/AREAS

BUILDING STORAGE

The terminal building lacks sufficient space for on-site storage. Maintenance equipment, supplies and other materials used at the terminal have to be held in mechanical rooms or remote locations, which is an inconvenience to terminal personnel.

DEDICATED DELIVERY ENTRY

As of 2016, when deliveries are made to the terminal items must be transported from curbside through the public space of the building to their destination. A dedicated delivery entry and unloading area would be more efficient, with distribution through a back-of-house passageway. This could eliminate congestion in the public spaces and provide a more secure entry for goods.



IMPROVED SIGNAGE

The secure passageway leading to the gates could use clearer gate markings in conjunction with destinations indicated at each ramp exit door. The use of video monitors would aid in providing clear direction and information that could change with each flight. The expanded use of informational display units at the holdroom gates and other strategic locations could provide weather information, flight information, and advertisement space.

PUBLIC ADDRESS SYSTEM

The PA system provides an inconsistent level of performance in the holdroom. It has been reported that announcements are difficult to hear.

POWER ISSUES AT GATE AREA

As of 2016, the gates have no back-up power. The gates doors stay in whatever position they are in when the power fails creating a security issue as well as access disruption. There is a desire to expand electrical power to the seating in the terminal.

REVOLVING DOORS

The revolving doors at secure exiting creates a queue as passengers must wait for the slowdown of traffic created by these doors. It was also noted that finding replacement parts for these doors is difficult.

ELECTRIC GROUND SUPPORT EQUIPMENT

The airlines are moving to the implementation of an all-electric fleet for their Ground Support Equipment. Provisions to locate charging stations and provide power to these units need to be developed.

GROUND SETTLEMENT

Some settlement has been noted at gates 1 and 2. These areas should be monitored to see if the settlement has subsided or presents an ongoing issue..

ENERGY EFFICIENCY

The community has expressed an interest in energy efficiency. Where systems need to be update or replaced, energy efficiency should be a priority. There are currently photovoltaic panels on the terminal roof. There is further interest increasing solar generated power.



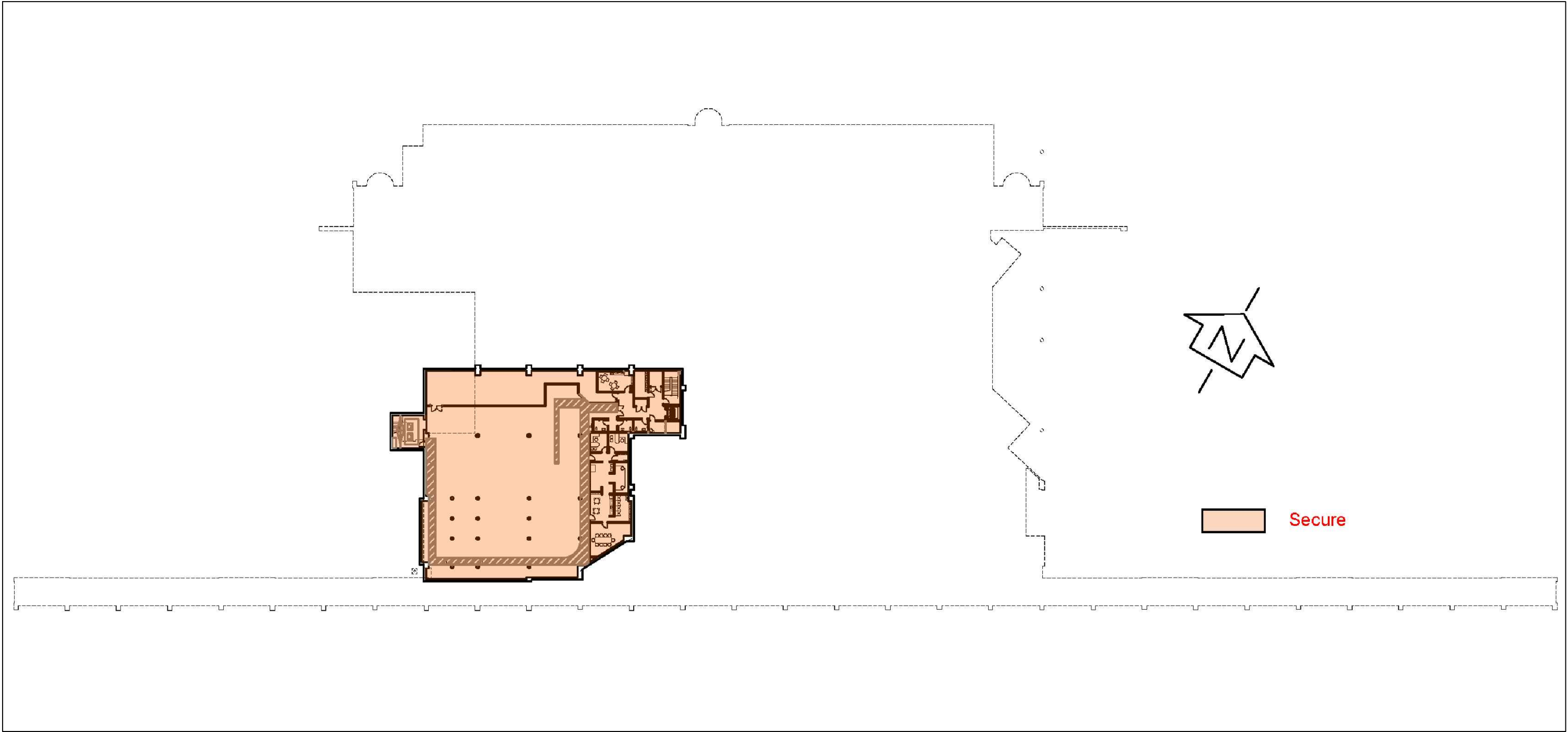


Figure 1-21
BASEMENT FLOOR PLAN



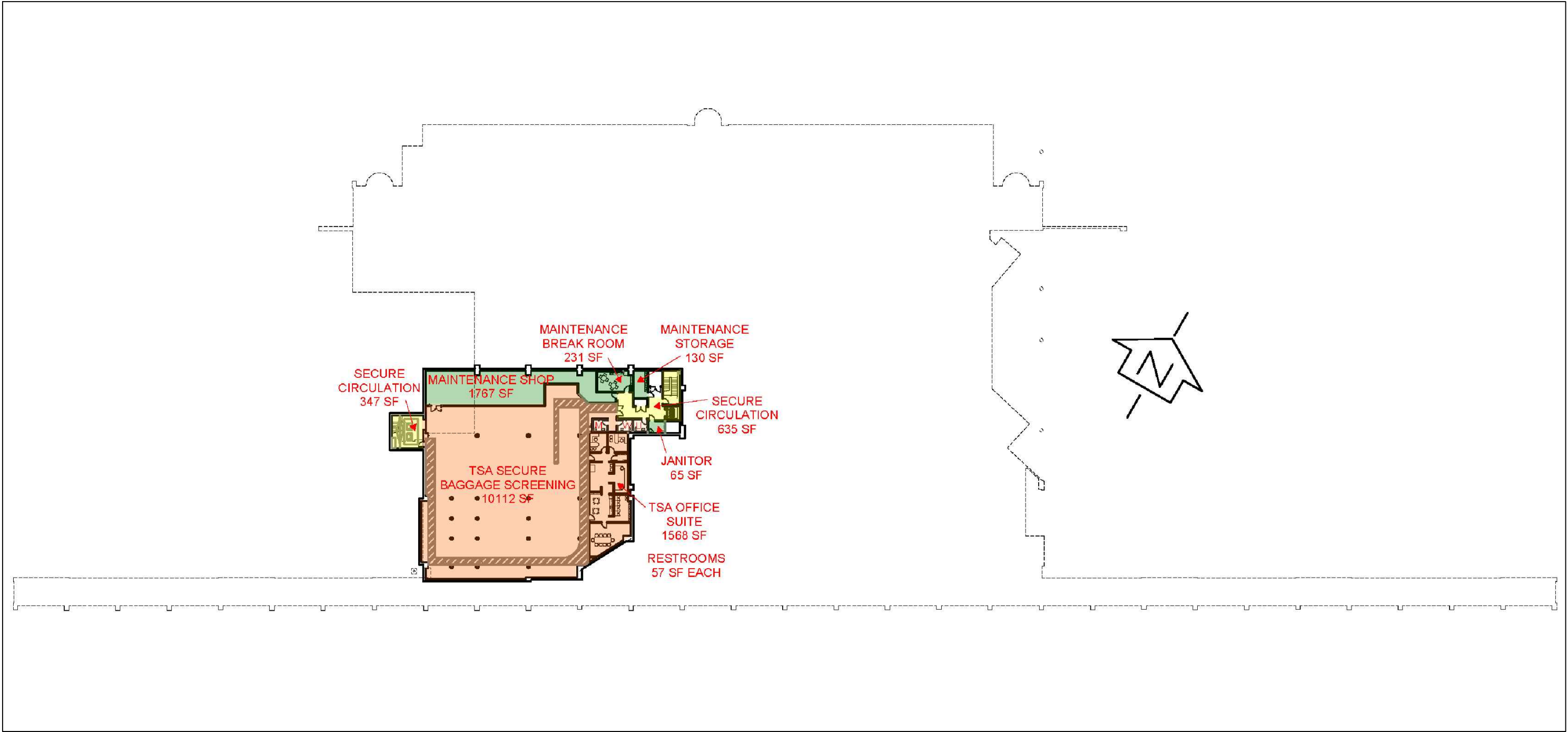


Figure 1-22
BASEMENT FLOOR PLAN



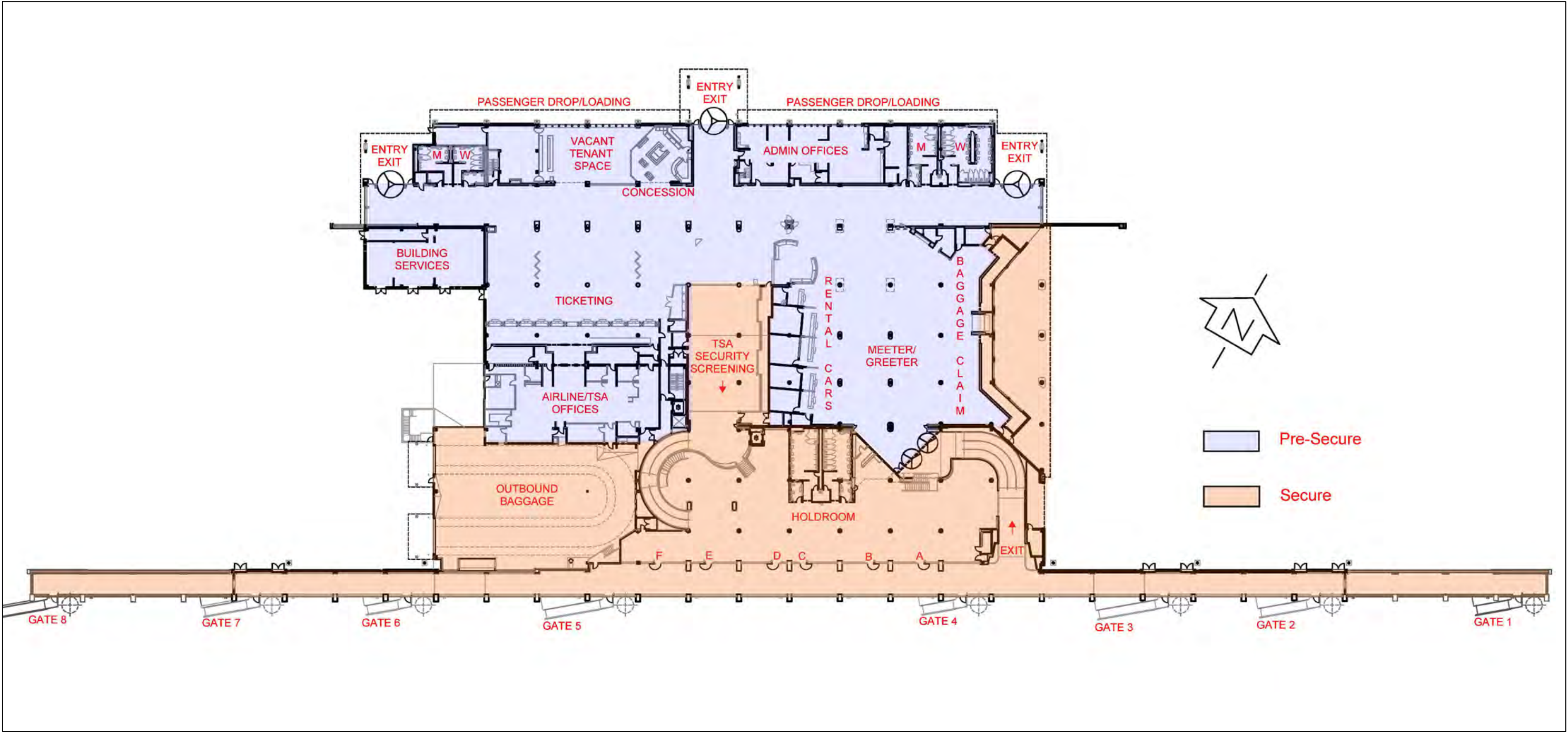


Figure 1-23
GROUND FLOOR PLAN



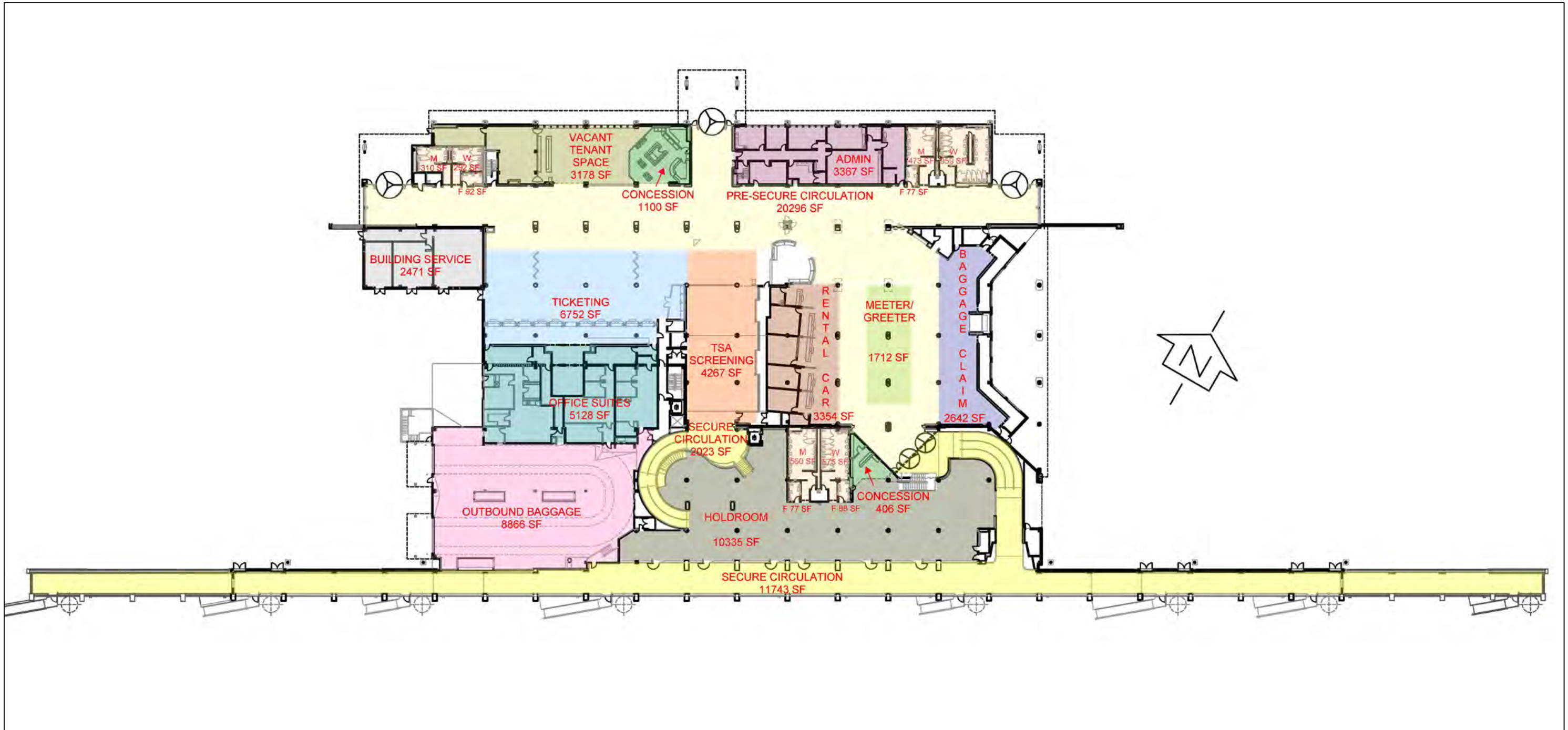


Figure 1-24
GROUND FLOOR PLAN



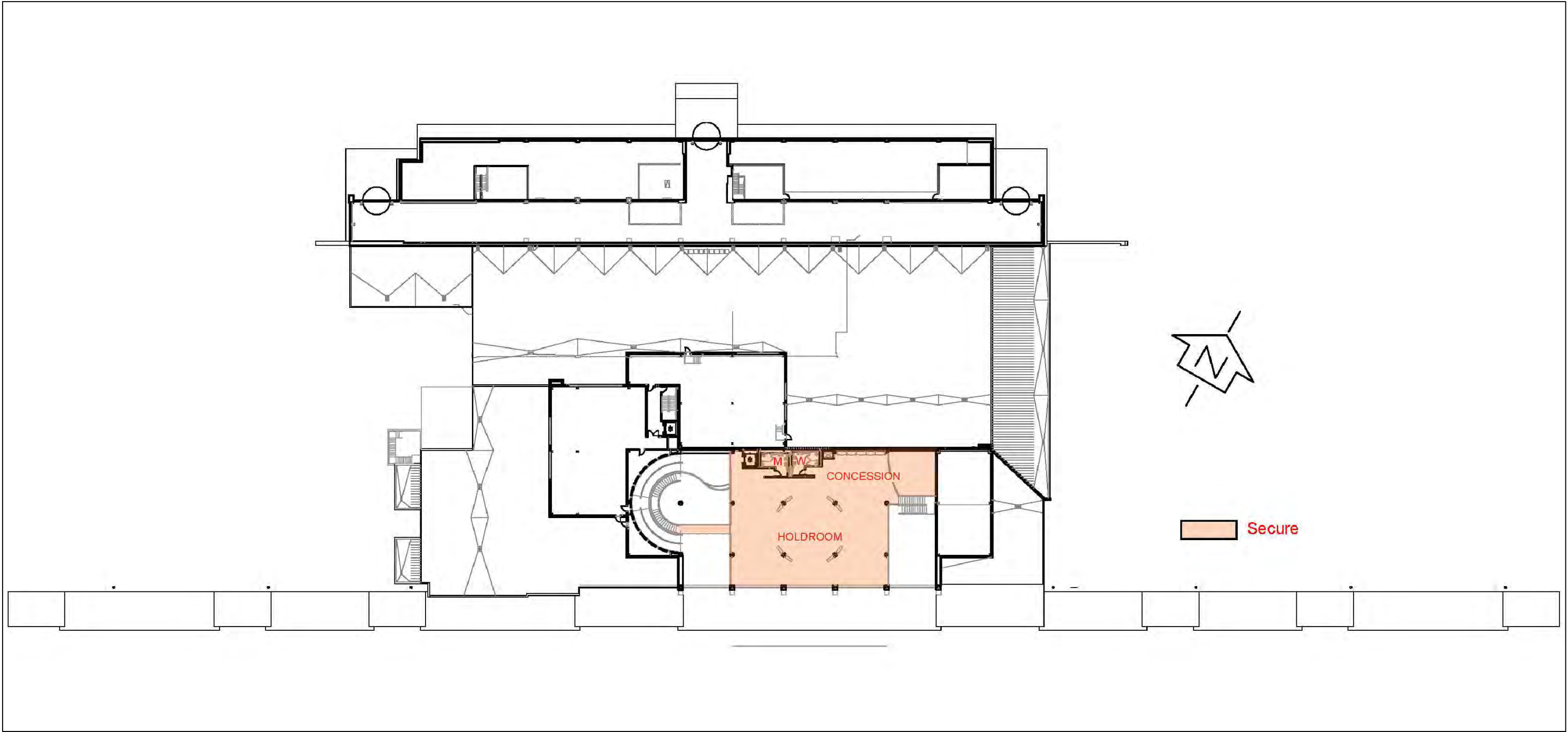


Figure 1-25
SECOND FLOOR PLAN



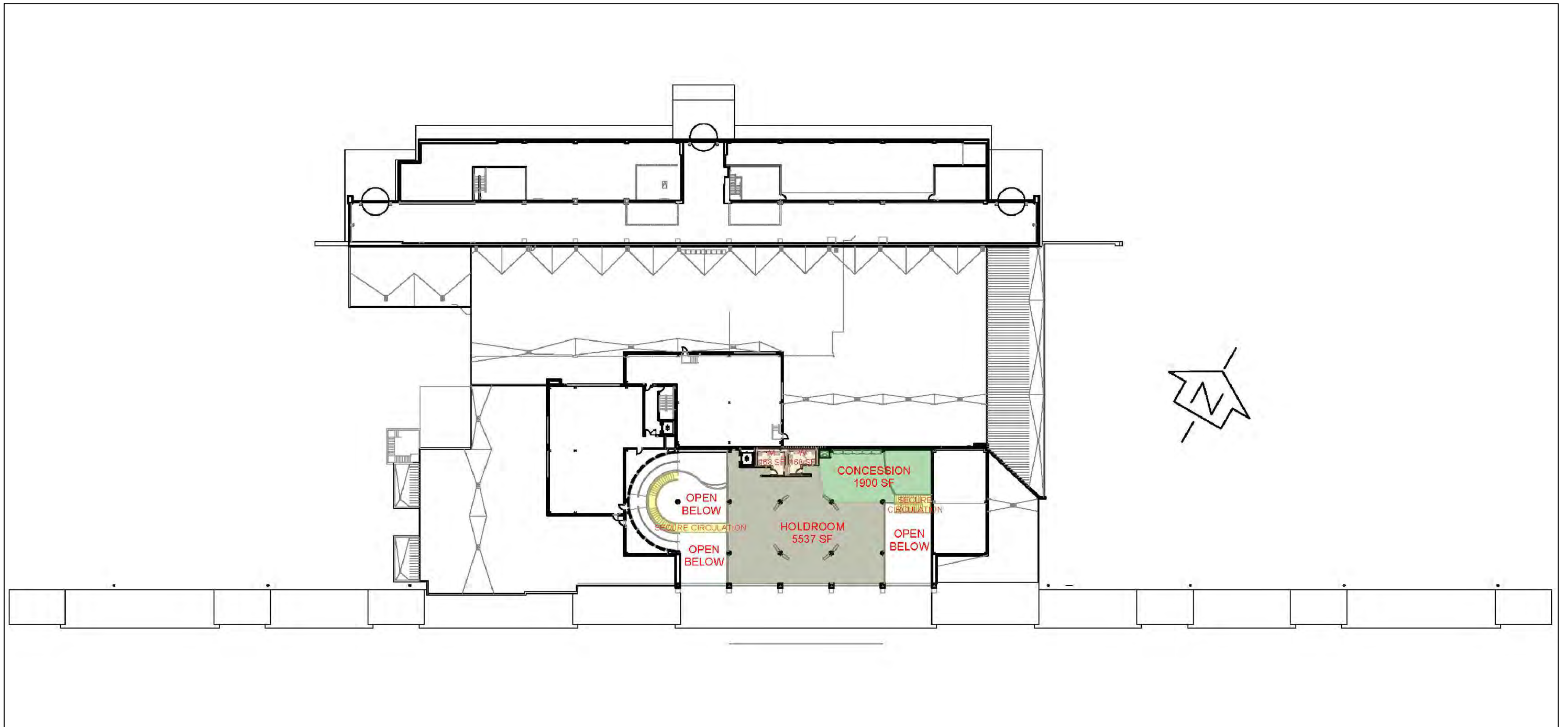


Figure 1-26
SECOND FLOOR PLAN



REDMOND MUNICIPAL
AIRPORT MASTER PLAN

1.6 AVIATION ACTIVITY

Aviation activity for the Airport is shown below for based aircraft, annual operations (itinerant and local), passenger enplanements, cargo volume (cargo in and cargo out), and flight patterns. This information serves as the baseline for aviation activity forecasts that will help determine the proper facilities needed to serve future aviation activity and demand. Aviation activity is described in detail in **Chapter 2, Aviation Activity Forecasts**. A summary of 2016 activity levels is presented in Table 1-20.

Table 1-20. Aviation Activity for Fiscal Year 2016*	
Activity Measure	Totals
Aircraft Operations*	40,162
<i>Air Carrier (Itinerant)</i>	5,127
<i>Air Taxi (Itinerant)</i>	6,340
<i>General Aviation (Itinerant)</i>	10,985
<i>General Aviation (Local)</i>	16,829
<i>Military (Itinerant and Local)</i>	881
Passenger Enplanements**	322,176
Cargo Volume (Tons)**	970.1
Number of Airlines	4
Non-stop Destinations	7
Based Aircraft***	
Aircraft Type	Totals
Single-Engine	64
Multi-Engine	4
Jet	6
Helicopters	6
Other	0
Total Based Aircraft	80
<i>The airport was closed for one month in 2016 for runway construction.</i> <i>Sources: *Terminal Area Forecast 2016, **RDM Monthly Report, RDM Performance Metrics,</i> <i>***RDM Based Aircraft Survey 2016</i>	

Annual totals are reported by FAA Fiscal Year, which runs from October 1 to September 30. Aviation activity measures reflect one month of airport closure during the reconstruction of Runway 5-23. The aviation activity forecasts will provide additional historical data and investigate changes in aviation activity over the most recent ten year period.



1.7 AERONAUTICAL SETTING

This section details the aeronautical setting surrounding the Airport, including details about neighboring airports and their facilities.

1.7.1 COMMERCIAL SERVICE AIRPORTS

PORTLAND INTERNATIONAL AIRPORT

Portland International Airport (PDX) is the largest airport in the state, located 150 miles from RDM. PDX offers domestic and international flights, and there are four non-stop flights a day from the Airport to PDX.

OTHERS

Four other airports in the greater region are air carrier airports: Eugene Airport (EUG), Rogue Valley International-Medford Airport (MFR), Eastern Oregon Regional Airport (PDT), and Crater Lake Klamath Regional Airport (LMT). EUG is 135 miles west of the Airport, MFR is 189 miles southwest of the Airport, PDT is 221 miles northeast of the Airport, and LMT is 160 south of the Airport. RDM does not have direct flights to these other Oregon airports.

1.7.2 GENERAL AVIATION AIRPORTS

Five general aviation airports are located within 30 nautical miles of the Airport: Bend Municipal (BDN), Madras Municipal (S33), Prineville (S39), Sunriver Airport (S21), and Sisters Eagle Air Airport (6K5). None of these have commercial service as of 2016 and have no future plans for commercial service. BDN has 203 fixed wing based aircraft and S39 has 122 fixed wing based aircraft. These two airports represent the greatest concentration of based aircraft in Crook, Deschutes, and Jefferson Counties.

BEND MUNICIPAL AIRPORT

BDN is 10 nautical miles south of the Airport, and has one 5,200-foot by 75-foot north-south lighted runway with non-precision instrument approach capability. The airport accommodates the highest volume of general aviation activity among all airports in Central Oregon, including flight training and an active glider community. BDN also has 19 helicopters based at the airport due to an extremely large volume of helicopter training activity. A number of small aviation businesses are located at the airport, including the Epic Aircraft manufacturing facility, which manufactures the Epic E1000 single engine turboprop aircraft. Aviation businesses located at BDN total approximately 300 employees. A future extension of Runway 16-34 to an ultimate length of 6,260 feet is proposed based on the approved Airport Layout Plan for BDN.



MADRAS MUNICIPAL AIRPORT

S33 is 25 nautical miles north of the Airport, and has two runways. Runway 16-34, the primary runway, is 5,089 feet long by 75 feet wide with medium intensity lights and existing visual approach capabilities. Runway 4-22, the crosswind runway, is 2,701 feet long by 50 feet wide. Runway 4-22 is primarily used by small, single-engine general aviation aircraft.

Erickson Aero Tankers, who contracts with the USFS and other entities for aerial firefighting aircraft, uses the S33 as a maintenance base for their fleet. The fleet consists of three DC-7 and seven MD-87 air tankers. In addition, Daimler Corporation is constructing a new truck model testing site at S33. As of 2016, this facility is under construction and will include two new test tracks that simulate road conditions for heavy duty trucks.

PRINEVILLE AIRPORT

S39 is 11 nautical miles east of the Airport with two runways. Runway 10-28, the primary runway, is 5,751 feet long by 75 feet wide with MIRL and non-precision instrument approach capability. Runway 15-33, the crosswind runway is 4,054 feet long with a non-standard, 40-foot width, and is limited to aircraft with a maximum takeoff weight of 5,000 pounds or less. This secondary runway has low intensity runway lighting (LIRL) with only visual approach capability.

S39 accommodates a fairly substantial on-site commercial pilot fixed wing training operation and a joint use Bureau of Land Management (BLM) helibase that is home to the Central Oregon Interagency Helitack Crew. Corporate traffic at S39 has increased as a result of the development of data centers for Facebook and Apple in Prineville. Hillsboro Aviation is a Fixed Base Operation at S39 that supports a growing pilot training operation.

SUNRIVER AIRPORT

S21 is approximately 26 nautical miles south/southwest of the Airport and has a single runway. Runway 16-34 is 5,461 feet long by 75 feet wide with LIRL and non-precision instrument approach capability. This airport is privately-owned by Sunriver Resort, LLC, and is for public use. The airport primarily serves residents and visitors to the 3,300-acre Sunriver Resort, which is a planned, fully-contained private residential and resort community. The resort itself is bordered on the north, east, and west by the Deschutes National Forest and the unincorporated community of Three Rivers on the south.

SISTERS EAGLE AIR AIRPORT

6K5 is approximately 20 nautical miles west of the Airport and has a single runway, 2-20. Runway 2-20 is 3,460 feet long and 60 feet wide with visual approach capability only. The airport is privately-owned by Sisters Eagle Air, Inc., and is for public use. The airport primarily serves residents and general aviation pilots who fly in the vicinity of the airport. The runway surface is made of asphalt and the airport has 100LL fuel.



Table 1-21 lists the nearby airports with a summary of available facilities and activity information. Airport locations are shown in **Figure 1-27**.

Table 1-21. Nearby Airports, Primary Runways, and Activity					
Element	Bend Municipal Airport (BDN)	Madras Municipal Airport (S33)	Prineville Airport (S39)	Sunriver Airport (S21)	Sisters Airport (6K5)
Runway Designation	16-34	16-34	10-28	18-36	2-20
Runway Length	5,200'	5,089'	5,751'	5,461'	3,460'
Runway Width	75'	75'	75'	75'	60'
Pavement Strength (000)	30 S	75 S, 120 D, 180 2D	30 S	30 S	4 S
Runway Composition	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt
Runway Lighting	MIRL	MIRL	MIRL	LIRL	N.A
Taxiway Lighting	Reflectors	N.A.	N.A.	Reflectors	N.A
Approach Aids	REIL, PAPI-4L	REIL, VASI-4L	PAPI-4L	VASI-2L	N.A
Weather	AWOS	AWOS	AWOS	N.A.	AWOS
Airport Beacon	Clear/Green	Clear/Green	Clear/Green	Clear/ Green	N.A
Approach Capability					
Existing	Non-Precision	Visual	Non-Precision	Non-Precision	Non-Standard
Future	Non-Precision	Non-Precision	Non-Precision	Non-Precision	Non-Standard
2015 Annual Operations*					
Local	70,030	9,192	29,437	2,518	400
Itinerant	70,044	6,128	17,613	3,671	1000
Total Operations	140,074	15,320	47,050	6,189	1,400
2015 Based Aircraft**					
Single engine	177	40	115	26	15
Multi-Engine	16	0	5	11	2
Jet	10	0	2	4	0
Fixed Wing	203	40	122	41	17
Rotor	19	1	1	0	0
Gliders	8	0	0	2	0
Ultra-Light	3	2	2	0	0
Total Based	233	43	125	43	17

*: Bend = 2015 EA; Madras = 2010 Madras Master Plan Interpolated; Prineville = 2016 Prineville Master Plan Interpolated; Sisters = FAA 5010 Airport Master Record; Sunriver = 2015 FAA Terminal Area Forecast (TAF).

**:: BDN, S33, S21, 6K5 = FAA 5010 Airport Master Record, Prineville based aircraft = 2016 Airport Master Plan interpolated.





Figure 1-27
SURROUNDING AIRPORTS

1.8 COMMUNITY SETTING

This section presents socioeconomic data to provide a profile of the airport users and the community served by the Airport. Socioeconomic data is used to guide aviation activity forecasts in **Chapter 2**.

1.8.1 SOCIOECONOMIC DATA

In order to define an area of analysis, socioeconomic data was gathered by using data compiled by Woods & Poole Economics, Inc. Woods & Poole categorizes Deschutes County and the cities located in the county, including Redmond, as the Bend-Redmond Metropolitan Statistical Area (MSA). The Bend-Redmond MSA is the area of analysis because it includes data for all of Deschutes County where the Airport is located. The study comprised these socioeconomic indicators to help determine trends in the Bend-Redmond MSA:

The data range was from 2006 to 2015. A longer period of time, rather than one or two years, is helpful for indicating trends more accurately, which is why a ten-year period was used. The accuracy of trends is critical, since trends are used to help determine future forecasts for airports. The selection of this ten-year period incorporates periods of growth and decline, such as the 2008 recession and the strong growth the Airport has seen since 2012. **Table 1-22** shows the socioeconomic data for the Bend-Redmond MSA during 2006 to 2015.

Table 1-22: Socioeconomic Data for Bend-Redmond MSA						
Indicator	Population	Employment	Earnings	Income/Capita	GRP	Retail Sales
2006	143,860	91,910	\$4,045	\$40,619	\$6,876	\$3,262
2007	147,240	91,670	\$4,004	\$40,368	\$7,052	\$3,282
2008	150,690	91,420	\$3,964	\$40,118	\$7,232	\$3,301
2009	154,220	91,180	\$3,924	\$39,869	\$7,417	\$3,321
2010	157,840	90,930	\$3,885	\$39,622	\$7,607	\$3,341
2011	159,800	92,310	\$3,868	\$40,532	\$7,620	\$3,518
2012	161,890	93,940	\$3,978	\$41,377	\$7,847	\$3,650
2013	165,950	97,710	\$4,195	\$41,539	\$8,202	\$3,816
2014	169,160	99,890	\$4,373	\$42,257	\$8,411	\$3,958
2015	172,500	102,090	\$4,515	\$42,975	\$8,622	\$4,071

Source: Woods & Poole (2016)
 Note: Total Earnings (in millions, adjusted to 2016 dollars), Total Personal Income Per Capita (adjusted to 2016 dollars), GRP (in millions, adjusted to 2016 dollars), Total Retail Sales (in millions, adjusted to 2016 dollars).



1.9 AIRPORT FINANCIAL OVERVIEW & ECONOMIC CONTRIBUTION

Commercial service airports are economic engines in the communities that they serve, facilitating the movement of goods and people to and from the community. Airports serve as employment centers, and as municipal entity that leases property and enters into contracts with private enterprise, their financial structure differs from other municipal departments. This section describes the revenues and expenses associated with airport operation, and the economic contribution that the Airport makes to the community it serves through jobs and wages, and business sales.

1.9.1 HISTORICAL FINANCIAL INFORMATION

The Airport generates revenue to cover its expenses and operates as an airport enterprise fund (AEP), which means that it maintains separate accounting from the City of Redmond general fund. The AEP is primarily funded through revenue from passengers and airlines. Grants from the FAA Airport Improvement Program help offset much of the cost of eligible capital improvements. The AEP is organized into three cost-centers: the Terminal Program, the Airfield Program, and the General Operations program. There are three additional sub-funds for debt service, passenger facility charges, and capital projects that are separated out to keep these capital improvement and financing funds from comingling with operating funds.

The Terminal Program uses a cost-recovery rates and charges basis, where the Airport looks to recover investment in facilities from users and tenants. The scope of this program includes the passenger terminal building. The Airfield Program covers operations and maintenance of the airfield, and rates and charges are set on a cost recovery basis. The General Operations Program includes hangars, parking lots, roadways, and non-aviation development, and uses a market rate basis to set rates and charges. The General Operations program helps the Airport diversify revenue streams to guard against slowdown in the aviation industry. A summary of the AEP is presented in **Table 1-23**.



Table 1-23: Airport Financial Overview

Year	FY2013/14	FY2014/15	FY2015/16	FY2016/17
Type	Actual	Actual	Budget	Budget
Total Resources	\$15,105,114	\$18,742,348	\$37,122,840	\$24,355,420
General Operations	\$7,757,230	\$8,754,158	\$9,713,972	\$8,570,154
Terminal Operations	\$1,565,455	\$1,624,505	\$1,547,364	\$1,853,345
Airfield Operations	\$1,282,264	\$1,174,730	\$1,237,932	\$1,349,270
Debt Service Reserve	\$2,247,694	\$2,350,098	\$2,539,651	\$2,539,651
Passenger Facility Charge	\$1,082,796	\$1,138,806	\$933,921	\$1,100,000
Capital Projects	\$1,169,675	\$3,700,051	\$21,150,000	\$8,943,000
Total Expenditures	\$9,542,577	\$13,124,756	\$37,122,840	\$24,355,420
General Operations	\$4,952,535	\$5,923,221	\$9,665,236	\$8,848,222
Terminal Operations	\$1,226,044	\$1,079,200	\$1,536,043	\$1,575,277
Airfield Operations	\$1,138,805	\$1,233,063	\$1,297,989	\$1,349,270
Debt Service Reserve	\$-	\$-	\$2,539,651	\$2,539,651
Passenger Facility Charge	\$988,743	\$1,036,438	\$933,921	\$1,100,000
Capital Projects	\$1,236,450	\$3,852,834	\$21,150,000	\$8,943,000
Net Program	\$5,562,537	\$5,617,592	\$-	\$-
General Operations	\$2,804,695	\$2,830,937	\$48,736	\$(278,068)
Terminal Operations	\$339,411	\$545,305	\$11,321	\$278,068
Airfield Operations	\$143,459	\$(58,333)	\$(60,057)	\$-
Debt Service Reserve	\$2,247,694	\$2,350,098	\$-	\$-
Passenger Facility Charge	\$94,053	\$102,368	\$-	\$-
Capital Projects	\$(66,775)	\$(152,783)	\$-	\$-

Source: City of Redmond FY2016/17 Budget

1.9.2 AIRPORT ECONOMIC IMPACTS

The Airport is included in the 2014 Oregon Department of Aviation (ODA) Economic Impact Statement for NPIAS Airports. This report identifies the economic contributions of airports to the Oregon economy through on and off airport activities, the jobs created due to the airports, and the total payroll of the jobs created. **Table 1-24** represents the economic impact of the Airport on the Oregon economy in 2012 dollars.

Table 1-24. RDM 2014 Economic Impact

Jobs	Payroll	Business Sales
810	\$24,735,000	\$81,561,000

Source: 2014 ODA Economic Impact Statement for NPIAS Airports



1.10 ENVIRONMENTAL CONDITIONS

The following sections are included to provide a baseline of the existing environmental conditions on and around the Airport. The information presented is a high level overview provided for planning purposes and is not intended to satisfy the requirements of the National Environmental Policy Act (NEPA).

1.10.1 AIR QUALITY

The Airport and surrounding areas are located within a National Ambient Air Quality Standards (NAAQS) Attainment area for the State of Oregon (Oregon Department of Environmental Quality [DEQ], 2016). The EPA established NAAQS for a limited number of pollutants in response to enactment of the Clean Air Act of 1970 and the Amendments of 1975 and 1977. The pollutants of most concern in an arid environment such as Redmond are particulates. The primary impacts to local air quality created by aircraft occur when planes are at or close to ground level during takeoff, landing, and taxiing. Airports have numerous other sources of pollutants including automobile traffic, service trucks, fuel trucks, and auxiliary equipment such as emergency generators. Aircraft engines emit carbon monoxide, carbon dioxide, particulate matter, volatile organic compounds, and oxides of nitrogen and sulfur. Fossil-fuel engines that combust diesel, aviation fuel, and gasoline fuels emit a variety of toxic compounds, which are primarily formaldehyde, benzene, and heavy metals.

Changes in aircraft operations or development at the Airport would require air quality modeling to evaluate the emission of priority pollutants to see if they will approach or exceed the NAAQS. Air quality impacts will be modeled in conjunction with aircraft noise. The FAA Aviation Environmental Design Tool (AEDT) is the required model for aviation noise and air quality modeling and will be used to quantify those impacts for the Airport.

1.10.2 COMPATIBLE LAND USE

Several factors can go into the analyses of whether or not a proposed land use is compatible with an airport. For Redmond Airport, the factors the City has to measure against are provided through the following three avenues:

Noise contours will be created for the Airport in a subsequent chapter of this Master Plan in conjunction with the forthcoming forecasted aviation activity. Once created, the noise contours will provide one factor for reviewing proposed land uses against. The FAA considers the DNL 65 dB an acceptable level at which residential land uses are compatible. Oregon Administrative Rule 340-035-0045 contains State of Oregon criteria for airport noise. The State of Oregon uses the 55 DNL contour to represent the “airport noise criterion.” The airport noise criterion does not indicate liability or legal obligation on the part of the airport; instead it defines the “airport noise impact boundary,” which is used to identify noise sensitive properties near the airport that may experience regular aircraft noise exposure. Local jurisdictions may also implement tighter restrictions.



Airport airspace surfaces as defined in FAR Part 77 *Safe, Efficient Use, and Preservation of the Navigable Airspace* will be depicted in the Airspace Plan, a component of the Airport Layout Plan set. These airspace surfaces should be used by the City of Redmond as a basis for protecting the Airport against incompatible development on the basis of height.

The FAA's Memorandum *Interim Guidance on Land Uses Within a Runway Protection Zone* should serve as a guidance document for allowable land uses within a RPZ.

1.10.3 HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

APPLICABLE REGULATIONS

The following state laws protect archaeological sites and cultural resources in Oregon: Indian Graves and Protected Objects (ORS 97.740-97.760) and Archaeological Objects and Sites (ORS 358.905-358.961). In order to conduct a survey for archaeological sites, the Oregon State Historic Preservation Office (SHPO) requires an archaeological permit (ORS 390.235). If an archaeological site is recorded on public land, an archaeological permit is required to conduct ground disturbing activities within site boundaries.

Under ORS 358.653 the City is required to consult with the SHPO to avoid inadvertent impacts to historic properties for which they are responsible; this relates primarily to buildings and structures which are listed on the National Register of Historic Places or eligible for listing. Generally, eligible historic properties are at least 50 years old, retain their historic appearance, and meet one of four National Register significance criteria. Airport buildings and structures may also be subject to the City of Redmond Historic Preservation Ordinance.

BACKGROUND RESEARCH METHODS

This effort consisted of a literature review of all areas within one mile of the Airport to identify cultural resources within the study area. The purpose of the review was to identify any cultural resources including Traditional Cultural Properties within the Study Area. The study area has already experienced 36 previous cultural resources studies in support of infrastructure and utility improvements (highway, road, trail, gas, and fiber optic and transmission lines), land exchanges, testing at training centers, and the Redmond Caves. One archaeological survey previously conducted within the Airport boundaries used pedestrian survey methods and did not identify any archaeological resources, as documented in *Redmond Municipal Airport Taxiway "B" Rehabilitation Project - Phase I Field Survey and Section 106*, prepared by Scott E. in 2016 for Morrison Maierle. Reviewed information included recorded cultural resources, historic register-listed properties, ethnographic studies, historical maps, government landowner records, aerial photographs, regional histories, geological maps, soils surveys, and environmental reports. Relevant documents were examined at the Oregon SHPO via the GIS System for Archaeological Records Data and online research library. This literature review did not include fieldwork.



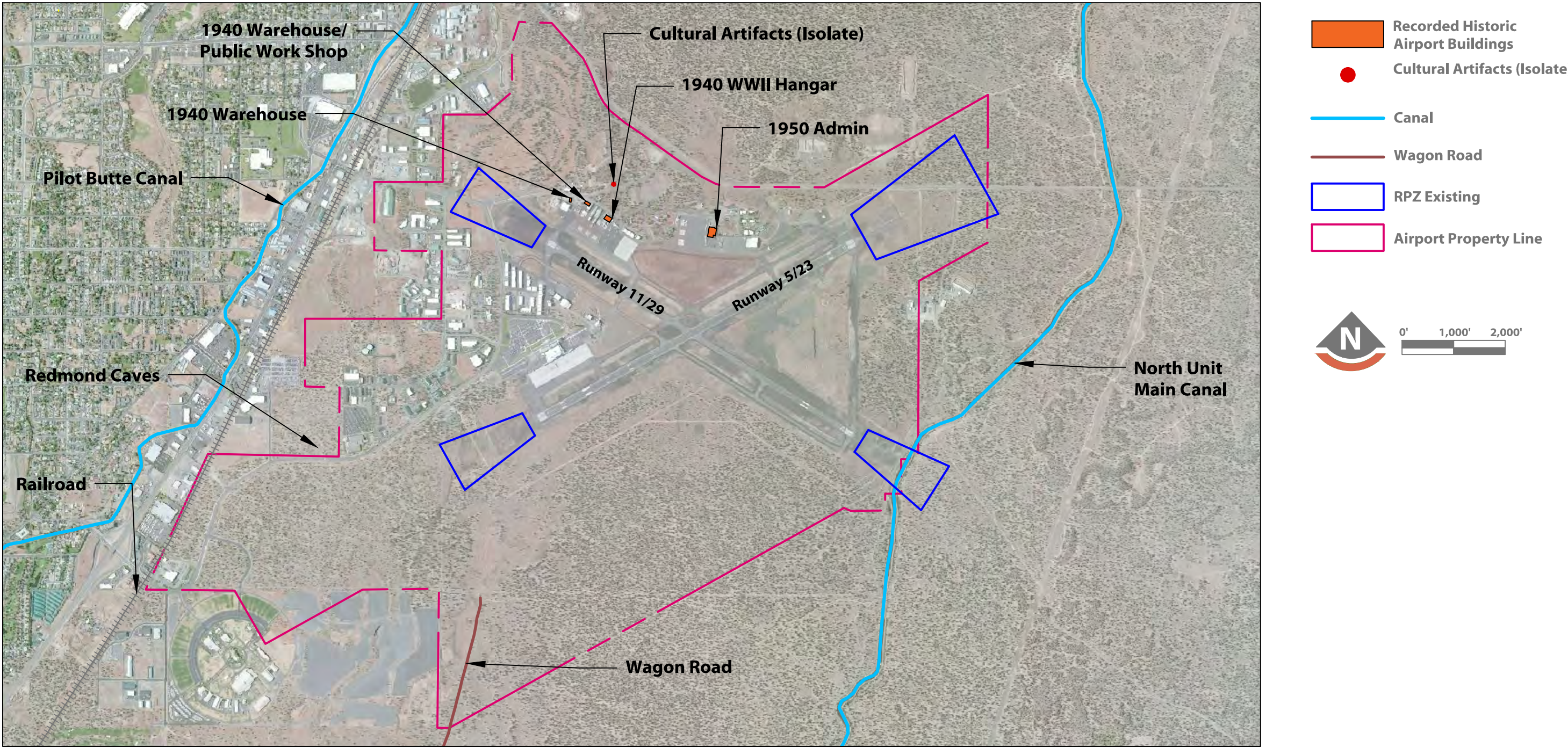


Figure 1-28
Environmental Conditions

CULTURAL SETTING

The type of soils at the Airport have the potential to contain buried cultural remains that were present prior to the eruption of Mount Mazama over 7,500 years ago leaving what is now Crater Lake.

Non-Native explorers arrived in central Oregon in the 1820s under contract with the Hudson's Bay Company. Migration to Oregon began in the 1840s and followed the Oregon Trail. Frank and Josephine Redmond, who arrived in the area in 1904, founded the City of Redmond. Settlers constructed irrigation canals soon after and the town incorporated in 1910. Records of the Greater Redmond Historical Society accessed in 2013 state that, the following year, the Oregon Trunk Railroad was completed and provided improved economic and passenger transportation opportunities for city residents.

Efforts to build an airport began in 1928 and the first runways were constructed in 1929. The Works Progress Administration carried out improvements to the Airport during the 1930s, and during World War II, the US Army Air Corps used the Airport for training activities. The first commercial flight at the Airport was in 1946, as shown in **Figure 1-29**.

Figure 1-29 First Commercial Flight at the Redmond Airport 1946



Source City of Redmond 2016.

United States Geological Survey data from 1962a, 1962b, and 1975 indicates development in the vicinity of the Airport after 1950 has been minor, with some new construction on the northern boundary of the Airport.

PREVIOUS INVESTIGATIONS

A 2016 records search of SHPO's online GIS System for Archaeological Records Data was performed to identify any previously recorded historic or cultural resources surveys within the study area. A review of the Oregon Historic Sites Database was conducted to identify any recorded historic buildings within or directly adjacent to the study area.



RECORDED CULTURAL RESOURCES IN THE STUDY AREA

There are 48 recorded archaeological sites within the study area. They include isolated archeological artifacts, rockshelters (caves), rock alignments; and a historic-era homestead, wagon road, canals, and railway. In addition to these recorded sites, more than 20 isolated precontact-era and historic-era sites are mapped in the SHPO database that do not have Smithsonian site numbers. One, a single obsidian flake, was identified within the Airport boundaries near the intersection of SE Veterans Way and SE Sisters Ave. Sixteen other isolated finds are adjacent to the Airport boundaries. There is the potential for additional precontact archaeological sites to be discovered through an archeological survey of the Airport. An archaeological survey was not part of this study.

The sites listed below are protected under the National Historic Preservation Act. These sites could be affected by changes in airport operations or development. Projects that could affect these sites will require consultation with the SHPO to determine the potential project effects.

REDMOND CAVES SITE (35DS173)

The Redmond Caves Site is immediately adjacent to the Airport's western boundary, along SE Airport Way between SW 13th St and SW 6th St. During investigations in 1941, a sage bark sandal and projectile points were collected. Radiocarbon dating placed the sandal from approximately 1700 to 1900 years old, as noted on the US Bureau of Land Management website, accessed in December 2016. The site integrity has been impacted by looting and recreational use, as recorded by Lee R. Lyman on the form entitled, *Oregon Archaeological Survey, Site 35DS173 – Redmond Caves*, filed in 1983.

REDMOND MUNICIPAL AIRPORT

The Airport itself has been determined eligible for listing in the NRHP. Inventory and recording of buildings on the Airport property in 1997 led to five structures on the property being recommended as contributing to the Airport's historical significance: the Administration Building (1950), Warehouse #1 (1940), Warehouse #2/City of Redmond Public Works Shop (1940), the World War II Hangar (1940), and a storage shed (no construction date provided).

HUNTINGTON WAGON ROAD

East of the County Fairgrounds and south of the Airport boundary is an intact segment of the Huntington Wagon Road (c.1845), which is recorded as archaeological site 35DS2579. This resource extends northward through the airport property in a gentle southwest-northeast trajectory, extending between in sections 33, 27, 22, 15, and 10, recorded on the 1872 map accessed through the US Surveyor General website. The Huntington Wagon Road was part of the section of Oregon Trail (c.1845) between Bend and The Dalles (Cunningham 1976). In 1864 J.P. Huntington, Oregon Superintendent of Indian Affairs, used the route to travel between Fort Dalles and Fort Klamath.



IRRIGATION CANALS

The North Unit Main Canal (1938), which has been determined eligible for listing in the NRHP, is immediately east of the Airport's eastern boundary. This resource is within a future RPZ.

HISTORIC PROPERTIES ON AIRPORT

Based on a review of an Airport property schedule and a 1997 historic inventory, there are at least five historic buildings within the Project Area as of 2016. **Table 1-25** summarizes the information on the Airport property schedule.

Table 1-25. Airport Buildings 50 years or older	
Description	Construction Year
Old Administration	1950
World War II Hangar	1940
Warehouse #1	1940
Warehouse #2	1940
Storage Shed	Unlisted

1.10.4 SECTION 4(f) PROPERTY

Section 4(f) of the U.S. Department of Transportation Act of 1966 protects significant publicly-owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. Under Section 4(f), the Secretary of Transportation may approve a transportation program or project requiring the use of such sites only if there is no feasible and prudent alternative to using that land, and the program or project includes all possible planning to minimize harm resulting from the use.

Section 4(f) properties include:

- ✓ Parks and recreational areas of national, state, or local significance that are both publicly-owned and open to the public;
- ✓ Publicly-owned wildlife and waterfowl refuges of national, state, or local significance that are open to the public; and
- ✓ Historic sites of national, state, or local significance in public or private ownership regardless of whether they are open to the public.



PARKS AND RECREATIONAL AREAS

The Redmond Caves are a group of five caves formed by volcanic flows of molten lava from the Newberry Caldera. They are immediately adjacent to the western boundary of the Airport, along SE Airport Way between SW 13th St and SW 6th St, and the caves are located inside the Redmond city limits. The Bureau of Land Management (BLM) in partnership with the City of Redmond manages the caves, which are open to the public.

The collapse of a single lava tube created these five caves. The largest opening, Cave 1, enters a fairly deep and expansive cave, while Cave 3 has two openings joined by a narrow but easily passable connection. Caves 1, 3, and 4 are accessible and have deep, sandy soils, with scattered boulders and ceiling blocks.

Native Americans used the caves, at least periodically, over the past 6,000 years. Today, the Redmond Caves are managed as a unique site where visitors can learn about geology, wildlife, and past human use. A Section 4(f) analysis may be needed to assess the potential effects to users of the caves as a result from changes to airport operations.

WILDLIFE AND WATERFOWL REFUGES

There are no publicly-owned wildlife or waterfowl refuges within the study area.

HISTORIC SITES

A literature review of all areas within one mile of the Airport indicates significant historic resources in the study area, as listed below, that would be considered Section 4(f) properties in or near the study area:

- ✓ Five structures on airport property may contribute to the Airport's historical significance: the Administration Building (1950); Warehouse #1 (1940); Warehouse #2/City of Redmond Public Works Shop (1940); the World War II Hangar (1940); and a storage shed (no construction date provided).
- ✓ Huntington Wagon Road
- ✓ Two irrigation Canals: the North Unit Main Canal, which has been determined eligible for listing in the NRHP and is on airport property, and the Pilot Butte Canal, which has also been determined eligible for listing in the NRHP but is not on airport property.
- ✓ Redmond Caves, which are near, but not on, airport property.
- ✓ Oregon Trunk Railroad

A Section 4(f) analysis may be needed to assess the potential effects to these resources as a result from changes to airport operations or development.



1.10.5 THREATENED AND ENDANGERED SPECIES

An official species list was obtained from the U.S. Fish and Wildlife Service (USFWS) website (2016). The only species listed under the Endangered Species Act with the potential to occur in the study area is the gray wolf. The Oregon Biodiversity Information Center (ORBIC) database also was queried to obtain records of known sensitive, threatened and endangered plant and animal species within a two-mile radius of the Airport (ORBIC 2016). There are no documented records of species listed as endangered or threatened, proposed for listing, or candidate for listing as occurring within a two-mile radius of the Airport. There is no designated Critical Habitat for any species within the study area.

According to the USFWS website accessed in 2016, the Airport is in the East Wolf Management Zone where wolves are listed as Endangered. As of USFWS data in 2015, there are no recorded areas of wolf activity in the Redmond area, but given the 2016 population according to the USFWS website and the dispersal capabilities of wolves, at this point it is possible for a wolf to show up in almost any part of the state.

Contact with the USFWS again prior to future development at the Airport is recommended to ensure no species listed under the Endangered Species Act are in the development area.

1.10.6 WATER QUALITY

The City of Redmond has an Underground Injection Control (UIC) Management Plan that documents the City's stormwater management program. The plan also explains how the City protects groundwater quality from stormwater impacts of UIC facilities in compliance with their UIC Water Pollution Control Facility (WPCF) Permit (No. 103050). The City has no naturally occurring surface water within the Urban Growth Boundary, where the highest density development is, so the City's stormwater outfall systems uses drywells, drill holes, injection galleries, and outfalls to vegetated swales and infiltration basins.

WETLANDS AND OTHER WATERS

The following sections provide an overview of known wetlands and other waters on and surrounding the Airport property.

APPLICABLE LAWS AND REGULATIONS

Wetlands are protected under the State of Oregon Removal Fill Law and Section 404 of the Clean Water Act. Wetlands are under the jurisdiction of both Oregon Department of State Lands (DSL) and the US Army Corps of Engineers (Corps). Both agencies use the 1987 *Corps of Engineers Wetlands Delineation Manual* and the 2008 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* to determine what a wetland is and its extent. An area is determined to be a wetland if it has a dominance of plants that grow in wet conditions (called hydrophytic vegetation), hydric soils, and positive wetland hydrology.



BACKGROUND RESEARCH

A literature review covered areas extending one mile in every direction from the study area. Reviewed information included the US Department of Agriculture Natural Resources Conservation Service (NRCS) Soil Survey, the USFWS National Wetlands Inventory, the Department of State Lands Local Wetlands Inventory, and Deschutes County online property database. A site reconnaissance was performed on October 24, 2016.

The National Wetlands Inventory shows the following wetlands within the study area:

- ✓ Two wetlands on the former Juniper Golf Course;
- ✓ Lateral E Canal and North Unit Main Canal; and
- ✓ Two wetlands on the Forest Service Rappel Base Helipad.

The two wetlands indicated on the former golf course are man-made water features and are not drained. These areas no longer meet the criteria of a wetland because the hydrology is no longer met. Both irrigation canals are not waterbodies under the jurisdiction of either DSL or the Corps because the canals are used for irrigation water conveyance and are turned on and off seasonally. The two wetlands indicated at the Forest Service Rappel Base are paved areas.

The Project Area is situated within the semi-arid shrub-steppe province (Franklin and Dyrness 1988). Vegetation is dominantly western juniper (*Juniperus occidentalis*) and big sagebrush (*Artemisia tridentata*), but also includes rabbitbrush (*Chrysothamnus* and *Ericameria* spp.), bitterbrush (*Purshia tridentata*), low sagebrushes (*Artemisia* spp.), and grasses, such as Idaho fescue (*Festuca idahoensis*), needlegrass (*Achnatherum* spp.), squirreltail (*Sitanion hystrix*), and Sandberg bluegrass (*Poa secunda*).

The NRCS maps soils as Deschutes-Stukel complex, dry and Stukel-Rock outcrop-Deschutes complex, dry. Neither of these soils series are classified as nor considered hydric soils. This further indicates that wetlands are unlikely to occur in the study area.

A site reconnaissance performed on October 24, 2016, identified no wetlands or waters of the State/US within the study area. The undeveloped areas of the Airport support an upland plant community of western juniper/gray rabbitbrush/cheatgrass. During this same site reconnaissance, neither primary nor secondary indicators of wetland hydrology were observed.

1.10.7 FARMLAND

Review of the 2016 NRCS Soil Survey of Deschutes County helped evaluate the presence of prime, unique, state or locally important farmland in the project area. The survey indicated the Airport property and study area do not contain soil types classified as “prime farmland.” As of 2016, no property within the study area is being used or was recently used or zoned for farming purposes.



1.10.8 CRITICAL AREAS

Local jurisdictions may have critical areas that relate to Oregon's State-wide Land Use Goals. There are no Critical Areas in the City of Redmond's Comprehensive Plan or Development Code.

1.10.9 FLOODPLAINS

FEMA maps floodplains all across the U.S. Specifically, the FEMA Flood Map Service Center collects data from Flood Insurance Rate Maps (FIRMs) and incorporates all the data into a national flood hazard layer to map where floodplains are. There are no floodplains on airport property.

1.10.10 RECYCLING PLAN

The FAA Modernization and Reform Act of 2012 (FRMA) expanded the definition of airport planning to include “developing a plan for recycling and minimizing the generation of airport solid waste” and added a provision requiring airports that prepare a master plan to address issues related to solid waste recycling.

A site visit and staff interviews took place on December 15, 2016, to collect information about recycling at the Airport. The study team toured the passenger terminal, airport offices, airline and other tenant spaces, SRE and ARFF facilities, and other airport buildings. Interviews of the staff from airport management and the facilities department clarified details about the recycling program in place in 2016.

The Airport has an active recycling program; the Airport does not have a written recycling plan. Under this master plan project, a recycling plan document will be developed that describes the existing program and recommends strategies to improve recycling and waste management at the facility. The recycling plan will be an appendix to this master plan report.



1.11 CONCLUSION AND SUMMARY

The facilities and conditions described in this chapter form the baseline of the Airport Master Plan. The research put into preparing this document will support further analysis and recommendations that will occur in subsequent chapters. A summary of key facilities is presented in **Table 1-26**.

Table 1-26. Inventory Chapter Summary

Runways

- Runway 5-23: 7,038 ft. x 150 ft.
- Runway 11-29: 7,006 ft. x 100 ft

Runways and Navigational Aids

- Runway 5-23
 - Good Pavement Condition
 - High Intensity Runway Lights (HIRL)
 - Precision Runway Markings
- Runway End 5
 - Runway End Identifier Lights (REIL)
 - Visual Approach Slope Indicator (VASI)
- Runway End 23
 - Precision Approach Path Indicator (PAPI)
- Runway 11-29
 - Good Pavement Condition
 - Medium Intensity Runway Lights (MIRL)
 - Non-precision Runway Markings
- Runway End 11
 - VASI
- Runway End 29
 - PAPI

Airport Navigational Aids

- VHF Omni-directional Range with Distance Measuring Equipment (VOR/DME)
- Non-Directional Beacon (NDB)
- Automated Surface Observing System (ASOS)
- Two Wind Socks

Emergency

- ARFF Index B

FAA Certification

- Part 139

Instrument Procedures

- Runway 5
 - RNAV (RNP)
 - RNAV (GPS)
 - REDMOND THREE
- Runway 23
 - ILS
 - VOR/DME
 - VOR-A
 - NDB
 - RNAV (RNP)
 - RNAV (GPS)
 - REDMOND THREE
 - Visual
- Runway 11
 - VOR A (Category A)
 - GPS
 - REDMOND THREE
- Runway 29
 - GPS
 - RNAV (GPS)
 - REDMOND THREE

Building Area

- Passenger Terminal and TSA
- Airport Traffic Control Tower
- Aircraft Maintenance
- Aircraft Fuel (Full Service & Self Service FBOs)
- Hangars and Tie-downs
- Snow Removal Equipment and Maintenance
- Aircraft Rescue and fire Fighting (ARFF)
- United States Forest Service (USFS)
- Business Park



2.0 FORECAST SUMMARY

Central Oregon is growing across all indicators. In the ten years between 2006 and 2016, the population of Deschutes County has grown by 23 percent, gross regional product has grown by 20 percent, and employment has recovered to pre-recession levels. Permanent migrants are drawn by the quality of life and comparatively lower cost of living when compared to Western Oregon and California, and tourists come throughout the year to partake in the tax-free shopping and outdoor activities.

This regional growth has been reflected in the strong uptick in aviation activity. Passenger enplanements have grown at an annual average of 2.1 percent per year, and 2016 enplanements are 66 percent above 2006 levels. Deschutes County has some of the fastest growing communities in the country, and RDM is one of the nation's fastest growing Airports. Historical and FAA-projected growth exceed the levels for Oregon and the U.S.

Air cargo volume has declined by 40 percent over the last ten years. This decline is largely because of a global movement towards electronic substitutes for mail, and high fuel prices, and increased air cargo screening pushing cargo on to trucks. General aviation has spread to other airports in the region, and much flight training relocated from Redmond to Bend. Redmond, with its airport traffic control tower (ATCT), instrument landing system, and two fixed base operators, remains the primary regional airport for jet traffic. A summary of the demand forecasts is presented in **Table 2-1**.

Table 2-1: Forecast Summary				
Category	2006	2016	2036	CAGR 2016-2036
Enplanements	197,223	298,322	680,750	4.2%
Air Cargo (Tons)	1,612.8	970.1	1,000	0.2%
Aircraft Operations	68,388	40,162	47,740	0.9%
Itinerant Operations				
Air Carrier	1,433	5,127	13,140	4.8%
Commuter / Air Taxi	16,803	6,340	2,100	-5.4%
General Aviation	22,170	10,985	14,000	1.2%
Military	366	341	300	-0.6%
Local Operations				
General Aviation	27,376	16,829	18,900	0.6%
Military	240	540	500	-0.4%
Based Aircraft	129	80	127	2.3%
Single-Engine Piston	92	64	78	1.0%
Multi-Engine Piston	31	6	2	-5.3%
Jet & Turbo-Prop	3	4	30	10.6%
Helicopter	3	6	12	3.5%
Other	0	0	5	N/A
<i>Year corresponds to FAA Fiscal Year, October to September. Airport was closed for three weeks in 2016 for construction. 2016: Enplanements and Air Cargo – RDM Monthly Report and RDM Performance Metrics, Aircraft Operations – Terminal Area Forecast 2016, Based Aircraft – Airport Management Records 2016, CAGR: Compound Annual Growth Rate</i>				



2.1 INTRODUCTION TO FORECASTS

Aviation activity forecasts evaluate the future demand at the Airport. This chapter forecasts the following:

- ✓ Passenger Enplanements
- ✓ Cargo Volume
- ✓ Based Aircraft
- ✓ Aircraft Operations (Itinerant and Local)

Forecasts have a base year of 2016, and use the Federal Aviation Administration (FAA) fiscal year (October to September). The forecast period is 20 years with reporting intervals of every five years. Multiple forecasting methodologies are used with each activity, and are compared with the FAA Terminal Area Forecast (TAF).

Forecasts help determine if existing airport facilities are sufficient to handle future demand (passengers, cargo, operations, and based aircraft), or if facilities need to be modified to meet future demand. The FAA Seattle Airports District Office will review forecasts for rationality and comparison to the FAA TAF.

The chapter is organized in the following sections:

- ✓ Community Profile
- ✓ Aviation Activity Profile
- ✓ Scheduled Service Forecasts
- ✓ General Aviation Forecasts
- ✓ Peaking and Critical Aircraft
- ✓ Forecast Summary

TERMINOLOGY

Aircraft Operation: A count of a takeoff, landing, or touch-and-go. Each time an aircraft touches the runway to takeoff or land, it counts as an operation.

Aircraft Approach Category (AAC): Classification of an aircraft by approach speed, with “A” being the slowest and “E” being the fastest.

Airplane Design Group (ADG): Classification of an aircraft by its size (wingspan and tail height) with “I” being the smallest and “VI” being the largest.

Airport Reference Code (ARC): Used to determine facility size and setback requirements. The airport reference code is a composite of the approach category and design group of the critical aircraft.

Based Aircraft: Aircraft that are stored at RDM. These aircraft may be stored full-time or seasonally.

Critical Aircraft: The most demanding aircraft (in terms of size and/or speed) to use an airport more than 500 times a year or to have scheduled operations at an airport.

Enplanement: The act of a passenger boarding a scheduled or charter aircraft operated by a passenger airline.

General Aviation (general aviation): Aviation activities conducted by recreational, business, and charter users not operating as airlines under FAR Part 121, Part 135, or military regulations.

Itinerant Operation: An operation that originates and terminates at different airports. An example is an aircraft flying from RDM to another airport.

Local Operation: An operation that originates and terminates at the same airport. An example is an aircraft taking off from RDM, remaining near the airport to practice flight maneuvers, and then landing at RDM.

Touch-and-Go: A maneuver where an aircraft lands and takes off without leaving the runway. A touch-and-go counts as two aircraft operations.



Table 2-2 describes the data sources used in this chapter.

Table 2-2: Description of Data Sources	
Source	Description
FAA TAF	The FAA TAF, published in January 2017, provides historical records and forecasts for passenger enplanements, aircraft operations and based aircraft at RDM. These forecasts serve as a comparison for forecasts prepared as part of this planning effort, and provide historical information on aircraft activity. The TAF is included in Appendix B as Attachment 1 .
FAA Aerospace Forecast	The Aerospace Forecast 2016-2036 is a national-level forecast of aviation activity. The Aerospace Forecast helps guide local forecasts by serving as a point of comparison between local trends and national trends.
FAA Traffic Flow Management System Counts Data (TFMSC)	The TFMSC includes data collected from flight plans. These operations are categorized by aircraft type, and used to identify trends in the RDM fleet mix. The advantage of the TFMSC data is its degree of detail and its insights into the itinerant users of RDM. A disadvantage of TFMSC data is it does not include local operations or operations that did not file a flight plan. As such, the utility of TFMSC data is limited to larger aircraft, including scheduled commercial passenger, cargo, and charter operators, and private business jets.
U.S. Department of Transportation (USDOT) T-100 Database	Scheduled, charter passenger, and air cargo airlines fill out the T-100 form monthly. The T-100 database is an online repository of the data recorded on the forms, such as number of seats sold, number of seats available, freight transported, aircraft used, and departures performed. The T-100 provides a detailed look at the operations of passenger and cargo airlines.
U.S. Census Bureau	U.S. Census Bureau data was used to compare growth in Deschutes County to other communities across the country. Highlights from the Census Bureau are included in Appendix B as Attachment 2 .
Airline Ticket Data	Airline ticket data was used to identify the catchment area and fare trends at RDM. Two sources were used: The Airline Reporting Corporation (ARC) and Market Information Data Tapes. These sources provide insight on the zip codes (based on billing information) that RDM travelers came from, which defines the catchment area. This information was then used to see where else travelers in the catchment area fly from, and determine how many potential RDM passengers chose to fly from other airports.
---- Continued on Next Page ----	



Table 2-2: Description of Data Sources – Continued

Source	Description		
Socioeconomic Data	Socioeconomic data is provided by data vendor Woods & Poole, Inc. (W&P), and the Portland State University College of Urban & Public Affairs: Population Research Center (PRC). The local municipalities use PRC data for population projections. The City of Redmond Comprehensive Plan was consulted; however, it is dated and does not reflect the best available information. The City of Redmond's Comprehensive Plan was last completed in 2001 (with updates through 2015), and will be fully updated in 2017/2018. The Deschutes County Comprehensive Plan was adopted in 2012. W&P provides data for gap years in the U.S. Census. The W&P dataset considers the Bend-Redmond Metropolitan Statistical Area (MSA), and provides 124 data categories with records from 1970 to 2016, and forecast through 2040. Data categories considered include population, employment, earnings and income, and gross regional product.		
Local Economic Development Data	Economic development data helps tell the story behind the community's recent growth and shows where the community is focusing its efforts in terms of business recruitment. Data was provided by the Central Oregon Visitors Association (COVA), Redmond Economic Development, Inc. (REDI), and the Central Oregon Association of Realtors (COAR). Presentations prepared by these groups are included in Appendix B as Attachment 3.		
State Plans	The Oregon Aviation System Plan (OASP) was last prepared in 2007, and projects aviation activity through 2025. The forecast base year was 2005. The OASP projected that RDM would grow from 174,008 enplanements to 537,400 enplanements, based aircraft were expected to grow from 117 to 197, and total operations were going to grow from 62,708 to 95,330. In 2015, OASP enplanement projections were 19 percent higher than actual enplanements, operations projections were 21 percent higher, and based aircraft projections were 14 percent higher.		
Stakeholder Interviews	The aviation forecasting team collected data firsthand from airport stakeholders and community members during a series of interviews conducted October 24 and 25, 2016. Interviews were performed with representatives from the following groups <table> <tr> <td> • Airport Management • Airport Security • United States Forest Service • American Airlines • Delta Air Lines • Alaska Airlines </td> <td> • Redmond Police • SERCO (Air Traffic Control) • Leading Edge Jet Center • Butler Aircraft Services • Transportation Security Administration </td> </tr> </table>	• Airport Management • Airport Security • United States Forest Service • American Airlines • Delta Air Lines • Alaska Airlines	• Redmond Police • SERCO (Air Traffic Control) • Leading Edge Jet Center • Butler Aircraft Services • Transportation Security Administration
• Airport Management • Airport Security • United States Forest Service • American Airlines • Delta Air Lines • Alaska Airlines	• Redmond Police • SERCO (Air Traffic Control) • Leading Edge Jet Center • Butler Aircraft Services • Transportation Security Administration		



Part of the master planning process includes getting the best available data for development of forecasts, and evaluating the quality of this data to address anomalies. Common forecast methods, such as regression analysis and time-series evaluation can be thrown off by anomalies in historical data. One such anomaly is the three-week airport closure that occurred in May for runway construction. The closure interrupted normal operations and reduced enplanement totals and operations counts. Extended closures are not part of normal operations for the Airport; therefore, it is important to understand how many operations might have occurred had the Airport not been closed for three weeks. The calculation for the effect of this closure is shown in **Table 2-3**.

Table 2-3: Data Adjustment for Three Week Airport Closure			
Category	May Count	Adjust Method	May Adjust
Enplanements	7,113	Load Factor	20,274
Operations	1,910	Sum	3,826
Air Carrier	166	Same as April	520
Air Taxi	154	Same as April	352
Itinerant GA	440	% of Year	881
Local GA	1,107	% of Year	1,874
Military	43	N/A	43
Passenger Enplanements: Alaska: 157 additional departures at 78 percent load factor. American: 20 additional departures at 75 percent load factor, Delta: 38 additional departures at an 84 percent load factor. United: 84 additional departures at an 87 percent load factor. May operations: Averaged 8.84 percent of annual operations from 2006-2015. Air Taxi Operations: Include passenger and air cargo. Military operations: Not adjusted. Sources: Airport management records from airlines and ATCT, FAA OPSNET database, FAA Terminal Area Forecast.			

Passenger enplanements were calculated based on the number of scheduled operations that were canceled during the closure, using the average annual load factor to estimate number of passengers that would have been on the flights. Air carrier and air taxi operations were based on the prior month's schedule. Air taxi operations include both scheduled passenger and air cargo operations.

General aviation operations were estimated through a multi-step process.

1. May 2016 operations were calculated by based on the percent of operations that occurred in May from 2006 to 2015. Records from the ATCT show that an average of 8.8 percent of annual operations occur in May. This means that 3,826 operations were likely to occur in May 2016.
2. Subtracting the air carrier, air taxi, and military operations leaves 2,755 general aviation operations.
3. The FAA Operations Network (OPSNET) database shows that there were 440 itinerant operations and 1,107 local operations classified as general aviation in May 2016. This ratio was applied to the 2,755 expected general aviation operations, producing 881 itinerant operations and 1,874 local operations.



The adjusted enplanement and operations totals were used in forecast models to project future activity. Data reported in the chapter for 2016 matches FAA TAF values. Airport management did not report that based aircraft totals were impacted by the closure. Some tenants relocated their aircraft temporarily; however, overall based aircraft did not change before and after the closure.

2.2 COMMUNITY PROFILE

Community profile describes the location of the Airport, and the community it serves. The Airport is located within Bend-Redmond Metropolitan Statistical Area (MSA) and serves the Central Oregon region. There are five other general aviation (general aviation) airports within 30 nautical miles of the Airport: Bend Municipal Airport (BDN), Madras Municipal Airport (S33), Prineville Airport (S39), Sunriver Airport (S21), and Sisters Eagle Air Airport (6K5). RDM is the only commercial service airport in Central Oregon. This section describes the community population, employment and economic development, gross regional product (GRP), the activities of the US Forest Service (USFS), tourism, the regional airports already mentioned, and the catchment areas and competition. These characteristics comprehensively form RDM's community profile.

2.2.1 POPULATION

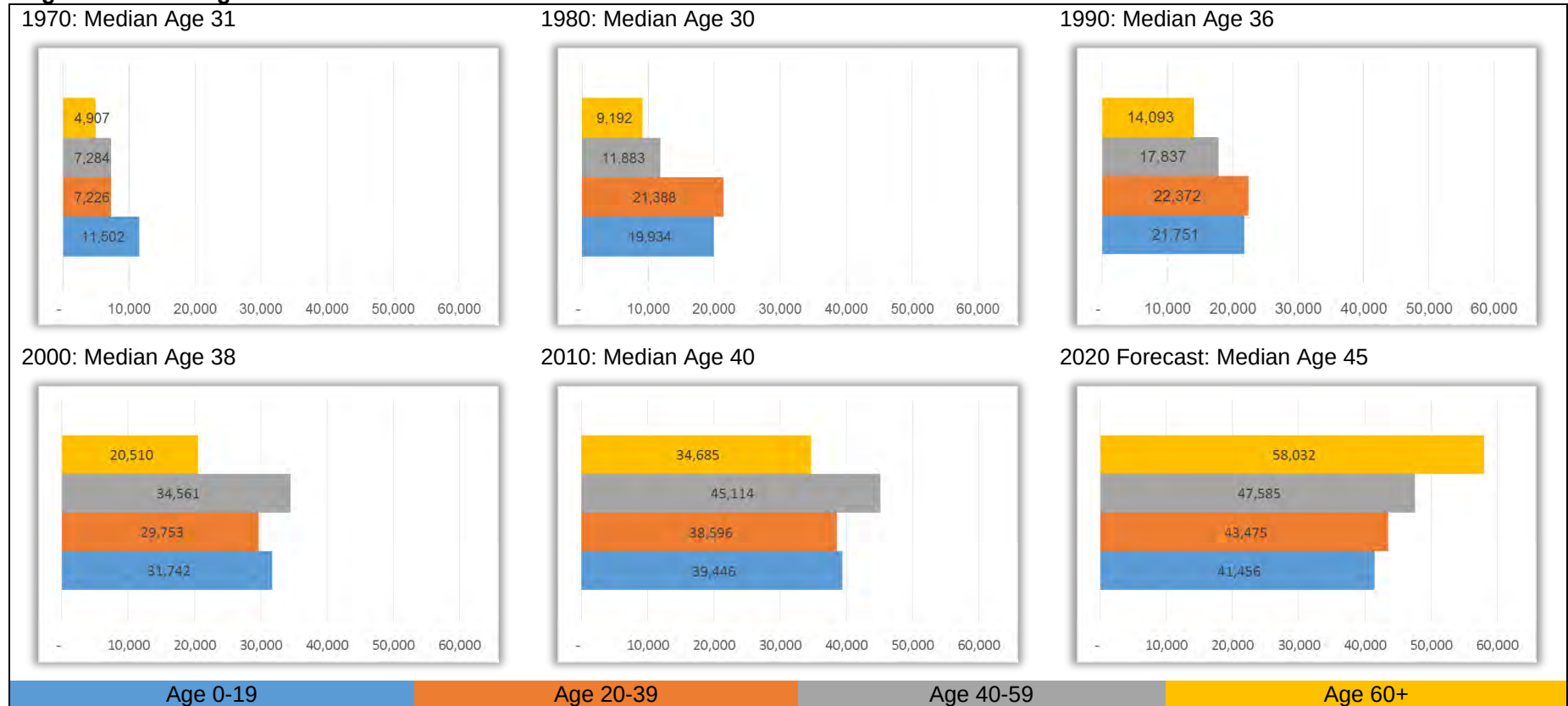
Table 2-4 shows the population records from 2006 to 2016 and the Portland State University Population Research Center (PRC) forecast through 2036. The PRC gathers population data on and collaborates with the state of Oregon, the counties, and cities within the state to create the forecast. The MSA grew at a compound annual growth rate (CAGR) of two percent from 2006 and 2015, increasing the total population by more than 33,000. The MSA population is forecasted to grow at a CAGR of 1.8 percent, reaching more than 252,000 by 2036.

Table 2-4: Bend-Redmond MSA Population		
Calendar Year	Population	Percent Change
2006	143,316	-
2011	158,875	10.9%
2016	176,635	11.2%
2021	194,593	10.2%
2026	214,606	10.3%
2031	234,022	9.0%
2036	252,681	8.0%
CAGR (2006-2016)	2.0%	N/A
CAGR (2016-2036)	1.8%	N/A
CAGR = Compound Annual Growth Rate Source: Portland State University Population Research Center		



The U.S. Census Bureau ranked the Bend-Redmond MSA as the seventh fastest growing metro area in the U.S. in 2014, and the 3rd fastest growing metro area in the U.S. in 2016 (**Appendix B, Attachment 2 – Census Data**). Population growth is driven by two primary factors: job availability attracting workers and their families, and quality-of-life factors attracting retirees. **Figure 2-1** shows the population distribution of the MSA from 1970 through to the forecast for 2020. From 1970 to 2020, the median age increases from 31 to 45, and the percent of population over the age of 60 grows from 16 percent to 30 percent. Working age population, particularly the more experienced workers between the ages of 40 and 59, have grown by a total of 40,301 during the same period.



Figure 2-1: RDM Age Distribution

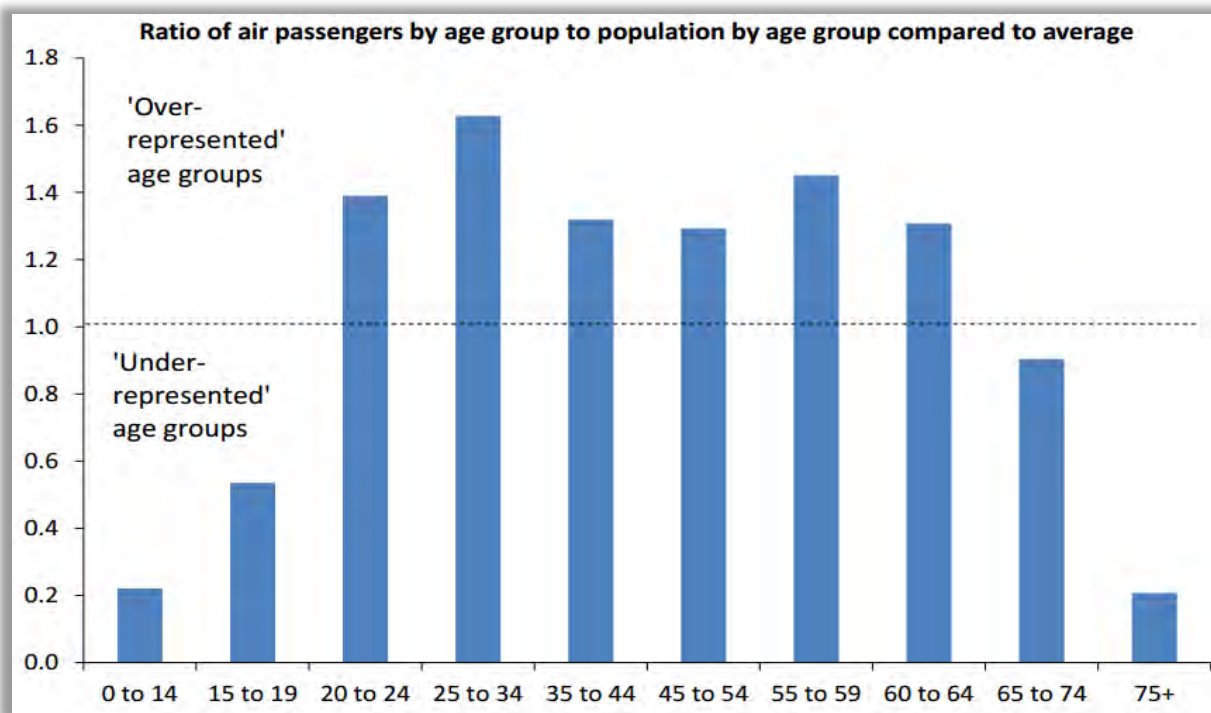
Source: Woods & Poole, 2014



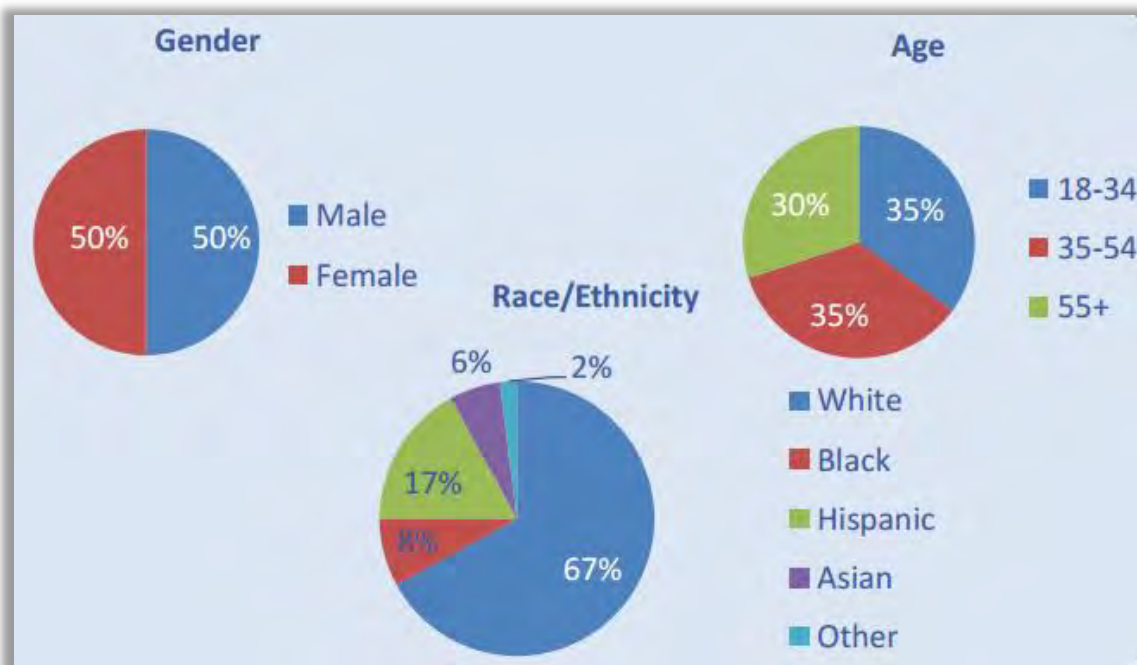
The changing demographics have significance for the incidence of air travel within the community. The 2014 *Shape of Air Travel Markets Over the Next 20 Years* report by the International Air Transportation Association (IATA) shows that working age travelers tend to fly more frequently than the population under the age of 19 and over the age of 65. Population growth, partially spurred by job growth and economic diversification discussed in **Section 3.2**, helps drive up the number of average trips per capita in RDM.

A 2015 survey by Airlines for America (A4A), presented in the 2016 report *Status of Air Travel in the USA*, confirms that working-age U.S. travelers (age 18-54) make up 70 percent of adult travelers. A point of distinction between the IATA and A4A reports is that the A4A report does not address trip frequency amongst the population directly, and does not include children. Travel by age group from the IATA and A4A reports are presented in **Figure 2-2**

Figure 2-2: Air Passenger Trips per Capita by Age



U.S. Air Traveler Composition



Source: IATA, 2014, Airlines for America, 2016

2.2.2 EMPLOYMENT AND ECONOMIC DEVELOPMENT

Per Woods and Poole data, the economy of the Redmond MSA has exhibited recovery since the end of 2007-2009 recession with total employment growing at an annual average rate of one percent from 2009 to 2016. Because of the recession, the MSA employment dropped by a total of 41 percent between 2006 and 2011. Industries that saw the greatest decline in employment were construction with a 14 percent decline, manufacturing with a 7.5 percent decline, and mining with a four percent decline. Professional services, such as finance, insurance, real estate, and professional and technical services were more resilient and posted employment growth between 2006 and 2011.

Economic recovery and diversification have been occurring since the end of the recession. Top industries by total employment in 2006 were construction (13 percent of jobs), retail (12 percent of jobs), and healthcare (10 percent of jobs). By 2016, top industries were healthcare (12 percent of jobs) and retail (12 percent of jobs), while construction dropped to sixth place with seven percent of jobs. MSA employment fluctuates by 6,000 jobs over the course of the year due to the seasonal nature of the ski season. Employment has kept pace with population growth, and the employment per capita ratio was 0.59 in 2016. The decline from 2006 to 2011 is indicative of population growth, coupled by a decline in labor intensive industries (construction and mining) and growth in more automated industries like healthcare and professional services. Total employment and employment per capita are presented in **Table 2-5**. Top industries by employment and sales are presented in **Table 2-6**.



Table 2-5: Bend-Redmond MSA Employment			
Calendar Year	Total Employment	Percent Change	Employment/Capita
2006	98,159		0.68
2011	92,312	-6.0%	0.58
2016	104,289	13.0%	0.59
2021	115,293	10.6%	0.59
2026	126,746	9.9%	0.59
2031	138,395	9.2%	0.59
2036	151,019	9.1%	0.60
Compound Annual Growth Rates			
'06 - '16	0.6%	N/A	-1.5%
'16 - '36	1.9%	N/A	0.1%
Jobs Per Capita = Total Employment / Total Population. MSA Population included in Table 2-3 . Sources: Employment: Woods & Poole, Population: Portland State University			

Job diversity has seen growth as the population and number of people employed has increased. Growing job sectors include aviation, engineering, health, technology, and social media. Below are examples of companies in the MSA that have shown recent growth:

- ✓ RDD – Provider of major systems and components for experimental aircraft.
- ✓ Stratos Aircraft – Located on Airport, Stratos designs, manufactures, and maintains the Stratos 714, a very light jet.
- ✓ Bend Research – Medical and pharmaceutical research company.
- ✓ Patheon – A supply-chain oriented pharmaceutical and biopharmaceutical company.
- ✓ Facebook – A social network that houses a server hub in nearby Prineville.
- ✓ Les Schwab Tires – A tire retail chain with a hangar on the Airport and headquarters in Redmond.
- ✓ PCC Structurals, Inc. – Global manufacturer of components are used in aircraft engines, airframes, power generation equipment, armaments, and commercial and medical needs.
- ✓ Nanometrics – Provider of advanced, high performance process control metrology and inspection systems used in the fabrication of products like semiconductors and solid-state devices.



Table 2-6: Bend-Redmond MSA Top 5 Industries by Employment and Sales 2006 – 2016

Top Industries by Employment								
Rank	2006		2011			2016		
	Industry	Jobs	Industry	Jobs	Δ	Industry	Jobs	Δ
1	Construction	12,492	Retail Trade	11,382	(6.3%)	Health Care	13,035	18.0%
2	Retail Trade	12,145	Health Care	11,043	16.5%	Retail Trade	12,939	13.7%
3	Health Care	9,476	Accom. + Food Serv.	8,369	0.2%	Accom. + Food Serv.	9,476	13.2%
4	Accom. + Food Serv.	8,352	State and Local Gov.	7,355	11.1%	State and Local Gov.	7,935	7.9%
5	Manufacturing	6,940	Real Estate	7,212	15.2%	Real Estate	7,924	9.9%
Top Industries by Retail Sales								
Rank	2006		2011			2016		
	Industry	Sales (\$M)	Industry	Sales (\$M)	Δ	Industry	Sales(\$M)	Δ
1	Motor Vehicles	\$786.5	Gen. Merchandise	\$703.9	7.6%	Motor Vehicles	\$950.4	35.1%
2	Gen. Merchandise	\$654.1	Motor Vehicles	\$703.5	(10.6%)	Gen. Merchandise	\$772.9	9.8%
3	F&B Retail	\$419.1	F&B Retail	\$474.9	13.3%	F&B Retail	\$533.7	12.4%
4	Building Materials	\$353.6	Restaurants	\$339.2	12.9%	Restaurants	\$407.0	20.0%
5	Restaurants	\$300.5	Gasoline Stations	\$271.1	34.1%	Building Materials	\$327.1	35.9%
Bend-Redmond MSA Top 5 Industries by Employment and Sales 2016 – 2036								
Top Industries by Employment								
Rank	2016		2026			2036		
	Industry	Jobs	Industry	Jobs	Δ	Industry	Jobs	Δ
1	Health Care	13,035	Health Care	17,981	37.9%	Health Care	23,629	31.4%
2	Retail Trade	12,939	Retail Trade	15,289	18.2%	Retail Trade	17,475	14.3%
3	Accom. + Food Serv.	9,476	Accom. + Food Serv.	11,375	20.0%	Accom. + Food Serv.	12,883	13.3%
4	State and Local Gov.	7,935	Real Estate	9,561	20.7%	Real Estate	11,310	18.3%
5	Real Estate	7,924	State and Local Gov.	9,344	17.8%	Prof. and Tech Serv.	10,994	22.0%
Top Industries by Retail Sales								
Rank	2016		2026			2036		
	Industry	Sales (\$M)	Industry	Sales (\$M)	Δ	Industry	Sales(\$M)	Δ
1	Motor Vehicles	\$950.4	Motor Vehicles	\$1,222.4	28.6%	Motor Vehicles	\$1,462.2	19.6%
2	Gen. Merchandise	\$772.9	Gen. Merchandise	\$1,025.4	32.7%	Gen. Merchandise	\$1,338.4	30.5%
3	F&B Retail	\$533.7	F&B Retail	\$634.7	18.9%	Restaurants	\$745.3	35.1%
4	Restaurants	\$407.0	Restaurants	\$551.9	35.6%	F&B Retail	\$744.3	17.3%
5	Building Materials	\$327.1	Building Materials	\$412.5	26.1%	Building Materials	\$522.3	26.6%

Δ = Total percent change from period before (10 years). Retail sales presented in millions of inflation-adjusted 2016 dollars. Accom. + Food Serv. = Accommodation and Food Services (e.g. hotels). Prof. and Tech Serv. = Professional and Tech Services F&B Retail = Food and Beverage Retail (e.g. grocery stores). Gen. Merchandise: = General Merchandise is a wide array of retail with the exception of food and beverage (e.g. clothing, hardware, etc.). Source: Woods & Poole



2.2.3 GROSS REGIONAL PRODUCT

Gross regional product (GRP) is the value of goods and services produced in the MSA. GRP serves as an index for the health of the overall economy. As the economy increases production— both by producing more goods and producing more valuable goods, GRP increases. GRP per Capita shows the impact of the recession on 2011 GRP, which was down compared to 2006 GRP per Capita despite overall GRP being higher. Woods and Poole projections for GRP show that it will increase slightly faster than the MSA population. This is due to increases in efficiency and growth in the healthcare, professional service, and technical manufacturing industries, which produce higher value goods per person than traditional MSA industries that focus on raw material extraction (agriculture, mining, and forestry). **Table 2-7** shows the GRP of the MSA from 2006 to 2036.

Table 2-7: Bend-Redmond Gross Regional Product			
Calendar Year	GRP (\$M)	Percent Change	GRP (\$M) per Capita
2006	\$7,356		\$0.051
2011	\$7,552	2.7%	\$0.048
2016	\$8,755	15.9%	\$0.050
2021	\$9,812	12.1%	\$0.050
2026	\$10,924	11.3%	\$0.051
2031	\$12,103	10.8%	\$0.052
2036	\$13,302	9.9%	\$0.053
Compound Annual Growth Rates			
'06 - '16	6.1%	N/A	0.3%
'16 - '36	2.1%	N/A	0.3%
GRP per Capita = GRP / Total Population. GRP is inflation-adjusted 2016 dollars Sources: GRP: Woods & Poole, Population: Portland State University			

2.2.4 UNITED STATES FOREST SERVICE

The United States Forest Service (USFS) Redmond Air Center (RAC) plays a major role in supporting firefighting efforts in the region. USFS aviation activities contribute an average of 500 annual operations, which includes flights by helicopters, tankers, and single-engine spotter aircraft. USFS operations are concentrated during the fire season from May to October. Total operations depend on the severity of the fire season, and the Airport has seen as many as 1,000 tanker flights and as few as 300. The RAC expects to see Lockheed C-130 air tankers following the reconstruction of former Taxiway B (now Taxiway D) in 2017.

In addition to aerial response, the RAC hosts firefighting and emergency response training, and acts as a depot for firefighters headed out to events across the northwest. USFS and contract employees generally fly on scheduled commercial flights; however, charter flights have occurred when demand is sufficient.



Governmental organizations, such as national law enforcement and elected officials, use the RAC when in town.

The USFS classifies the RAC as a hub of operations, incident support base, and critical asset for the Federal Emergency Management Agency (FEMA) and related emergency efforts. FEMA and other disaster response agencies will use the RAC for large scale natural disasters in the Pacific Northwest, such as an earthquake in the Cascadia subduction zone.

2.2.5 TOURISM

The Airport receives tourists throughout the year due to the multitude of activities and attractions in the Central Oregon area. The Central Oregon Visitors Association lists golf courses, ski resorts, hiking trails, and the natural beauty of Oregon as tourist attractions. The Central Oregon Golf Trail features more than two dozen golf courses, three of which are ranked by *Golf Digest* and *GOLF Magazine* in the top 100 public courses in the nation. These top golf courses are a strong attraction for visitors to fly to Central Oregon.

Central Oregon is home to two ski resorts, Mt. Bachelor and Hoodoo where visitors can participate in winter outdoor activities between November and May. Both resorts are also open from June to October for hiking and biking, and complement the trails elsewhere in the community.

Tourism activity is gauged by transit room tax (TRT) collection, which is provided by the Central Oregon Visitors Association (COVA). TRT is a percentage tax charged on hotel rooms. Growth in TRT shows two changes: an increase in average room price, an increase in hotel occupancy, and an increase in the number of rooms available. **Table 2-8** shows that TRT declined during the recession in 2008 and 2009 due to decreased travel, and has grown since. Strong growth from 2013 to 2016 is indicative of new lodging that has been built in response to the demand. Tourism peaks in the summer.



Table 2-8: MSA Transit Room Tax			TRT Collection by Month
Fiscal Year	TRT	% Change	
2006	\$7,159,430		
2007	\$7,634,226	6.6%	
2008	\$7,535,010	-1.3%	
2009	\$6,560,361	-12.9%	
2010	\$6,952,963	6.0%	
2011	\$7,414,547	6.6%	
2012	\$7,930,881	7.0%	
2013	\$9,008,940	13.6%	
2014	\$11,061,570	22.8%	
2015	\$13,789,892	24.7%	
2016	\$15,513,984	12.5%	
Compound Annual Growth Rate			
'06-'16	8.0%	N/A	

TRT = Transit Room Tax. TRT adjusted to match FAA fiscal year.
 TRT is sum of amount collected by City of Bend, City of Redmond, City of Sisters, and Deschutes County
 Months: 1= January, 12 = December
 Source: Central Oregon Visitors Association

TRT growth exhibits strong correlation (0.91) with passenger enplanement growth from 2006 to 2016. This is to be expected as both indicators have common drivers. Growth in business and leisure visitors to the community help drive up TRT and passenger enplanement numbers. This, combined with population and employment growth (**Section 3.1** and **3.2**), explain the overall increase in passenger enplanements at RDM.

2.2.6 REGIONAL AIRPORTS

RDM is the only commercial service airport within 100 miles of the main population centers in Central Oregon; however, there are five general aviation airports nearby (Bend (BDN), Madras (S33), Prineville (S39), Sunriver (S21), and Sisters (6K5)). These airports are within 30 miles of RDM and provide general aviation users with choices for aircraft storage and services. A detailed description of the facilities offered at these airports are described in **Chapter 1**. Markets served by each airport are described in **Table 2-9**.



Table 2-9: Regional General Aviation Airports

Airport	Characteristics			Markets Served			
	Runway Length	Instrument Procedure	Jet A & FBO	Large Jets	Small Jets	Turbo-Props	Piston
Redmond	7,038 feet	Precision	Yes	Yes	Yes	Yes	Yes
Bend	5,200 feet	Non-Precision	Yes	No	Yes	Yes	Yes
Madras	5,089 feet	Non-Precision	Yes	No	Yes	Yes	Yes
Prineville	5,751 feet	Non-Precision	Yes	Yes	Yes	Yes	Yes
Sunriver	5,461feet	Non-Precision	Yes	No	Yes	Yes	Yes
Sisters	5,460 feet	Visual	No	No	No	No	Yes

Sources: Airport Facilities: FAA Airport Facilities Directory; Primary Market: Consultant assessment derived from based aircraft records and available facilities (runway length, fuel, instrument procedure)

Determination of market does not indicate the most common aircraft type at an airport, or suggest that a market that is not served will never use an airport. Rather, it reflects the presence of facilities at an airport that cater to the needs of a certain market. For example, piston aircraft are versatile in that they do not need Jet A fuel or a long runway, and due to their susceptibility to strong winds and turbulence, they tend not to be operated when visibility is particularly low due to stormy weather. For this reason, piston aircraft owners have fewer requirements for the airport where they based their aircraft than the owner of a business jet.

Large jets need a long runway to operate at their full potential, and owners generally need the aircraft available to fly regardless of the weather so airport instrumentation is more important. While large jets can use any of the regional airports under the right conditions, owners requiring year-round availability would be unlikely to base their large jet at an airport without the necessary facilities.



2.2.7 CATCHMENT AREAS AND COMPETITION

An airport's "catchment area" is the geographic boundary from which it draws its users, and airport activity is primarily influenced by the movement of people and products to and from the catchment area.

Catchment areas are defined by the types of services offered at an airport, proximity of competitor airports, and the tendency of the local population to use the airport. The catchment area for RDM was split up into three different areas: air carrier, business jet, and general aviation. A map of the catchment areas is shown in **Figure 2-3**.

The air carrier catchment area is the largest of the three areas for RDM. The air carrier catchment area includes Central Oregon due to the Airport's location and the distance from other airports. The catchment area boundary is defined by assessing ticket purchases in the area surrounding the Airport, and looking at the zip codes of the passengers that traveled from RDM. The catchment area shows where RDM passengers are likely to come from; however, it should not be misinterpreted to mean that all air travelers in this area use RDM. Some fly from other airport, shown in the next section.

TERMINOLOGY

Air Carrier Catchment Area: Defined by the zip codes passengers live in when they purchase a ticket for an originating flight from the Airport.

Business Jet Catchment Area: Defined by proximity to other airports capable of handling business jets.

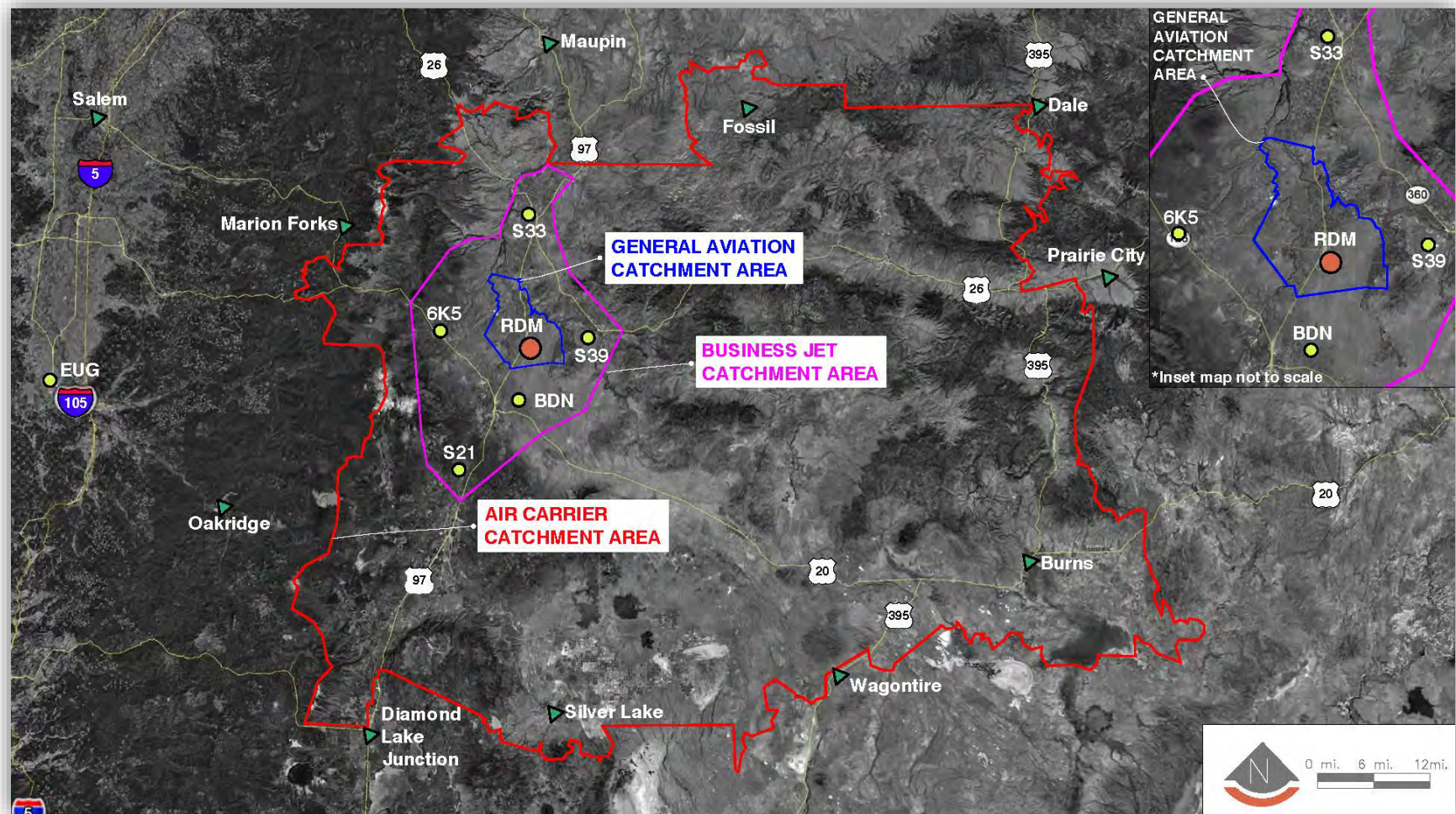
General Aviation Catchment Area: Defined by the towns near the Airport who base general aviation aircraft at RDM.

The business jet catchment area is the second largest of the three areas and extends just past the city limits of Bend, Prineville, Madras, Sisters and Sunriver. This catchment area is based on the primary markets defined in **Table 2-9**. Surrounding airports do not have adequate facilities to serve large business jets throughout the year, which drives the size of the business jet catchment area.

The general aviation catchment area, which is the smallest, includes the City of Redmond and the areas halfway between the airports in Madras, Bend, Sisters, and Prineville. As shown in **Table 2-9**, the nearby airports in these communities have facilities that cater to small jets, turbo props, and piston aircraft. It is expected that aircraft operators will use the facility closest to their home or business provided space is available.



Figure 2-3: Catchment Areas



AIR CARRIER CATCHMENT AREA

The air carrier catchment area was determined based on a sample of passenger tickets issued between June 30th 2015 and June 30th 2016. This sample includes 24,457 tickets out of an estimated 747,325 tickets issued to travelers in the area over this period, meaning that the results are statistically valid at the 95 percent confidence level. *True market* for RDM is 747,325 tickets, which is the total number of tickets sold to the population of the catchment area. The true market includes travelers that used RDM, and travelers that live near RDM and used other airports.

Ticket sales data indicate that 75 percent of the true market used RDM for air travel, 24 percent used Portland (PDX), and the remaining one percent diverted to Eugene (EUG). When assessed based on international and domestic trips, RDM captured 76 percent (527,747) of domestic travelers and 59 percent (32,881) of international travelers. **Table 2-10** shows airport use by communities near the Airport.

Table 2-10: Airport Use by Community ¹					
Community	Distance from RDM (Miles)	Year Ending June 30 th , 2016			True Market
		% Airport Use			
		RDM	PDX	EUG	
Bend	17	80	19	1	524,628
Redmond	2	73	26	1	84,581
Sisters	21	69	31	0	33,032
Prineville	20	77	23	1	29,396
Terrebonne	8	72	28	0	17,876
Madras	28	50	49	0	17,448
La Pine	46	74	24	3	11,245
Powell Butte	9	82	17	1	7,486
Culver	21	73	27	0	5,684
Burns	144	56	44	0	2,170
Hines	142	59	41	0	1,711
Silver Lake	95	84	16	0	1,344
Christmas Valley	111	55	45	0	1,283
John Day	135	37	63	0	1,253
Crescent	64	67	28	5	1,192
Mount Vernon	127	48	52	0	947
Camp Sherman	36	75	21	4	856
Warm Springs	52	26	74	0	825
Kimberly	116	57	43	0	703
Canyon City	137	43	52	5	642
Total	N/A	75	24	1	747,325

1: Does not include markets with fewer than 100 passengers.

Sources: Airline Reporting Corporation, Market Information Data Tapes, and U.S. Department of Transportation



Travelers typically divert to other airports for non-stop flights, lower airfares, and more convenient flight times. Distance from RDM is another factor. **Table 2-10** shows that the Airport retains 72 percent of the true market within 30 miles of the Airport, 58 percent of the true market between 31 and 60 miles, 67 percent of the true market between 61 and 90 miles, and 55 percent of the true market over 91 miles away.

Table 2-10 shows the top 25 destinations true market estimates for passengers daily each way (PDEW) from RDM. PDEW numbers do not justify route existence on their own as many passengers flying from RDM connect in the airline hubs to other destinations. A passenger flying from RDM to Anchorage via Portland is part of the RDM-Anchorage PDEW total, and not part of the RDM-Portland PDEW total. RDM has non-stop service to each of the top five markets, and six of the top ten markets. The Airport uses the information contained in **Table 2-11** to advocate for new routes when meeting with the airlines.



Table 2-11: Top 25 Destinations True Market Estimate And PDEW

Rank	Destination	RDM Reported PAX	Diverted PAX	True Market	PDEW
1	Seattle, WA ¹	61,199	4,442	65,641	89.9
2	Los Angeles, CA ¹	39,780	15,751	55,531	76.1
3	San Francisco, CA ¹	39,417	4,626	44,042	60.3
4	Portland, OR ¹	33,032	0	33,032	45.2
5	Phoenix, AZ (PHX) ¹	25,316	7,136	32,452	44.5
6	Las Vegas, NV	19,226	7,076	26,302	36.0
7	San Diego, CA	19,117	6,765	25,883	35.5
8	Denver, CO ¹	20,496	3,219	23,715	32.5
9	Orange County, CA	16,165	4,163	20,328	27.8
10	Chicago, IL (ORD)	10,465	3,357	13,822	18.9
11	Dallas, TX (DFW)	8,887	4,860	13,748	18.8
12	Anchorage, AK	8,642	4,723	13,364	18.3
13	Salt Lake City, UT ¹	10,010	2,624	12,633	17.3
14	San Jose, CA	6,801	5,096	11,896	16.3
15	Kahului, HI	5,947	5,947	11,893	16.3
16	Boston, MA	8,199	3,160	11,358	15.6
17	Minneapolis, MN	7,729	2,540	10,268	14.1
18	Oakland, CA	5,092	3,907	8,999	12.3
19	Sacramento, CA	5,320	3,587	8,907	12.2
20	Ontario, CA	6,293	1,981	8,274	11.3
21	Newark, NJ	6,778	1,450	8,228	11.3
22	Honolulu, HI	4,483	3,665	8,148	11.2
23	Orlando, FL (MCO)	5,169	2,613	7,783	10.7
24	Spokane, WA	5,710	1,404	7,114	9.7
25	Atlanta, general aviation	4,948	1,693	6,640	9.1
Top 25 destinations		384,217	105,784	490,002	671.2
Total domestic		527,747	164,405	692,152	948.2
Total international		32,881	22,292	55,173	75.6
All markets		560,628	186,697	747,325	1,023.7

1: Indicates routes with non-stop service.

PDEW: Passengers Daily Each Way

Airport codes used to identify specific airport used in cities with multiple commercial airports.

Sources: Airline Reporting Corporation, Market Information Data Tapes, and U.S. Department of Transportation



2.3 AVIATION ACTIVITY PROFILE

The aviation activity profile is the baseline of the forecasts. The profile shows trends in activity at the Airport and provides context that explains what, how, and why changes in aviation activity have occurred. Sources that have provided information include the FAA, Airport Management, ATCT staff; and airport tenants. This section is organized in the following order:

- ✓ Airline Service (Passenger and Cargo)
- ✓ General Aviation
- ✓ Military
- ✓ Terminal Area Forecast

The ATCT operates and tracks flights from 5 a.m. to 7 p.m. Arrivals and departures that occur outside of these hours are not included in operations records submitted to the FAA. Commercial airline operations are also reported to the U.S. Department of Transportation (USDOT) and operations that occur when the ATCT is closed are captured using USDOT records.

General aviation operations do not have such records; however, flight records captured by FlightAware.com show only 327 general aviation operations occurring outside of ATCT hours. FlightAware records do not capture all operations, only those that file flight plans. However, given the low number of recorded operations, it is expected that total GA operations that occur when ATCT is closed make up a small percentage of overall operations. The absence of a more definite count is not expected to materially impact the forecast. GA operations when the ATCT is closed are shown in **Table 2-12**.

Table 2-12: GA Operations During ATCT Closure				
Category	Arrivals	Departures	Total	% of Total Operations
Single Engine Piston	17	8	25	0.06%
Multi Engine Piston	7	3	10	0.02%
Jet	110	70	180	0.45%
Single Engine Turboprop	51	23	74	0.18%
Multi Engine Turboprop	18	20	38	0.09%
Total	203	124	327	0.81%
Source: FlightAware Fiscal Year 2016 data. ATCT records show 40,162 operations in 2016				

2.3.1 AIRLINE SERVICE

Airline service includes scheduled passenger and cargo flights, and non-scheduled charter flights that operate charters for casinos and the U.S. Forest Service. The sections that follow describe the airline profile, opportunities for new airlines to come to RDM, passenger enplanements, commercial operations, and air cargo service at the Airport.



AIRLINE PROFILE

The Airport has four scheduled passenger airlines: Alaska, United, Delta, and American. In 2017, all flights were operated by regional airlines on behalf of the mainline carriers. Each provides service to their hubs with Alaska flying to Portland and Seattle; America flying to Phoenix and Los Angeles; Delta flying to Salt Lake City and Seattle; and United flying to Denver and San Francisco. Non-stop service to the seven hub airports puts RDM within one stop of many major cities in the world. The 2016 market share for airlines in terms of passengers carried was not evenly divided amongst the airlines: 57 percent of passenger traveled on Alaska, 24 percent on United, 12 percent on Delta, and seven percent on American.

Scheduled cargo service is operated by Ameriflight on behalf of United Postal Service (UPS), and Empire on behalf of Federal Express (FedEx). Alaska Airlines carries cargo on their scheduled passenger flights. The 2016 market share for scheduled cargo carriers in terms of pounds of cargo carried was 51 percent for Ameriflight, 45 percent for Empire, and four percent for Alaska.

The growth in passenger activity at RDM has corresponded with increasing seat capacity on the scheduled carriers. Average seats per departure was 39 in 2006, 70 in 2011 (when Allegiant was operating with 166 seat aircraft), and 64 in 2016 (after Allegiant left the market). Nationally, the FAA Aerospace Forecast 2017-2037 reports that the average seats per departure for regional airlines has grown from 50 in 2006 to 61 in 2016, and is projected to grow to 73 by 2037. The trend of larger aircraft is expected to continue at RDM based on the following fleet decisions made by the major airlines.

Major changes in seat capacity for aircraft operating at RDM are described below.

- ✓ Alaska Airlines replaced the 37-seat Q200 with the 76-seat Q400 in 2008. As a result, flight frequencies in RDM and other markets served by Alaska declined. Passenger numbers also declined at this time; however, this was primarily due to the recession that occurred in 2008-2009. Alaska Airline's passenger numbers returned to growth in 2010 and exceeded 2008 levels in 2014.
- ✓ SkyWest (operating for United and Delta) has been replacing the 50-seat CRJ-200 with the 65 to 70-seat CRJ-700 and the 76 seat CRJ-900 during peak months. In conversations with airport management, United has indicated that the CRJ-200 will leave the RDM market and be replaced by the CRJ-700 and CRJ-900 in 2017, and Delta has indicated that they intend to phase out the CRJ-200 from the RDM market as soon as the CRJ-700 and CRJ-900 become available throughout the year. Delta did not specify a date when this would occur.



Regional airlines are capped at a maximum of 76 seats per the terms of labor agreements between mainline pilot's unions and the airlines. Aircraft operated by regional airlines typically have fewer seats than they are capable of accommodating because of these agreements. For example, the Bombardier CRJ-900 can accommodate 90 seats in an all economy configuration. Airline purchases known as of April 2017 show that interest is focused on aircraft with greater seating capacity. Alaska, American, Delta, and United have indicated in the fiscal year investor filings with the U.S. Securities and Exchange Commission that they are updating their fleets with more fuel efficient narrow body aircraft as described below. This list does not include conventional narrow body aircraft (e.g. A321ceo), and wide body aircraft (e.g. 787-10) that the airlines have on order.

- ✓ Alaska: 30 Embraer 175 aircraft (up to 88 seats), 30 A320neo aircraft (up to 186 seats), and 32 Boeing 737 MAX aircraft (up to 200 seats);
- ✓ American: 12 Embraer 175 aircraft, 100 Airbus A321neo aircraft (up to 240 seats) and 100 Boeing 737 MAX aircraft;
- ✓ Delta: 75 Bombardier CS100 aircraft (up to 135 seats),
- ✓ Skywest: 18 Embraer 175 aircraft, 200 Mitsubishi MRJ-90 aircraft (up to 90 seats),
- ✓ United: 24 Embraer 175 aircraft, 99 Boeing 737 MAX aircraft

While it is not known how the airlines will deploy these aircraft in their system, it is evident that there are no orders placed for aircraft with fewer than 60 seats. This means that as these smaller aircraft are retired, they will be replaced by larger aircraft. As seen through the retirement of the 37-seat Bombardier Q200 in 2008, communities that cannot fill the larger aircraft will face a reduction in frequency, and potentially lose service all together. The effect that this may have on RDM is discussed in **Section 4.1.3**.

NEW AIR SERVICE OPPORTUNITIES

The most likely new candidate to service the Airport is Allegiant Airlines. As shown in **Table 2-11**, Las Vegas is the market without non-stop service from the Airport. Passengers either connect on flights from RDM, or drive to another airport to fly direct. Allegiant provided service between RDM and Las Vegas between 2007 and 2012, with load factors (number of passengers divided by the number of seats) ranging from 63 percent in 2007 to 81 percent in 2011. Allegiant used the MD-80 aircraft with 166 seats on the Las Vegas route. Allegiant ceased service in 2012 citing rising airport costs as the reason for leaving; however, the Airport and Allegiant are investigating reinstating the service as demand has remained strong.

Allegiant is transitioning from their Boeing MD-80 fleet to a more modern Airbus narrow body fleet. The Airbus aircraft have comparable seating capacity to the MD-80; however, the Airbus are more fuel efficient and can operate on shorter runways at a given takeoff weight than the MD-80. The new aircraft would allow Allegiant to serve RDM throughout the year with a lower weight restriction on hot days, enabling the airline to carry more passengers.



Allegiant is a niche market low-cost carrier that caters to leisure travelers and typically does not offer flights every day of the week, helping keep load factors high. Mainline carriers like Alaska, America, Delta, and United cater to business and leisure travelers and tend to offer multiple daily flight frequencies that coincide with connecting flights at their hubs. The Airport has non-stop service to every mainline airline hub within 1,000 miles. Regional jets that serve the Airport begin to become uneconomical beyond 1,000 miles because they need to remove passengers to take on more fuel. It is not expected that the Airport will see non-stop service to Midwest hubs until airlines begin serving the Airport with larger aircraft such as the Boeing 737 and Airbus A320 series. Entry of these aircraft into the RDM market will depend on the local demand proving that they can fill these larger aircraft reliably.

PASSENGER ENPLANEMENTS AND AIRLINE OPERATIONS

A passenger enplanement is any passenger who boards any aircraft that is considered scheduled commercial and charter aircraft with more than nine seats for turboprops (or any number of seats for jet aircraft). The aircraft must be operating under Title 14 Code of Federal Regulations (CFR) Part 121, which pertains to passenger airlines. Passengers are not counted toward enplanements if they board aircraft that operate under 14 CFR 91, which pertains to general aviation, and 14 CFR 135, which pertains to on-demand air taxis (not airlines). Passenger enplanements include both revenue and non-revenue passengers who paid taxes and passenger facility charges (PFC) for their carriage. Passenger enplanements do not include the flight crew, flight attendants, and any other members of the airline crew.

Passenger enplanements are classified by either *air carrier* or *air taxi/commuter*. Air carrier enplanements are any enplanements that occur on a mainline carrier, such as Delta, United, and American. Air taxi/commuter enplanements are those that occur on a feeder carrier, such as SkyWest Airlines, Mesa Airlines, and Horizon Airlines.

RDM passenger enplanements have increased by 100,000 between 2006 and 2016, which is a CAGR of 4.2 percent. This includes years of decline in 2009, 2012, and 2013. The 2009 decline was caused by the economic recession, and the decline in 2011 and 2012 was caused by Allegiant exiting the market, shown by the drop of air carrier enplanements while Air Taxi/Commuter enplanements grew. RDM enplanements from 2006 to 2016 are shown in **Table 2-13**.



Table 2-13: Passenger Enplanements

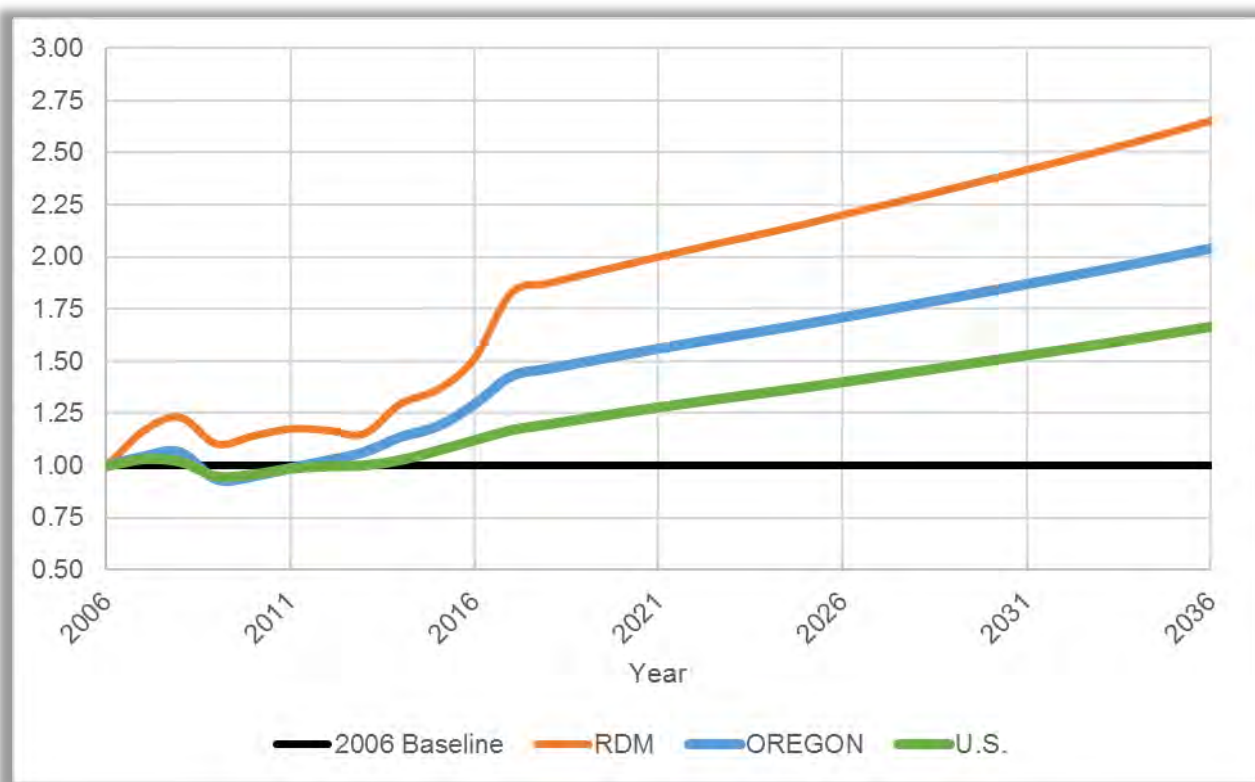
Fiscal Year	Air Carrier	Air Taxi/Commuter	Total	Percent Change
2006	1,427	195,796	197,223	
2007	9,262	220,711	230,033	16.6%
2008	13,886	229,311	243,197	5.7%
2009	26,618	191,208	217,826	-10.4%
2010	28,031	197,530	225,561	3.6%
2011	26,259	205,719	231,978	2.8%
2012	16,660	214,173	230,833	-0.5%
2013	430	226,980	227,410	-1.5%
2014	305	255,560	255,865	12.5%
2015	303	268,829	269,132	5.2%
2016	536	297,786	298,322	19.7%
CAGR	-9.3%	4.2%	4.2%	N/A

CAGR = Compound Annual Growth Rate.
Source: 2016 TAF. 2016 total is impacted by Airport closure in May.

As shown in **Figure 2-4**, growth at RDM exceeded growth experienced by the State of Oregon and the U.S. from 2006 to 2016. The State and the U.S. saw steeper declines during the recession than RDM. Growth at RDM since 2013 has been more pronounced. One reason for the periods of slower decline and more rapid growth over the past ten years is that the local economy has been adding jobs faster than the State and the nation, and the population of the MSA has been growing more quickly.

Forecasts, which come from the FAA TAF published January 2017, project that RDM will grow more quickly than the State and the U.S. through 2036. A key reason behind the higher growth rate is that RDM is an emerging market, whereas the State and the U.S. are mature markets, driven by the medium and large hub airports. PDX made up 88 percent of Oregon passenger enplanements, and medium and large hub airports made up 89 percent of U.S. enplanements in 2016. Hub airports tend to remain more stable than non-hubs, hence the lower historical and projected volatility. The RDM TAF is discussed in **Section 4.4**.



Figure 2-4: Passenger Enplanement Growth

Source: 2017 TAF

Airline operations are categorized as either *air carrier* or *air taxi*. Categorization is based on the seating capacity of an aircraft, regardless of which carrier is operating the aircraft. A seating capacity of 60 seats is the determining factor on how an aircraft is categorized. Aircraft such as 50-seat CRJ-200 with are considered air taxi, and aircraft such as the 76-seat Q400 are considered air carrier.

Total passenger airline operations at RDM have declined by an annual average of 2.2 percent from 2006 to 2016. The largest drop in operations was during the recession; however, total operations numbers have declined every year since except 2010, 2014 and 2016. The primary reason behind the decline in operations is the airline's transition of from *air taxi* aircraft to air carrier aircraft. The greater seating capacity offered by the air carrier aircraft has allowed the airlines to reduce flight frequencies while maintaining or increasing the number of available seats in the market. For example, Alaska cut their operations by a little less than half when they retired the 37-seat Bombardier Q200 in 2008; but they replaced these aircraft with 76-seat Bombardier Q400s, thereby offsetting the decline in operations and maintaining the number of seats available in the market.



Other airlines – American, Delta, and United, have been phasing out the 50-seat CRJ-200, an *air taxi* aircraft, in favor of larger regional jets, which are considered *air carrier* aircraft. These larger jets increase the number of seats available in the market, which has accommodated the growth in passenger enplanements. Passenger airline operations and average seats per departure are shown in **Table 2-14**.

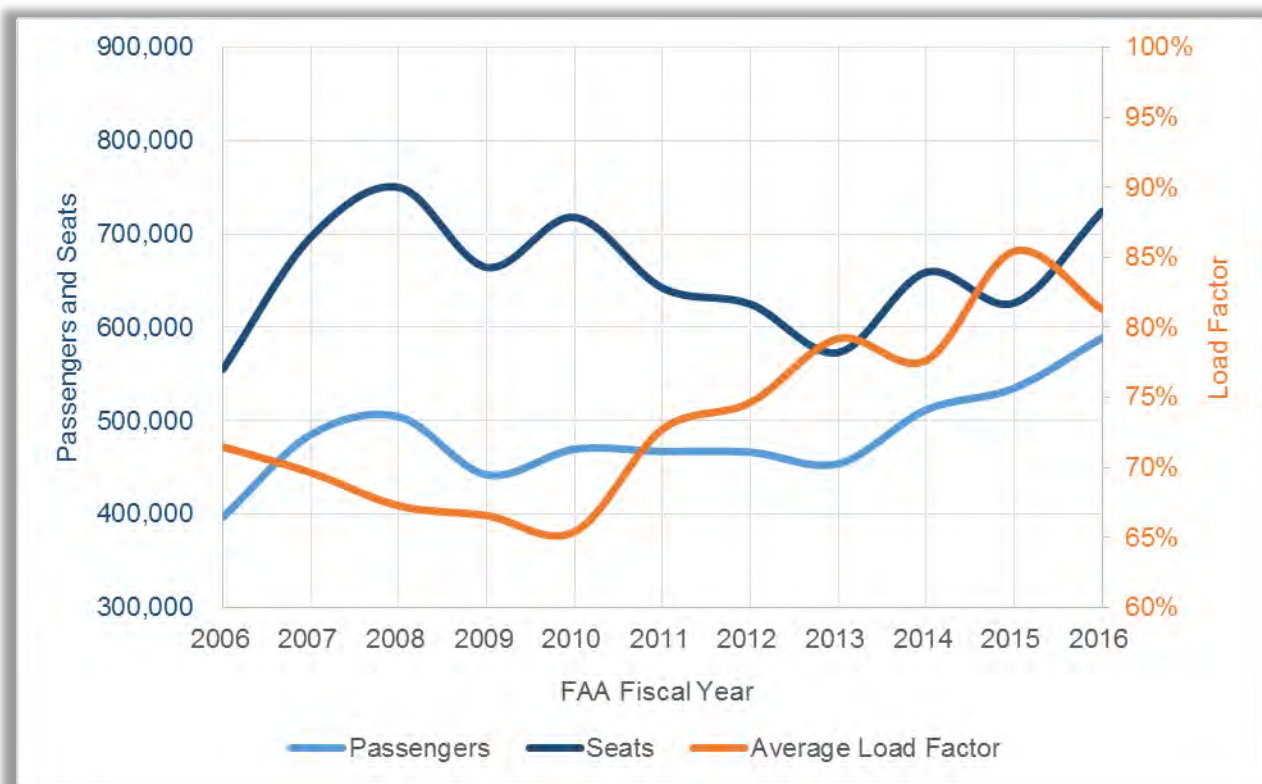
Table 2-14: Passenger Airline Operations					
Fiscal Year	Air Carrier	Air Taxi	Total	% Change	Avg. Seats per Departure
2006	360	14,368	14,728		39
2007	2,484	13,792	16,276	10.5%	46
2008	4,782	10,414	15,196	-6.6%	54
2009	5,204	6,360	11,564	-23.9%	67
2010	5,568	6,234	11,802	2.1%	70
2011	4,484	6,248	10,732	-9.1%	70
2012	4,376	6,344	10,720	-0.1%	79
2013	4,276	6,106	10,382	-3.2%	56
2014	5,138	6,440	11,578	11.5%	57
2015	5,292	4,428	9,720	-16.0%	64
2016	6,946	4,796	11,742	20.8%	64
CAGR	34.4%	-10.4%	-2.2%	N/A	N/A
CAGR = Compound Annual Growth Rate. Sources: 2006-2016 USDOT T-100 Database Note: TAF and FAA OPSNET counts include Charter, Air Cargo and Forest Service Tanker. Numbers above are for scheduled passenger flights only.					

SCHEDULED PASSENGER AIRLINE LOAD FACTOR

Load factor is one metric used by the airlines to assess route performance, and is calculated by dividing the number of passengers by the number of seats available. Available seats represent the supply, and passengers represent the demand. Load factor grows as demand and supply move closer together, and load factor declines when supply grows faster than demand. Airline capacity discipline, which is where airlines reduce seats to a market to increase load factor is evident at RDM from 2010 to 2013, as shown in **Figure 2-5**. The airlines reduced supply by 150,000 seats between 2010 and 2013. Passenger numbers declined by a tenth of this amount during the same period, and average load factor grew from 65 percent to 79 percent. The airlines have added capacity since 2013 and average load factor has remained high. A reason for this is that there is strong demand for air travel in the community, and available seats are being purchased.

The 2017 FAA Aerospace Forecast reports that the average domestic load factor for U.S. regional carriers was 80.1 percent in 2016 and RDM had a load factor of 80.1 percent. Performing at or above industry average helps the Airport market itself to the airlines. As shown in **Table 2-9**, the Airport retains 75 percent of local passengers, and the population and economy of the Redmond MSA are expected to grow. These factors suggest that if RDM is successful in attracting additional air service in the future, the demand will exist to sustain the routes at industry-average load factors.



Figure 2-5: RDM Passengers, Seats, and Average Load

Source: USDOT T-100. Data presented included passengers, seats, and load factors for both inbound and outbound travel.

SCHEDULED PASSENGER AIRLINE AVERAGE FARE AND AVERAGE YIELD

Airfares play an important role in traveler airport selection. Airfares affect an airport's ability to retain passengers, and an airline's desire to increase service to a market. One-way airfares (excluding taxes and PFC) paid by travelers are used to measure the relative fare competitiveness between the Airport and competing airports. **Table 2-15** shows the average airfares of RDM and competing airports for the top 25 destination from RDM.

Multiple factors dictate the price of average airfares: availability of seats, stage length, number of flights, and airline competition. The average one-way airfare for the Airport was \$197, which is \$32 higher than Portland (\$165), and \$19 higher than Eugene (\$178). Part of Eugene's lower average airfare is due to the presence of Allegiant Airlines, which flies to Los Angeles, Las Vegas, Oakland, and Phoenix. Excluding Allegiant's impact in a few select markets at Eugene, the average one-way fare at RDM was lower than Eugene by \$5. The Airport's fare was higher than Portland in every market compared in the analysis. The largest difference was to and from Denver, Chicago-O'Hare and Orlando at more than \$70 one-way. When compared to Eugene, the Airport had lower airfares in six markets, including Seattle, San Francisco, Denver, Anchorage, Honolulu, and Atlanta.



Table 2-15 Average Domestic One-Way Fares

Rank	Destination	Average one-way fare			RDM Max Δ
		RDM	PDX	EUG	
1	Seattle, WA	\$123	\$109	\$127	\$14
2	Los Angeles, CA	\$149	\$109	\$115	\$40
3	San Francisco, CA	\$178	\$126	\$200	\$52
4	Portland, OR	\$93	-	\$81	\$12
5	Phoenix, AZ (PHX)	\$143	\$141	\$141	\$2
6	Las Vegas, NV	\$141	\$104	\$89	\$52
7	San Diego, CA	\$158	\$122	\$152	\$36
8	Denver, CO	\$208	\$128	\$211	\$80
9	Orange County, CA	\$143	\$111	\$133	\$32
10	Chicago, IL (ORD)	\$257	\$180	\$250	\$77
11	Dallas, TX (DFW)	\$226	\$161	\$212	\$65
12	Anchorage, AK	\$206	\$167	\$212	\$39
13	Salt Lake City, UT	\$195	\$129	\$176	\$66
14	San Jose, CA	\$144	\$118	\$119	\$26
15	Kahului, HI	\$272	\$259	\$270	\$13
16	Boston, MA	\$262	\$228	\$239	\$34
17	Minneapolis, MN	\$235	\$202	\$234	\$33
18	Oakland, CA	\$148	\$117	\$63	\$85
19	Sacramento, CA	\$168	\$111	\$161	\$57
20	Ontario, CA	\$157	\$129	\$145	\$28
21	Newark, NJ	\$310	\$252	\$271	\$58
22	Honolulu, HI	\$289	\$232	\$305	\$57
23	Orlando, FL (MCO)	\$274	\$201	\$259	\$73
24	Spokane, WA	\$134	\$106	\$131	\$28
25	Atlanta, general aviation	\$294	\$253	\$296	\$41
Average domestic fare		\$197	\$165	\$178	\$32

Note: YE 2Q 2016; Fares do not include taxes or PFC.
Source: Diio Mi

The average yield, which is measured as revenue per mile flown, is 18.2 cents for RDM. This is 26 percent higher than the national average of 14.5 cents. When comparing the Airport to others in the FAA Northwest Mountain region, the Airport was 31 percent higher than the average of 13.9 cents. Airlines are for-profit businesses and look to add service to markets that produce high yields. Average yields for the airlines that service the Airport are below:

- ✓ Alaska Airlines: 19.2 cents, 44 percent higher than their U.S. average of 13.3 cents.
- ✓ American Airlines: 17.3 cents, 11 percent higher than their U.S. average of 15.6 cents.
- ✓ Delta Airlines: 18.1 cents, 9 percent higher than their U.S. average of 16.6 cents.
- ✓ United Airlines: 17.9 cents, 19 percent higher than their U.S. average of 15.0 cents.



SCHEDULED AIR CARGO

RDM scheduled air cargo volume (expressed in tons) has been highly volatile over the past ten years, with a five percent average annual decline from 2006 to 2016. Operations by dedicated cargo aircraft have declined proportionally, showing a general decline of 4.7 percent per year since 2006. The U.S. domestic cargo market has experienced an average decline of 0.5 percent per year during the same period. The 2017 FAA Aerospace Forecast states that U.S. air cargo has been in decline due to economic uncertainty, high fuel prices, additional security screening requirements, and “a shift from air to other modes (especially truck) [...]” Looking forward, the FAA projects that national cargo decline has bottomed out, and will grow slowly into the future. The 2017 Aerospace Forecast states that “the shift from air to ground transportation has occurred.”

The FAA Aerospace Forecast indicates that air cargo is strongly linked to growth of gross regional and domestic product. As shown in **Table 2-7**, The MSA GRP has grown by an average of 2.1 percent over the past ten years. The mismatch between local GRP growth and air cargo decline is likely explained by the proximity of RDM to Oregon’s cargo hub in Portland. While 75 percent of passengers avoid the three-hour drive to Portland, packages can easily be trucked over the Cascade Mountains. USDOT T-100 data shows that air cargo volumes at PDX have grown by an average of 1.6 percent per year from 2011 to 2016, while RDM air cargo volumes fell by 0.1 percent per year over the same period. Air cargo operations and volumes are shown in **Table 2-16**.

Table 2-16 Cargo Airline Operations and Activity

Fiscal Year	Redmond			U.S. Domestic Market	
	Operations	Total Cargo (Tons)	% Change	Revenue Ton Miles (Millions)	% Change
2006	3,259	1,612.8		12,481	
2007	3,440	1,633.9	1.3%	12,940	3.7%
2008	3,026	1,269.9	-22.3%	12,261	-5.3%
2009	3,340	1,145.1	-9.8%	10,275	-16.2%
2010	3,633	1,087.8	-5.0%	11,243	9.4%
2011	3,252	976.4	-10.2%	10,601	-5.7%
2012	2,815	918.7	-5.9%	10,886	2.7%
2013	3,057	1,003.4	9.2%	10,996	1.0%
2014	1,949	1,035.2	3.2%	11,226	2.1%
2015	1,896	924.5	-10.7%	11,636	3.7%
2016	2,014	970.1	4.9%	11,851	1.8%
CAGR	-4.7%	-5.0%	N/A	-0.5%	N/A

CAGR = Compound Annual Growth Rate.

Sources: RDM: Airport Management and 2006-2016 USDOT T-100 Database; U.S.: FAA Aerospace Forecast 2017-2037



2.3.2 GENERAL AVIATION

General aviation describes flight activities that are not performed by passenger and cargo airlines, and the military. General aviation is broad in scope – activities include, but are not limited to, flight training, recreational flying, private and corporate air transportation, emergency response, and flight testing of new aircraft. This section describes general aviation businesses and activities at RDM.

GENERAL AVIATION BUSINESSES

General aviation businesses include those that offer services to the flying public (e.g. fixed base operators), those that design and construct aircraft, and companies that use aircraft as part of their business (e.g. aerial photography, sightseeing, and employee transport). Key general aviation businesses at RDM are described below.

- ✓ There are two fixed base operators at RDM. These businesses sell 100 Low-Lead (LL) and Jet A fuel, and offer aircraft maintenance, de-icing, aircraft detailing and cleaning, an avionics shop, covered aircraft storage, and a pilot's lounge.
- ✓ There are two aircraft manufacturers based at RDM: Evolution and Stratos. The Evolution facility specializes in final assembly and maintenance of single engine piston aircraft. Stratos is in the process of building and certifying a very light jet. Evolution is a spin-off company of aircraft manufacturer Lancair.
- ✓ There are corporate tenants, such as Les Schwab, that base their business jets at RDM. The aircraft are an integral part of business operations, allowing the companies to move employees around the country
- ✓ Flight training occurs at RDM, but the flight school formerly located at the Airport moved to the Bend Airport in 2008. Features of the Airport, such as the airport traffic control tower and the instrument landing system, are attractive to student pilots preparing to become professional pilots. Students from nearby airports fly to RDM to practice from time to time.

ITINERANT GENERAL AVIATION OPERATIONS

Itinerant operations originate and terminate at different airports. Operators include business travelers to the community, student pilots performing cross country training flights, and recreational pilots. Itinerant operations made up 39 percent of overall general aviation operations in 2016, and have been declining at an annual average rate of 6.8 percent since 2006. This decline is more pronounced at RDM than the national decline of two percent per year. Itinerant general aviation operations are shown in **Table 2-17**.



Table 2-17: Itinerant General Aviation Operations

Year	RDM Operations	% Change	National Operations	% Change
2006	22,170		18,707,000	-0.7%
2007	26,174	18.1%	18,575,000	-5.8%
2008	20,221	-22.7%	17,493,000	-11.0%
2009	16,014	-20.8%	15,571,000	-4.5%
2010	14,767	-7.8%	14,864,000	-2.3%
2011	13,610	-7.8%	14,528,000	0.0%
2012	14,709	8.1%	14,522,000	-2.8%
2013	13,414	-8.8%	14,117,000	-1.0%
2014	12,372	-7.8%	13,979,000	-0.7%
2015	11,551	-6.6%	13,887,000	0.1%
2016	10,985	-1.1%	13,903,000	-0.7%
CAGR	-6.8%	N/A	-2.9%	N/A



CAGR = Compound Annual Growth Rate. Source: FAA Terminal Area Forecast



The decline in itinerant operations is indicative of an industry that is adjusting to modern realities, rather than one that is declining across the board. The 2017 FAA Aerospace Forecast shows that in 2016, aircraft with piston engines made up 72 percent of the national general aviation fleet, and turbine aircraft made up the remaining 18 percent. Hours flown by piston aircraft have declined by an annual average of 1.4 percent since 2010, while hours flown by turbine (jet and turboprop) aircraft have grown by 1.9 percent per year. Similarly, the overall number of active piston aircraft has declined by an annual average of 1.7 percent while total turbine aircraft have grown by an annual average of 1.9 percent.

The general aviation market is readjusting to one with a more even distribution of piston and turbine aircraft, albeit slowly. With the dominant piston market in decline, overall operations will continue to drop; however, there is a growing segment within the itinerant general aviation market.

LOCAL GENERAL AVIATION OPERATIONS

Local general aviation operations originate and terminate at the Airport, and are generally performed by pilots (both student and licensed) that are practicing landings. Local operations are highly sensitive to the level of flight training at an Airport. Touch-and-go landings, which is where the aircraft lands, slows, then accelerates and takes off without leaving the runway, count as two operations. An aircraft practicing touch and goes can perform upwards of six operations in an hour, depending on how busy the traffic pattern is. The flight school, located at RDM from 2007 to 2009 increased local aircraft operations by 79 percent in the first year. Local general aviation operations at RDM and nationally are shown in **Table 2-18**.

The largest decline in local general aviation operations was caused by the departure of the flight school in 2009. Despite the relocation of the school, the Airport still sees student pilots who come from flight schools in Prineville and Bend to practice touch-and-goes in controlled airspace, and to practice using the instrument landing system. The region is attractive for student pilots in the Pacific Northwest because it has more sunshine than areas to the west of the Cascades mountain range.

Nationally, local general aviation operations declined after the recession and have remained essentially flat since 2010. A 2016 Current Market Outlook, produced by aircraft manufacturer Boeing, projects that North America will need 112,000 new pilots between 2016 and 2035. The 2017 FAA Aerospace Forecast projects that student pilots will grow steadily at 0.4 percent per year through 2037, and those entering flight training will primarily do so to earn a sport pilot license (for recreational purposes), or an airline transport pilot (ATP) license (for professional purposes). FAA projections through 2037 have sport pilot license holders growing at 4.1 percent per year and ATP license holders growing at 0.5 percent per year.



Table 2-18: Local General Aviation Operations

Year	RDM Operations	% Change	National Operations	% Change
2006	27,376		14,365,000	
2007	48,990	79.0%	14,557,000	1.3%
2008	42,519	-13.2%	14,081,000	-3.3%
2009	25,261	-40.6%	12,448,000	-11.6%
2010	22,416	-11.3%	11,716,000	-5.9%
2011	19,554	-12.8%	11,437,000	-2.4%
2012	18,565	-5.1%	11,608,000	1.5%
2013	16,124	-13.1%	11,688,000	0.7%
2014	17,213	6.8%	11,675,000	-0.1%
2015	22,854	32.8%	11,691,000	0.1%
2016	16,829	-23.0%	11,776,000	0.7%
CAGR	-4.7%	N/A	-2.0%	N/A



CAGR = Compound Annual Growth Rate. Source: FAA Terminal Area Forecast, FAA Aerospace Forecast



BASED AIRCRAFT

TERMINOLOGY	
Single-Engine Piston (SEP): SEP have one piston-powered engine. These aircraft are generally smaller and are often used for flight training and recreational flying. SEP may be used for regional business trips. Depending on weight and operator certification, these aircraft generally require only one pilot. Multi-Engine Piston (MEP): MEP have two or more engines and are typically larger than SEP. Multiple engines make the aircraft more capable, and require additional flight instruction beyond what is needed to operate an SEP. MEP are primarily used for flight training and business aviation. MEP may require two pilots, but many variants can be operated with one. Jet: Jet aircraft are characterized for having a turbine engine instead of a piston engine. These aircraft may have turbojets, or a turboprop. Jet aircraft range in size from small four-passenger business jets to the largest airliners. They can generally fly faster and at higher altitudes than SEP and MEP, making them better suited for business travel and emergency response. It is less common, but not unheard of, to see a jet used for recreational flying and flight instruction. Some smaller civilian jets can operate with a single pilot; however, most civilian jet aircraft require two.	Helicopter: Helicopters are characterized by having a rotor mounted above the cabin for lift and propulsion. Helicopters are commonly used for flight training, by law enforcement and emergency response, and by aerial businesses such as pipeline inspection, forestry, and aerial agriculture. Helicopters can be piston or turbine powered, and depending on the complexity of the model, can be operated by one pilot or two. Other: The category of “Other” includes experimental, sport, glider, and ultralight aircraft. These aircraft are used for recreational flying. ✓ Experimental aircraft refer to kit airplanes that are built by users, or third-parties besides the original manufacturer. Experimental aircraft share many characteristics with SEP – the key differentiator is how and where the aircraft is assembled. ✓ Sport aircraft are airplanes that have a specific weight and maximum speed in level flight. Sport aircraft require less training and a less strict medical certificate to pilot the aircraft. ✓ Gliders are unpowered aircraft that are towed into flight, and use thermal uplift to sustain altitude. ✓ Ultralight aircraft weigh less than 155 and do not require the pilot operating the aircraft to have a private pilot’s license or medical certificate.

Based aircraft are those that use a hangar and are stored at the Airport. Based aircraft do not include visiting, or itinerant aircraft. The FAA breaks down based aircraft into different categories based on an aircraft’s propulsion system, engine configuration, and weight. As of 2016, there are 64 SEP aircraft at the Airport, making up 80 percent of the total based fleet. There are six jets, four MEP aircraft, and six helicopters. There were no “Other” aircraft are based at the Airport from 2006 to 2016. **Table 2-19** shows based aircraft records from 2006 to 2026. The airport’s counts for 2016 differ than TAF records for the same year. It is expected that the TAF will be updated with the most recent available information following FAA approval of the forecasts.



Table 2-19: Based Aircraft Fleet

Year	SEP	MEP	Jet	Helicopter	Other	Total	% Change
2006	92	31	3	3	0	129	
2007	92	31	3	3	0	129	0.0%
2008	93	44	4	5	0	146	13.2%
2009	96	23	3	3	0	125	-14.4%
2010	93	14	5	6	0	118	-5.6%
2011	61	5	4	5	0	75	-36.4%
2012	61	5	4	5	0	75	0.0%
2013	64	14	5	8	0	91	21.3%
2014	62	9	3	9	0	83	-8.8%
2015	63	9	3	9	0	83	1.2%
2016	64	4	6	6	0	80	-4.8%
CAGR	-3.6%	-18.5%	7.2%	7.2%	N/A	-4.7%	



CAGR = Compound Annual Growth Rate. Source: FAA Terminal Area Forecast, FAA Aerospace Forecast



Based aircraft at RDM have been decreasing since 2006. Factors contributing to declining numbers include the 2009 Recession, rising oil prices, the departure of the flight school, competition from area general aviation airports, growing costs associated with earning a private pilot's license, and growing cost of aircraft ownership. The 2008-2009 recession saw the largest drop in based aircraft, and there was a brief recovery in 2013. RDM hangars are currently at capacity and the Airport has a waiting list for aircraft storage. Uncovered apron space is available, but not desirable due to winter snow and ice.

The 2017 FAA Aerospace Forecast shows SEP and MEP aircraft have been retired and have not been replaced, with the combined fleet declining by 1.7 percent a year from 2010 to 2016. The national turbine fleet has grown by 1.3 percent per year, and the helicopter fleet has grown by one percent per year during this time.

2.3.3 MILITARY

There are no based military aircraft at RDM; however, military units occasionally visit to train and refuel. These operations are typically itinerant; however, some military aircraft perform touch-and-goes while in the area. Military aircraft are generally serviced by the FBO, although they occasionally park on the USFS apron. Unlike other aspects of aviation, military activity is driven by the needs of the U.S. Department of Defense, and does not fluctuate in line with market forces. The Department of Defense does not provide projections of future activity or airport use; therefore, military activity is forecasted to grow or decline like other variables in the forecast. For planning purposes, military activity is considered to remain constant throughout the forecast period. Historic military operations are shown in **Table 2-20**.

Figure 2-20: Military Operations

Fiscal Year	Itinerant	Local	Total	% Change
2006	366	240	606	
2007	306	336	642	5.9%
2008	312	303	615	-4.2%
2009	173	134	307	-50.1%
2010	221	300	521	69.7%
2011	224	96	320	-38.6%
2012	212	371	583	82.2%
2013	323	812	1,135	94.7%
2014	383	406	789	-30.5%
2015	241	214	455	-42.3%
2016	341	540	881	93.6%
CAGR	-0.7%	8.4%	3.8%	

Source: 2017 TAF



2.3.4 FAA TAF

The FAA TAF is the official FAA forecast for airports, and is prepared annually by FAA Headquarters for each airport in the FAA National Plan of Integrated Airport Systems. The TAF uses the FAA fiscal year (October to September). TAF data comes from the USDOT T-100 database, airport traffic control tower records, and FAA Form 5010, which airports submit annually to the FAA.

In *Forecast Process for the 2016 TAF*, the FAA states that passenger enplanement forecasts at airports like RDM are developed by looking at a 10 percent sample of passenger activity per quarter, and performing a “regression analysis using fares, regional demographics, and regional economic factors.” Commercial operations are based on USDOT T-100 data for city-pairs (e.g. routes airlines serve from RDM). General aviation activity is based on time-series analysis of past trends.

The FAA reviews forecasts prepared for the Master Plan by comparing them to the TAF. Forecasts that are within 10 percent of the TAF over the five-year period, and 15 percent within the ten-year period can be approved by the Airports District offices. Forecasts outside of these tolerances go to FAA Headquarters for review.

The TAF forecasts passenger enplanements, operations, and based aircraft. The TAF does not forecast operations by aircraft type, peak activity levels, critical aircraft, or air cargo. The TAF used for this forecast was published in January 2017. **Table 2-21** summarizes the TAF for the Airport.

Table 2-21: FAA TAF						
Fiscal Year	2016	2021	2026	2031	2036	CAGR
Enplanements	298,322	394,570	434,335	476,868	523,125	2.8%
Operations	40,162	41,531	43,004	44,644	46,398	0.7%
Air Carrier	5,127	10,139	11,691	12,835	14,080	5.2%
Air Taxi	6,340	3,699	3,333	3,539	3,758	-2.6%
Itinerant GA	10,985	10,807	10,932	11,057	11,182	0.1%
Itinerant Military	341	341	341	341	341	0.0%
Local GA	16,829	16,005	16,167	16,332	16,497	-0.1%
Local Military	540	540	540	540	540	0.0%
Based Aircraft	86	96	109	124	139	2.4%
Single Engine Piston	65	75	88	103	118	3.0%
Jet	3	3	3	3	3	0.0%
Multi Engine Piston	9	9	9	9	9	0.0%
Helicopter	9	9	9	9	9	0.0%
Other	0	0	0	0	0	N/A
Other. – Light sport aircraft, gliders, experimental aircraft, ultralights Source: 2017 TAF						



While the TAF is generally a reliable source of information, most recent data tends to lag a year behind airport records. FAA fiscal year 2016 data is marked with an asterisk, meaning that it has not been finalized yet. The 2016 TAF data does not match airport management records in certain areas, shown in **Table 2-22**. Given that Airport Management has the best available data, this information is used to model future scenarios and not the TAF. TAF discrepancies for the main categories (Enplanements, Operations, and Based Aircraft) are within the 10 percent FAA tolerances.

Table 2-22: 2016 Airport Management Records and TAF Differences				
Category	Airport Records	TAF	Difference	% Difference
Enplanements	304,588	298,322	24,390	2.1%
Operations	44,015	40,162	3,853	9.6%
Air Carrier	7,302	5,127	2,175	42.4%
Air Taxi	6,810	6,340	470	7.4%
Itinerant GA	11,426	10,985	440	4.0%
Local GA	17,596	16,829	767	4.6%
Based Aircraft	80	86	-6	-7.0%
SEP	64	65	-1	-1.5%
MEP	4	9	-5	-55.6%
Jet	6	3	3	100.0%
Helicopter	6	9	-3	-33.3%
Military operations and "other" based aircraft match TAF records. Sources: Airport records, TAF issued January 2017.				

The TAF has exhibited a consistent underreporting of passenger enplanements when compared to Airport records.

Airport records for passengers and commercial operations are presented and compared to the TAF in **Appendix B, Attachment 4**.



2.4 SCHEDULED SERVICE FORECASTS

This section discusses the passenger enplanement forecasts, air cargo volume, and commercial operations. Each sub-section explains the methods used during analysis. Risk and uncertainty are addressed, and comparisons made with the FAA TAF.

2.4.1 PASSENGER ENPLANEMENTS

Use of passenger enplanement forecasts determines the facility requirements for the passenger terminal building and airport parking and street access. The TAF classifies passenger enplanements as Air Carrier and Air Taxi, depending on the role of the airline transporting them. This distinction is more important for keeping records rather than planning facilities; therefore, passenger enplanements are presented in aggregate. The types of aircraft used to transport the passengers are presented in **Section 7**.

METHODS

The passenger demand forecasts employed trend analysis, single-variable regression, and multi-variable regression methods to project passenger enplanements. Regression models used variables that displayed a high level of correlation (greater than 0.8) with passenger enplanements over the past ten years: MSA Population U.S. Gross Domestic Product (GDP), and MSA GRP.

The three variables were checked against passenger enplanements from 2006 to 2016 using regression analysis. The validity of each equation was measured using the R-squared technique, which describes how well the regression equation explains variability in the model. The closer the R-square value is to 1.00, the more confidence can be placed in the equation explaining the historical variability, and it not occurring by chance. **Table 2-23** shows the results of the correlation and regression analyses.

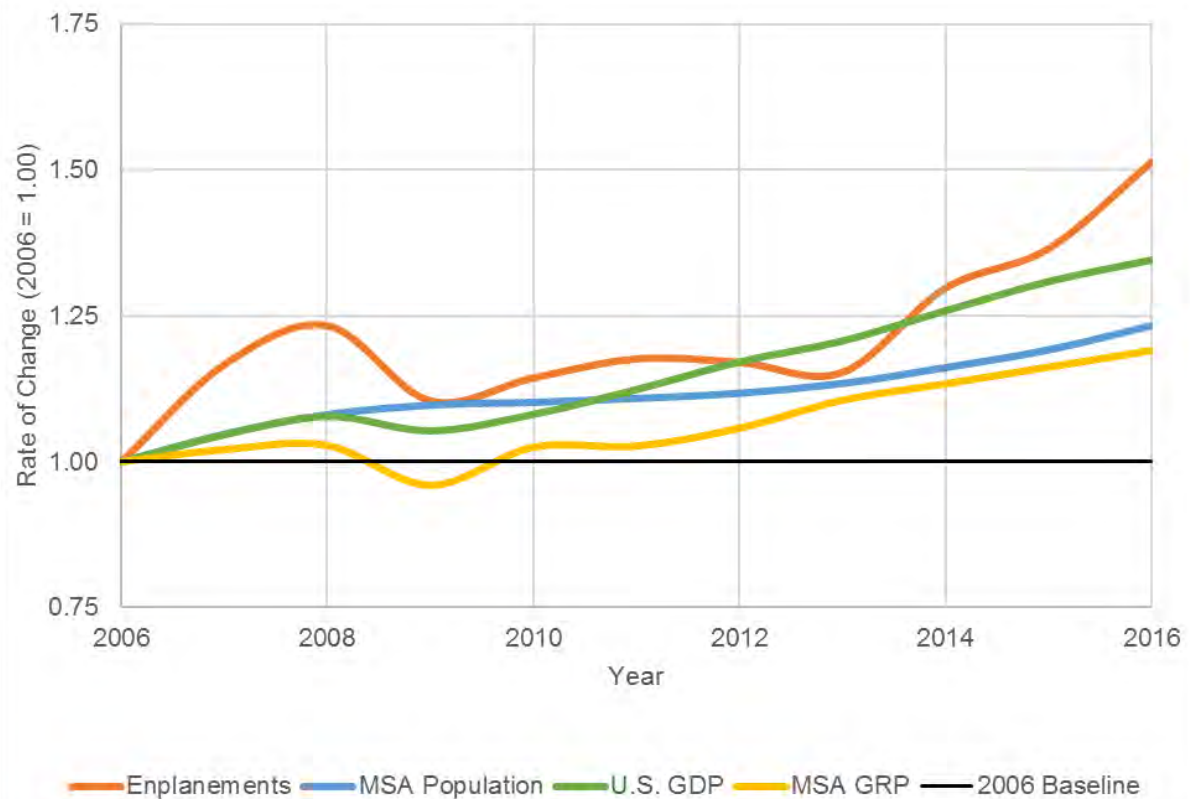
Table 2-23: Enplanement Correlation and Regression Analyses		
Variable	Correlation Coefficient	Regression R-Square
MSA Population ¹	0.87	0.75
U.S. Gross Domestic Product ²	0.84	0.71
MSA Gross Regional Product ³	0.83	0.69
Sources: 1) Portland State University, 2) U.S. Bureau of Economic Analysis, 3) Woods & Poole		

The three variables were also arranged into multi-variable equations and run through a regression analysis. This time, the adjusted R-square statistic was used to assess the models as the adjusted R-square considers how many variables are being used. Unadjusted R-squared does not consider multiple variables and can produce misleading results. The results of the multi-variable regression analyses are shown in **Table 2-24**.



Table 2-24: Multi-Variable Regression Analyses

Variables	Adjusted R-Square
Population ¹ , GRP ³ , GDP ²	0.78
Population ¹ , GRP ³	0.72
Population ¹ , GDP ²	0.69
GRP ³ , GDP ²	0.65



GRP: MSA Gross Regional Product, GDP: U.S. Gross Domestic Product
 Sources: 1) Portland State University, 2) U.S. Bureau of Economic Analysis, 3) Woods & Poole

Based on the results of the regression analyses, the equation accounting for population, GRP, and GDP was selected to prepare passenger enplanement forecasts. The equation is displayed below.

Passenger Enplanement Regression Equation: $y = m_1(x_1) + m_2(x_2) + m_3(x_3) + b$

y = Passenger Enplanements, b = Intercept from Regression Analysis

$(4.52 \times \text{MSA Population}) + (94.49 \times \text{MSA Gross Regional Product}) + (-46.58 \times \text{U.S. Gross Domestic Product}) - 730,835.51$



Forecasts exist for the three variables considered throughout the forecast period. The MSA Population forecast comes from Portland State University, and is used by the City of Redmond for their long-range planning. The MSA Gross Regional Product Forecast comes from Woods & Poole, and the U.S. Gross Domestic Product Forecast comes from the Organization for Economic Cooperation and Development (OECD). The forecasts for each variable are plugged into the regression equation to produce a passenger enplanement forecast for the next 20 years.

The regression-based method of forecasting incorporates a statistical analysis to give confidence that the variables chosen for forecasting have exhibited a degree of correlation with passenger enplanements in the past. The risk to this method is that future forecasts are ultimately based on one set of external projections. Forecasting, particularly over 20 years, will undoubtedly miss future events that will impact aviation activity at RDM. For this reason, the passenger enplanement regression equation goes through one more level of processing to account for future uncertainty.

ADDRESSING RISK AND UNCERTAINTY

The forecasts developed in **Section 5.1.2** rely on a fixed set of future variables. There is only one projected value for U.S. GDP in 2021 that is considered. The risk to this approach is that if the GDP is different than the forecast in the coming years, then the regression equation developed based on the old forecast is likely no longer useful.

One way to mitigate for this uncertainty about the future value of variables that the passenger enplanement forecast is based on is to incorporate a range of uncertainty into the forecast for each variable. This is accomplished by reviewing the historical volatility of the three variables, and then assuming the future values may deviate from the forecast accordingly.

As an example, the U.S. GDP in 2021 will be \$21 trillion dollars based on the OECD forecasts. Historical volatility shows that U.S. GDP could sway by plus or minus \$3 trillion dollars, which means that the actual value for 2021 could be as low as \$18 trillion (in an economic recession), or as high as \$24 trillion (in a period of strong growth). Since the value of U.S. GDP is one of the drivers of the enplanement forecasts, it makes sense to account for this volatility in the future and not assume that the U.S. GDP is guaranteed to grow as it has exhibited contraction in the past. The method chosen to account for this volatility is known as Monte Carlo simulation.

Monte Carlo considers the range of future values for each of the three variables in each forecast year using the process described above for GDP. Historical volatility is applied to the forecast value, which produces a range that the forecast value is likely to be within. Once this range has been established for each variable, thousands of trials are run for each of the forecast years. The three variables are permitted to independently and randomly fluctuate within the defined range for each trial. In some trials the variables all grow, in some they all decline, and in some there's a mix between growth and decline.



Monte Carlo partially mitigates subjectivity when it comes to setting up forecast scenarios. The range that the variables can fluctuate within must be defined, but after this range is established, the model will randomly pick the value of the variables. The Monte Carlo simulation can be run as many times as desired to reduce the impact of outliers (e.g. scenarios where all variables are at their maximums or minimums), and the results are interpreted using percentiles. Percentiles indicate what probability a value has of being higher or lower than the given value. For example, if the 50th percentile value for passenger enplanements in 2021 is 400,000, then this means that, of the thousands of trials run for 2021, 50 percent of the results were below 400,000, and 50 percent were above. Another way of expressing this is that there's a 50 percent probability that 2021 passenger enplanements will be 400,000 or below.

PASSENGER AND TAF COMPARISON

The passenger demand forecasts use the Monte Carlo simulation and the multi-variable regression model based on MSA population, MSA GRP, and U.S. GDP. The three variables are given a range based on historical volatility over the past ten years, which means they consider periods of economic recession and economic growth. The inclusion of local and national variables means that the model includes demand drivers, such as the population and economy driving the need for travel at RDM, and supply drivers, such as the national economy causing people to travel across the country and world.

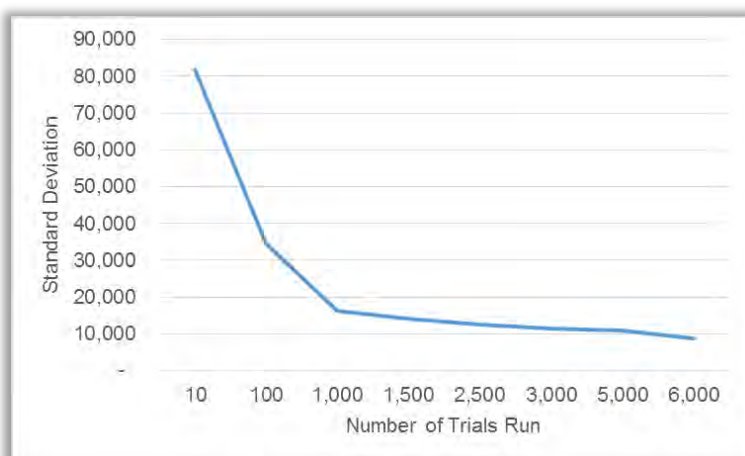
The Monte Carlo simulation was run 5,000 times to reduce the effect of outliers. Multiple trial runs produce a smoothing effect as the results coalesce around the mean. The law of diminishing returns applies in this situation, and the results differ less and less beyond 1,000 trials. An example of this effect is shown in **Table 2-25**.

The average range of the Monte Carlo trial runs remains near 600,000 after 1,000 trials, and incremental growth slows as more trials are performed. Using this example, it is expected that fewer than 5,000 trials could be run and similar results would be produced; however, running 5,000 trials does not skew the results.

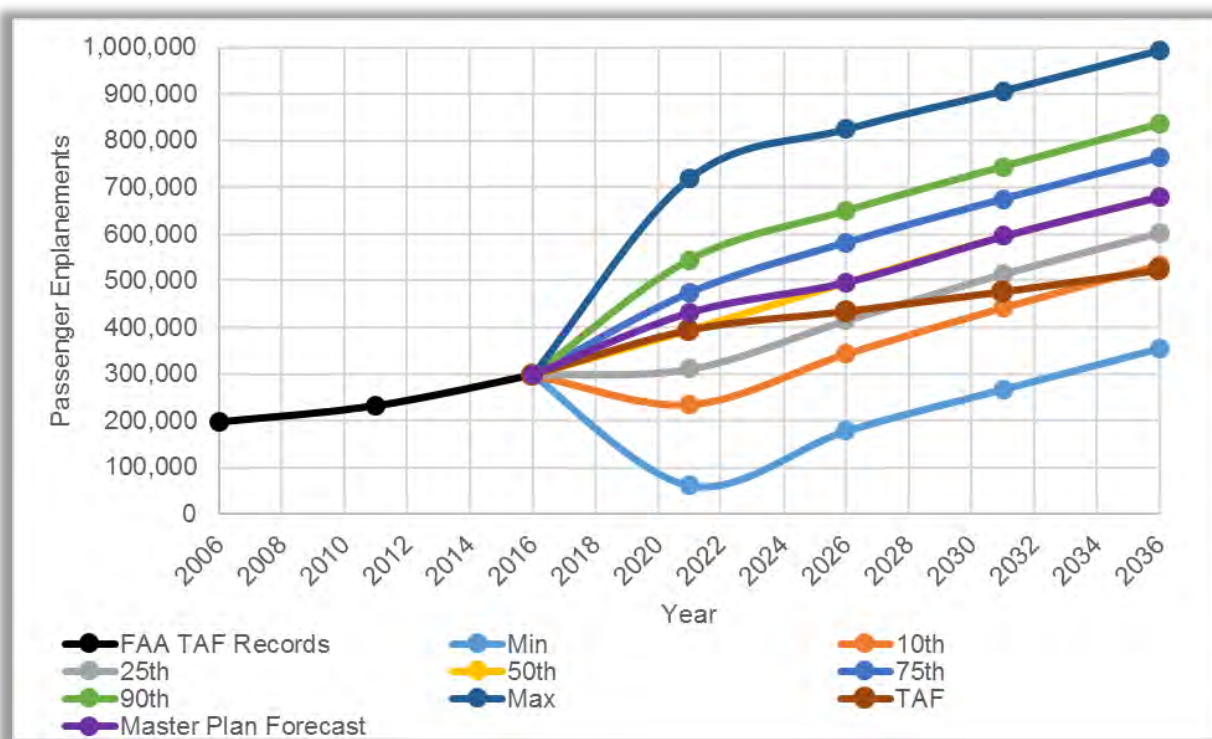


Table 2-25: Effect of Multiple Trials on Monte Carlo Range

Trials	Average Range	Standard Deviation
10	322,000	81,898
100	495,000	34,558
1,000	576,000	16,163
1,500	582,000	14,248
2,500	590,000	12,636
3,000	593,000	11,366
5,000	600,000	11,012
6,000	602,000	8,718



The 5,000 trials are presented using percentiles, minimums, and maximums. A percentile can be any number greater than zero and less than 100; however, presentation becomes less useful if too many percentiles are used. The RDM Enplanement Forecasts are presented for the minimum, 10th, 25th, 50th, 75th, 90th, and maximum percentiles. The results are plotted along with the 2017 TAF for purposes of comparison, and shown in **Figure 2-5**.

Figure 2-5: Passenger Enplanement Forecasts

As stated in **Section 5.1.2**, a key element in addressing risk and uncertainty in demand forecasting is acknowledging that the variable being forecast may decline. Traditional forecasting methods, such as trend analysis and time-series extrapolation, will not decline unless they are building on a model that has been in historical decline. Airport master plan forecasts tend to be more optimistic and project growth. The Monte Carlo analysis provides planners with a “decline” scenario, shown by the minimum, 10th, and 25th percentile results. There are also high-growth scenarios, represented by the maximum, 75th, and 90th percentile results.

The TAF for RDM has a CAGR of 2.8 percent and projects 523,125 enplanements by 2036. This growth rate exceeds the TAF for Oregon, which has a 2.3 percent CAGR, and the 2017 FAA Aerospace Forecast, which has a 1.7 percent CAGR. The higher than average growth rate for RDM reflects strong growth that has occurred over the past ten years, and shows that FAA expects this growth to continue. The passenger enplanement forecast growth rates range between 0.9 percent for the minimum forecast to 6.2 percent for the maximum forecast.

While Monte Carlo helps remove some elements of subjectivity from preparation of forecast scenarios, a decision must still be made on which percentile outputs to use for planning purposes. This decision is made by assembling relevant data that support picking one percentile over the others. TAF and FAA Aerospace Forecast growth rates are in line with the 2.9 percent CAGR of the 25th percentile forecast, while historical growth rates at RDM are between the 50th and 75th percentile forecasts.

Airlines have indicated that they will continue to add seats to the RDM market. Calendar year 2017 schedules from Alaska, American, Delta, and United show that larger aircraft will serve RDM, such as United’s transition from the 50-seat CRJ-200 to the 76-seat Embraer 175. Flight frequencies and destinations are planned to increase in 2017, such as Delta’s new Seattle service on the 50-seat CRJ-200 and 65-seat CRJ-700.

The True Market assessment, described in **Section 3.7**, shows that RDM retains 75 percent of its true market due to the distance between it and other airports in Oregon. Leakage is primarily to PDX, at 24 percent, and primarily on routes where RDM has limited or non-existent direct air service. These include Los Angeles (28 percent leakage) where RDM has one daily flight, Las Vegas (26 percent leakage) where RDM has no daily flights, and San Diego (27 percent) where RDM has no daily flights. As air service develops and airlines add frequencies and new service, it is expected that market retention will improve. Socioeconomic indicators for the MSA suggest that population and industry (measured by GRP) are expected to grow; therefore, the demand for air travel will continue to increase as these variables have been highly correlated in the past. The Airport actively markets to the airlines to attract additional air service, and has a track record of success with this marketing (new service on American Airlines to LAX and PHX and United adding larger aircraft and more frequencies to DEN and SFO).



Based on available information, historical performance, and known changes for the airlines operating at RDM, the 50th percentile forecast is preferred for long-range (5-20 years) passenger enplanement planning purposes. Due to recent passenger growth at the Airport, the short-range (1-5 year) forecast is expected to be between the 50th and 75th percentiles. The 4.2 percent CAGR is lower than the Airport has historically seen over the past ten years, which hints towards market maturation, but is higher than the national Aerospace Forecast and TAF for the state, which are driven by mature markets. The preferred enplanement forecast is compared to the 2017 TAF in **Table 2-26**.

Table 2-26: Passenger Enplanement Forecasts				
Year	TAF	Forecast	Difference	
2016	298,322	298,322	0	0.0%
2021	394,570	431,978	37,408	9.5%
2026	434,335	496,750	62,415	14.4%
2031	476,868	595,800	118,932	24.9%
2036	523,125	680,750	157,625	30.1%
CAGR (16-36)	2.5%	3.7%		
CAGR = Compound Average Growth Rate 1) 2016 value for 2017 TAF updated to reflect airport records.				

The passenger enplanement forecasts are reasonable and justified because they are based on variables (MSA population, MSA GRP, and U.S. GDP) that have exhibited a high degree of historical correlation with passenger enplanements. The population forecasts are the same as those used in local planning, meaning that stakeholders making municipal investment decisions at the cities in Deschutes County find them to be reasonable. While airlines are generally reluctant to share much of their long-range plans, what is known about future routes and fleet decisions support the growth in these forecasts. The use of Monte Carlo simulation in the forecasts allows for a sensitivity analysis of the forecasts should the MSA grow more quickly or less quickly than expected. The preferred passenger enplanement forecast is used to derive the scheduled commercial operations in **Section 5.3** and the peak enplanement numbers in **Section 7**.

2.4.2 AIR CARGO

Air cargo volume has declined at a CAGR five percent since 2006, which is a steeper decline than the national CAGR of -0.5 percent over the same period. The FAA Aerospace Forecast suggests that the decline in air cargo volume can be attributed to changing security requirements, use of truck carriers, and the advent of digital substitutes to documents and media that used to be shipped. Air cargo will remain critical for certain items and particularly important for communities like those in the MSA that are separated from other urban areas by great distances.



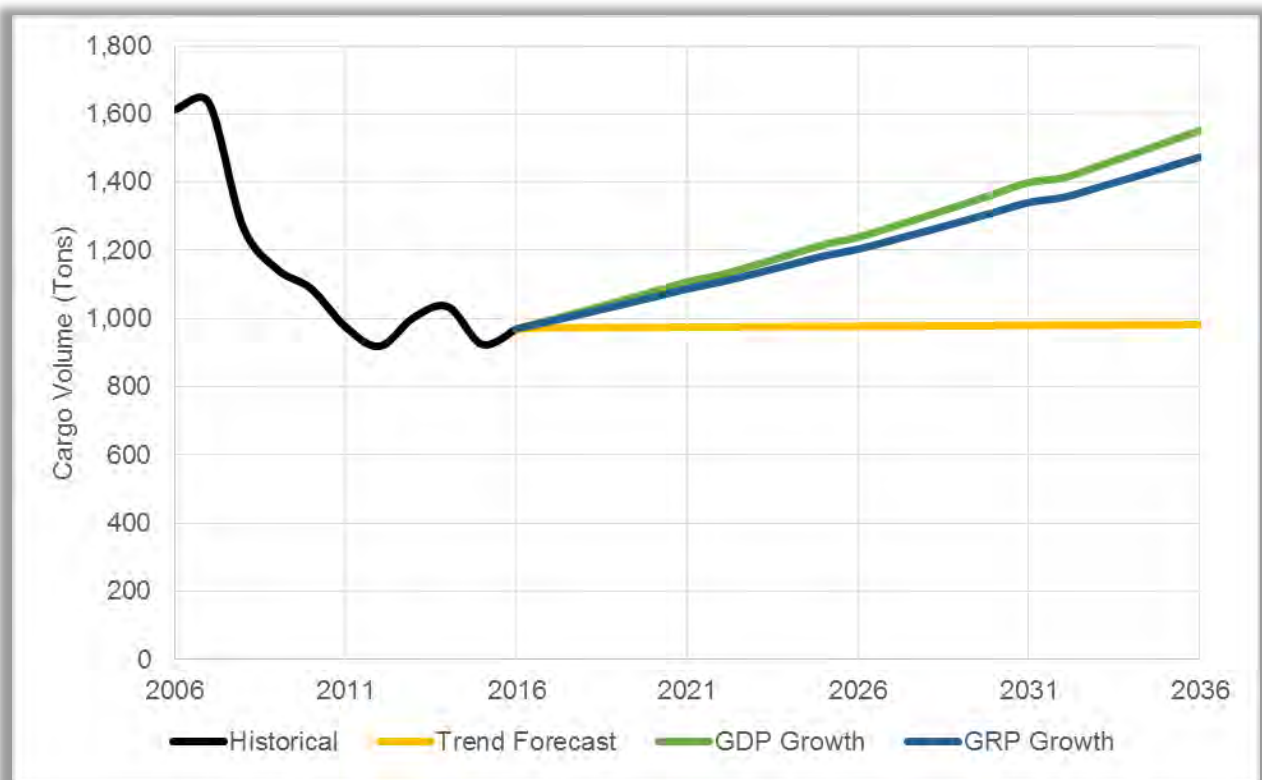
METHODS, FORECAST, AND PREFERRED METHOD

Air cargo at RDM did not exhibit strong historical correlation with any of the variables considered. In the absence of correlated data, the analysis considers variables typically used to forecast cargo volume. The FAA Aerospace Forecast is based on a model that links air cargo to U.S. GDP; therefore, GDP growth is included. MSA GRP is considered as it better reflects the local economy.

Regression analysis for both variables produces forecasts that continue the downward trend experienced since 2006. The FAA Aerospace Forecast suggests that “the shift from air to ground transportation has occurred;” therefore, the decline due to substitution of other methods has likely bottomed out. The decline in cargo volume at RDM was more pronounced from 2006 to 2011 at a CAGR of -9.5 percent than from 2011 to 2016, when the CAGR was -0.1 percent. It is expected that decline in air cargo at RDM has also stabilized.

The three methods considered for air cargo forecast are a trend analysis using 2011 to 2016 data, a time-series analysis using U.S. GDP growth, and a time-series analysis using MSA GRP growth. These methods are presented in **Exhibit 2-6**.

Figure 2-6: Air Cargo Forecasts



The trend methodology has a CAGR of 0.3 percent and projects that air cargo volumes will remain flat, growing from 970 tons to 1,000 tons annually. The GRP growth methodology has a CAGR of 2.1 percent and projects that air cargo volumes will grow from 970 tons to 1,474 tons annually. The GDP growth methodology has a CAGR of 2.4 percent and projects that air cargo volumes will grow from 970 tons to 1,552 tons annually.

As stated in **Section 3.2**, the economy of the MSA is changing and manufacturing is not as prevalent as it once was; however, there are several specialized manufacturers in town, including RDD, Stratos Aircraft, and PCC Structurals. It is expected that these businesses, and those like them, will continue to rely on air cargo for part of their supply chain in addition to rail and truck transport. The growing professional services industry will further support air cargo; however, many items traditionally shipped by lawyers, accountants, and engineers can now be transmitted digitally. It is expected that the volume of air cargo at RDM will remain flat unless the area attracts new manufacturers that are more reliant on just-in-time supply chains, and industries that specialize in logistics and storage outside of those that use truck and rail.

The trend methodology is the preferred air cargo forecast. It is expected that cargo volumes have bottomed out and will remain stable at around 1,000 tons per year into the future. Air cargo operations are expected to remain consistent throughout the forecast period, and will primarily be performed by single- and twin-engine piston and turbo-prop aircraft.

2.4.3 COMMERCIAL OPERATIONS

Commercial operations are those performed by scheduled and charter passenger airlines and cargo aircraft. Operations by business jets that use the FBO and private hangars are not counted towards the commercial operations total, and are instead part of general aviation discussed in **Section 6**.

METHODS

Scheduled passenger and air cargo operations made up 97 percent of the 13,248 commercial operations in 2016, and the remaining three percent were performed by on-demand charter airlines and tankers working for the U.S. Forest Service. Scheduled operations are based on passenger enplanement forecasts in **Section 5.1** and cargo forecasts in **Section 5.2**. Tanker and on-demand operations are expected to remain at their existing levels and growth is expected to be flat into the future. The USFS Redmond Air Center manager indicated that the level of operations will depend on the severity of the fire season, and airport landing records show that there were an average of 550 operations per year from 2006 to 2016.



Scheduled operations are organized based on TAF classifications. The two categories are air carrier, where the aircraft has 60 or more seats, and air taxi/commuter, where the aircraft has less than 60 seats. Forecasts are based on the following assumptions:

- ✓ Scheduled airlines will add service to meet the level of demand expected in the passenger enplanement forecasts.
- ✓ The 50-seat regional jets will be retired by 2026, in line with the FAA Aerospace Forecast projection that “Carriers remove 50 seat regional jets [...] while adding 70-90 seat jets, especially the E-2 family after 2020.”
- ✓ As smaller jets are replaced with larger aircraft, average seats per departure will grow. Airlines will adjust flight frequencies and routes to keep load factors at levels similar to what has been experienced in the last five years, more than 80 percent.

The scheduled commercial operations forecasts are presented in **Section 5.3.2**.

SUMMARY AND TAF COMPARISON

Commercial operations are presented in three tables. **Table 2-27** presents scheduled passenger operations only, and does not include air cargo, non-scheduled passenger, and air tanker operations.

Table 2-28 presents total commercial operations, and the **Table 2-29** compares commercial operations to the TAF.

Table 2-27: Scheduled Passenger Operations

Year	Enplanements	Air Carrier			Air Taxi / Commuter			Total
		Average			Average			Scheduled
		Operations	Load Factor	Seats	Operations	Load Factor	Seats	Operations
2006	197,223	360	58%	82	14,368	70%	38	14,728
2011	231,978	4,464	56%	104	6,248	72%	45	10,732
2016	298,322	6,946	84%	74	4,796	90%	50	11,742
2021	391,450	10,000	85%	80	2,000	90%	50	12,000
2026	484,300	11,600	88%	90	1,000	91%	50	12,600
2031	575,350	12,400	86%	108	0	N/A	N/A	12,400
2036	661,600	12,600	84%	125	0	N/A	N/A	12,600
CAGR ¹	4.2%	3.3%	N/A	N/A	-100%	N/A	N/A	0.7%

NOTE – Numbers presented in this table will not match TAF as they contain scheduled passenger operations only, and not charter or air cargo.

1) CAGR from 2016 to 2036 CAGR = Compound Average Growth Rate

Source: USDOT T-100 Database and Airport Records



Table 2-28: Commercial Operations Forecasts

Year	Air Carrier				Air Taxi / Commuter			Total
	Scheduled Passenger	Non-Scheduled Passenger	Tanker	Sub-Total	Scheduled Passenger	Air Cargo	Sub-Total	
2006	209	52	626	887	14,455	3,313	17,768	18,655
2011	4,542	8	514	5,064	6,283	3,333	9,616	14,680
2016	6,254	21	422	6,697	4,522	1,929	6,451	13,148
2021	10,000	40	500	10,540	2,000	2,100	4,100	14,640
2026	11,600	40	500	12,140	1,000	2,100	3,100	15,240
2031	12,400	40	500	12,940	0	2,100	2,100	15,040
2036	12,600	40	500	13,140	0	2,100	2,100	15,240
CAGR ¹	3.6%	3.3%	0.9%	3.4%	-100%	0.4%	-5.5%	0.7%

1) CAGR from 2016 to 2036

CAGR = Compound Average Growth Rate

Source: Historical data comes from airport records, included in **Appendix B** as **Attachment 4**.**Table 2-29: Commercial Operations Forecasts – TAF Comparison**

Year	2017 TAF	Forecast	Difference	
2021	13,838	14,640	802	5.8%
2026	15,024	15,240	216	1.4%
2031	16,374	15,040	-1,334	-8.1%
2036	17,838	15,240	-2,598	-14.6%
CAGR ¹	2.2%	0.4%	N/A	N/A

CAGR = Compound Average Growth Rate 1) CAGR for 2016 to 2036

Source: TAF issued January 2017

As with passenger enplanements, the TAF underreports commercial operations. One reason for this is that the ATCT is closed for the earliest and latest operations; therefore, they are not added to FAA OPSNET. Airport records and T-100 data are a more accurate count of operations than the TAF.



2.5 GENERAL AVIATION FORECASTS

General aviation forecasts consider itinerant and local operations, and based aircraft. General aviation covers the aspects of terrestrial flight that are not commercial or military, such as recreational flying, business aviation, flight instruction, and emergency services. General aviation forecasts address itinerant and local aircraft operations, and the number of based aircraft at RDM.

2.5.1 ITINERANT GENERAL AVIATION OPERATION

Itinerant operations are those that begin and end flights at different airports. Itinerant operations are conducted by a wide array of aircraft, from single engine pistons to large private jets.

METHODS

Trends in itinerant general aviation are described in **Section 4.2.2**. Itinerant general aviation operations have exhibited a strong historical correlation with national itinerant general aviation operations (0.97), national local general aviation operations (0.94), and the national single engine fleet (0.86). Strong positive correlation is likely the result of the decline that these indicators have experienced over the past ten years.

RDM and national itinerant general aviation operations have been in decline over the past ten years; however, much of the decline occurred immediately following the 2008-2009 recession. The average annual decline for RDM was -6.4 percent from 2006 to 2016 and -3.4 percent from 2011 to 2016. That national decline slowed from -2.9 percent from 2006 to 2016 to -0.9 percent from 2011 to 2016. The 2017 FAA Aerospace Forecast projects that national itinerant general aviation operations will grow at an average annual rate of 0.3 percent over the next 20 years.

Statistical analysis is only part of the considerations taken into account when establishing a forecast. Local demand drivers, such as those listed below, influence itinerant general aviation traffic at RDM.

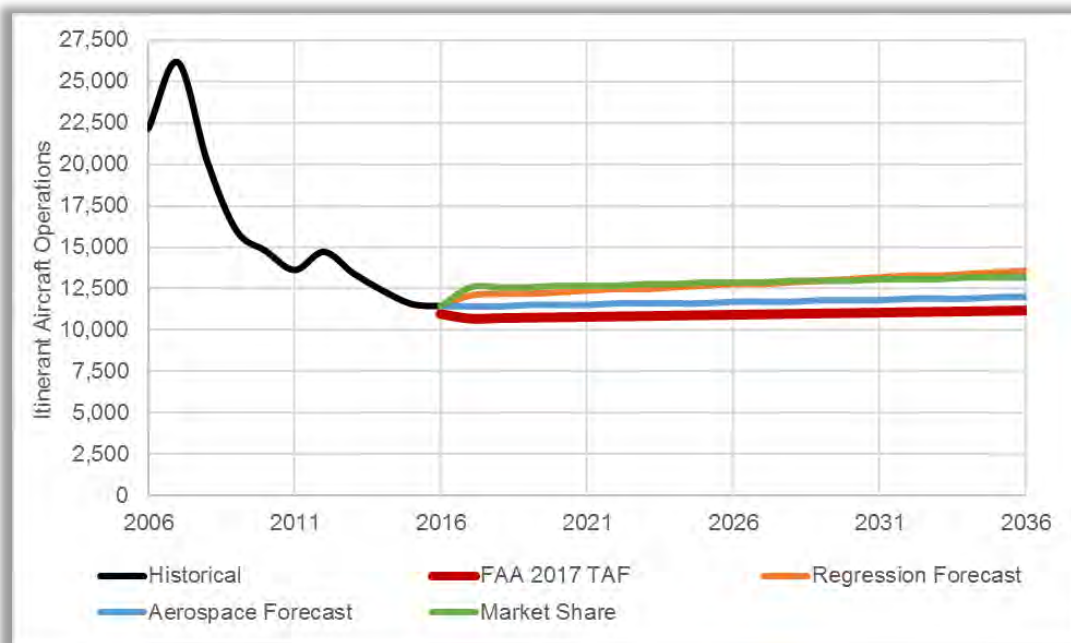
- ✓ General aviation businesses, such as those described in **Section 4.2.1**, perform itinerant operations as they move employees and products on their aircraft.
- ✓ Local aircraft manufacturers Stratos and Evolution Aircraft drive itinerant operations through testing and delivery of their aircraft.
- ✓ RDM is a destination market for outdoor recreation, such as golf, winter sports, and hiking. FBO staff indicate that some travelers fly general aviation when visiting the area. The FBO does not keep records on their passengers purposes for visiting the community.
- ✓ The Central Oregon Visitors Association reports that local ski resorts have invested \$800 million in development over past 10 years to compete with popular areas in other western states. FBO staff indicate that some winter visitors use GA to access the community; however, they do not keep records of who or how many.



Forecasts for itinerant general aviation operations use the following methods: applying the national growth rate from the 2017 Aerospace Forecast and a regression analysis using the top three correlated variables (national itinerant operations, national local operations, and national single engine fleet), using a market share analysis, and applying the FAA Aerospace Forecast growth rate. These forecasts are presented along side the 2017 TAF for purposes of comparison in **Table 2-30**.

Table 2-30: Itinerant General Aviation Operations Forecast

Year	Regression	Market Share	Aerospace	TAF
2016	11,426	11,426	11,426	10,985
2021	12,400	12,700	11,600	10,807
2026	12,800	12,900	11,700	10,932
2031	13,200	13,100	11,900	11,057
2036	13,600	13,200	12,100	11,182
CAGR	0.9%	0.7%	0.3%	0.1%



CAGR = Compound Annual Growth Rate. Source for Historical Data: FAA Terminal Area Forecast



PREFERRED AND TAF COMPARISON

There are two reasons that support itinerant operations retuning to growth at RDM: restructuring of the general aviation segments, and regional growth. Itinerant general aviation operations have experienced a period of restructuring following the 2008-2009 recession. As discussed in **Section 4.2.2**, the largest market within general aviation, single engine piston, is in a state of decline. Smaller markets, including turbine, experimental, and light sport are growing. RDM has the longest runway length in the region, which is necessary to accommodate larger jet aircraft, particularly on hot days. The FBO provides the services and facilities needed by these growing markets.

Despite the decline in itinerant operations at RDM over the past ten years, itinerant operations are growing in the Central Oregon region. Data from the TAF for the other airports in the region (Bend (BDN), Sunriver (S21), Madras (S33), and Prineville (S39)), show that the region experienced a six percent annual average growth in itinerant general aviation operations over the past ten years. Itinerant operations declined at RDM, S21, and S39 were offset by growth at BDN and S33. Total itinerant operations within the region more than doubled over the last ten years, as shown in **Table 2-31**.

Table 2-31: Regional Itinerant Operations

Fiscal Year	Bend (BDN)	Redmond (RDM)	Sunriver (S21)	Madras (S33)	Prineville (S39)	Total
2006	27,026	22,170	10,089	2,436	8,450	43,145
2011	49,041	13,610	3,000	4,669	7,000	77,320
2016	71,447	10,985	3,022	4,138	7,142	96,734
2021	80,626	10,807	3,132	4,693	7,847	107,105
2026	90,918	10,932	3,247	5,325	8,555	118,977
2031	102,526	11,057	3,363	6,034	9,314	132,294
2036	115,615	11,182	3,481	6,839	10,133	147,250
CAGR 06-16	6.1%	-4.8%	-11.4%	6.7%	-1.9%	6.0%
CAGR 16-36	2.4%	-0.1%	0.7%	2.5%	1.8%	2.1%

NOTE: Sisters (6K5) is part of RDM's catchment area, but is not part of the TAF. Operations numbers for 6K5 are unknown. 2016 numbers for RDM are adjusted to compensate for the Airport closure in May.
Source: FAA TAF.

Airport location and tenants are key drivers behind the regional growth. U.S. Census records for the City of Bend, where BDN is located, show that the population has grown by six percent from 2010 to 2015. The City is closer to the ski resorts than RDM is, and has facilities capable of serving piston and jet itinerant aircraft in all but the worst weather. The other key factor is tenants – both BDN and S39 have flight schools and the other airports do not. Student pilots perform itinerant operations as part of their training, which is helping drive the overall operations numbers.



Forecasts shown BDN operations continuing to grow, and total airport operations (including local) could reach 230,000 in the next 20 years. BDN has one runway which means that it will be near capacity in 20 years, based on guidance in FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*. As BDN approaches capacity, delays will increase, and the mix of quicker business jets and turbo props with slower fixed wing and helicopter flight training traffic will compound the congestion and delays. This can make BDN a less desirable for some users, and with RDM is 16 miles away, some traffic may choose to avoid the congestion.

The forecast methods considered produce similar results. The range between the lowest and the highest forecast in 2036 is 1,900. Key factors that influence selecting the higher forecast as preferred are described below.

- ✓ The MSA continues to grow, and development pressure in the City of Bend is pushing development in Deschutes County to other communities, such as RDM. As stated in Section 3.6, general aviation users tend to use facilities near their home or business when possible.
- ✓ The City of Redmond has more vacant industrial land with readily available infrastructure than other communities in the region. It is expected that there will be an increase in general aviation traffic from developers and prospective clients inspecting sites, and future tenants as this land develops.
- ✓ Aircraft manufacturer Stratos completed the first flight of its very light jet in November 2016. As the flight testing continues, additional traffic is expected.
- ✓ The FBO is planning to add additional hangars to grow their business, and to be able to accommodate more aircraft. RDM is attractive during the winter because of the instrument landing system; however, more covered aircraft storage is needed. If the FBO can develop more covered storage online, then itinerant operations will grow.

The preferred itinerant operations forecast is the one variable regression forecast, which is based on RDM performing in line with national itinerant general aviation operations. These two variables have exhibited strong historical correlation, and local demand inducing factors, described above, are expected to drive future itinerant general aviation operations. As shown in **Table 2-32**, the preferred itinerant general aviation operations forecast is within seven percent of the TAF in the five- and ten-year reporting periods.

Table 2-32: Itinerant General Aviation Operations Forecasts – TAF Comparison				
Year	TAF	Forecast	Difference	
2016	10,985	10,985	0	0.0%
2021	10,807	12,600	1,793	7.3%
2026	10,932	13,000	2,068	7.0%
2031	11,057	13,500	2,443	7.6%
2036	11,182	14,000	2,818	8.2%
CAGR	0.1%	1.2%	N/A	N/A
CAGR = Compound Average Growth Rate Source: TAF issued January 2017				



2.5.2 LOCAL OPERATIONS

Local operations are those that remain in an airport's traffic pattern. These operations are generally by smaller aircraft such as single engine pistons, light sport, and experimental. Local operations are commonly performed by student pilots, recreational pilots, and pilots maintaining proficiency. Pilots flying in the traffic pattern generally land multiple times per hour, which causes high local operations numbers compared to itinerant operations.

METHODS

Local general aviation operations saw their peak in 2007 when there was a flight school at RDM. Operations declined substantially in the years that followed due to the recession, airline hiring freezes, and the relocation of the flight school to BDN. Historical factors that have influenced local general aviation operations are described in **Section 4.2.3**.

Local general aviation forecasts employ market share analysis, growth rate analysis, and regression analysis methods. The market share analysis takes the percent of national local operations that have occurred at RDM over the past five years (0.16 percent), and forecasts that future local operations will maintain this ratio to national operations based on the 2017 FAA Aerospace Forecast projections. The growth rate analysis takes the variable that showed the highest degree of historical correlation (national local general aviation operations), and used the growth rates in the 2017 FAA Aerospace forecasts to project future activity. Despite the similar independent variables in the market share and growth rate methods, the outcomes are different.

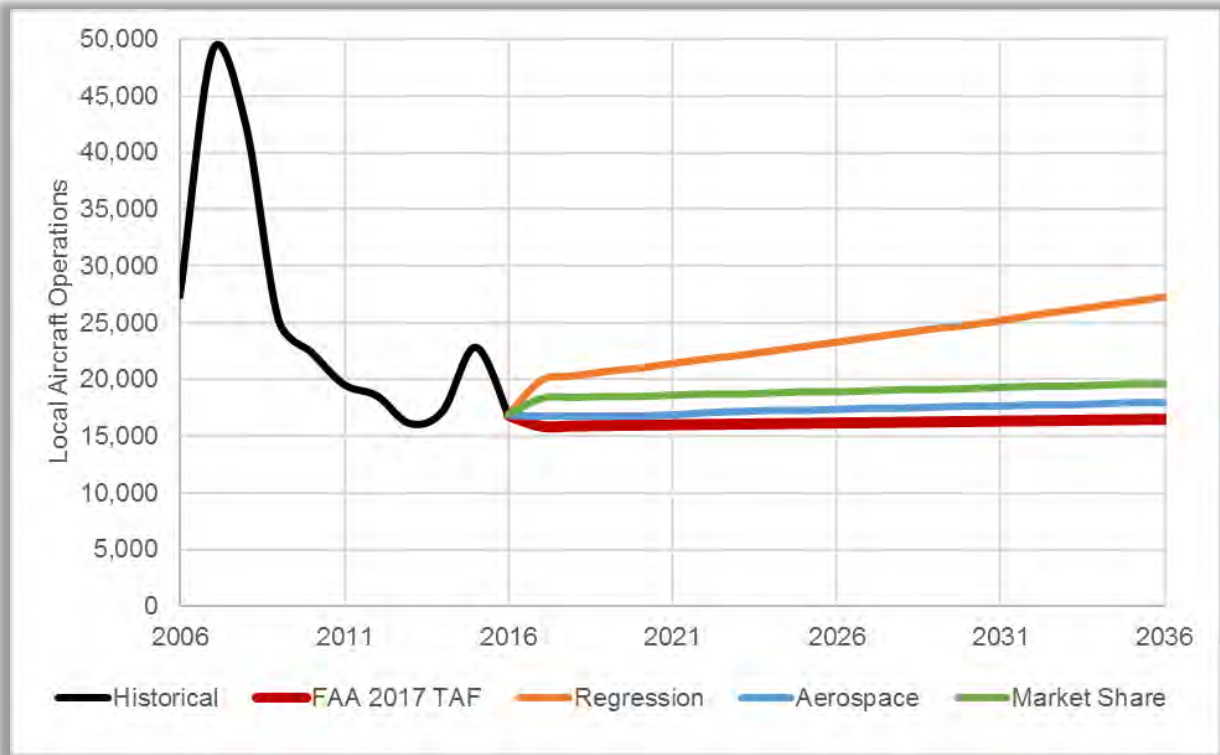
The regression analysis began with a correlation assessment, which found that local general aviation operations exhibited strong correlation with national local general aviation operations (0.87), national itinerant general aviation operations (0.83), and the national single-engine fleet (0.79). Other indicators did not have a strong enough correlation to be considered for analysis.

Local general aviation operations forecasts are shown in **Table 2-33**.



Table 2-33: Local General Aviation Operations Forecast

Year	Regression	Market Share	Aerospace	TAF
2016	16,829	16,829	16,829	16,829
2021	21,400	18,600	17,600	16,005
2026	23,300	18,900	18,200	16,167
2031	25,200	19,300	18,500	16,332
2036	27,300	19,600	18,900	16,497
CAGR	2.4%	0.9%	0.3%	-0.1%



CAGR = Compound Annual Growth Rate. Source: FAA Terminal Area Forecast

PREFERRED AND TAF COMPARISON

The TAF is forecasting a slight decline in local operations with a CAGR of -0.1 percent over the next 20 years. Given the historically higher levels of local operations activity and the demand for flight training over the next 20 years, it is unlikely that local general aviation operations will remain flat at RDM. The presence of flight schools in Prineville and Bend attract student pilots to the region, and the instrument landing system and airport traffic control tower at RDM are parts of the student's curriculum that are not found at other area airports. As noted in **Section 6.2.1**, the TAF for BDN suggests that the airport's single runway will near capacity over the next 20 years, which will displace some operations to other area airports. Regional local operations and expected growth at two percent per year, and are shown in **Table 2-34**.



Table 2-34: Regional Local General Aviation Operations

Fiscal Year	Bend (BDN)	Redmond (RDM)	Sunriver (S21)	Madras (S33)	Prineville (S39)	Total
2006	40,000	27,376	6,799	7,754	2,112	84,041
2011	50,144	19,554	2,500	8,189	3,000	83,387
2016	72,040	16,829	2,518	6,144	3,062	100,593
2021	81,172	16,005	2,613	6,910	3,371	110,071
2026	91,396	16,167	2,712	7,777	3,681	121,733
2031	102,908	16,332	2,813	8,749	4,013	134,815
2036	115,868	16,497	2,916	9,846	4,371	149,498
CAGR 06-16	2.3%	-4.7%	-9.5%	0.5%	3.6%	-0.1%
CAGR 16-36	2.4%	-0.2%	0.7%	2.4%	1.8%	2.0%

NOTE: Sisters (6K5) is part of RDM's catchment area, but is not part of the TAF. Operations numbers for 6K5 are unknown.
Source: FAA TAF.

Regional local operations growth will be led by BDN and S33 at 2.4 percent per year, then S39 and S21. As stated in the FAA document *Forecast Process for the 2016 TAF*, GA operations are assessed based on past trends. The TAF for RDM is likely so low because of the -3.3 percent average annual drop in local operations that the Airport has seen over the past ten years. Given that the regional market is projecting a two percent average annual growth and BDN is nearing capacity, it is expected that RDM local general aviation operations will grow faster than TAF projections.

The preferred local operations forecast is the one based on the 2017 FAA Aerospace Forecast growth rate. This methodology projects that RDM will see growth in line with national demand. As flight training increases across the country, RDM will see local operations grow in kind. One point for consideration when projecting future local general aviation operations is the location of regional flight schools. Schools have expressed interest in moving to RDM; however, the Airport does not have space to accommodate them. Should the Airport attract a flight school by developing a site for aircraft storage and classrooms, then growth could occur in line with the regression forecast. As shown in **Table 2-35**, the preferred local general aviation operations forecast is within ten percent of the TAF at the five-year reporting period, and within fifteen percent of the TAF at the ten-year reporting period.

Table 2-35: Local General Aviation Operations Forecasts – TAF Comparison

Year	2017 TAF	Forecast	Difference	
2016	16,829	16,829	0	0.0%
2021	16,005	17,600	1,595	10.0%
2026	16,167	18,200	2,033	12.6%
2031	16,332	18,500	2,168	13.3%
2036	16,497	18,900	2,403	14.6%
CAGR	-0.1%	0.4%	N/A	N/A

CAGR = Compound Average Growth Rate
Source: TAF issued January 2017



2.5.3 BASED AIRCRAFT

Based aircraft are those that are stored at the Airport, either in hangars or tie-downs. Scheduled commercial aircraft that visit the Airport routinely and U.S. Forest Service aircraft that are temporarily stored at the Airport during fire season do not count as based. Based aircraft forecasts are primarily used to define aircraft parking and storage needs.

METHODS

Historical trends and the composition of the based aircraft fleet at RDM are discussed in **Section 4.2.4**. Three methods are used to project the size and composition of the based aircraft fleet. The first is a growth rate analysis based on the change by aircraft category (e.g. SEP, MEP, and Jet) from 2011 to 2016. The second is a market share forecast that compares the number of based aircraft at RDM, by category, with the national fleet from 2011 to 2016. The third uses the growth rates for each category of aircraft in the 2017 FAA Aerospace Forecast to project future growth.

PREFERRED AND TAF COMPARISON

Based aircraft forecasts are done at the aircraft category level of detail – SEP growth rates are applied to SEP based aircraft, and jet growth rates are applied to jet aircraft. The 2017 FAA Aerospace Forecast shows that piston aircraft, the most common type at RDM, is expected to decline at -0.8 percent per year into the future. Growth markets include turbine, which are expected to grow at 1.9 percent per year, and helicopters, which are expected to grow at 1.6 percent per year, and Other, which are expected to grow at 1.2 percent per year. Each of the three forecast methods considers the impending change in general aviation fleet composition, and future projections expect that turbine, helicopter, and other aircraft will grow while piston aircraft decline.

The Growth Rate forecast methodology projects 2.3 percent growth per year. In this methodology, MEP continue to decline, SEP remain stable, and other categories grow. The high growth markets of light sport and experimental aircraft, which were not based at RDM in 2016, are expected to arrive over the next 20 years as the types become more common and replace some of the retired SEP aircraft.

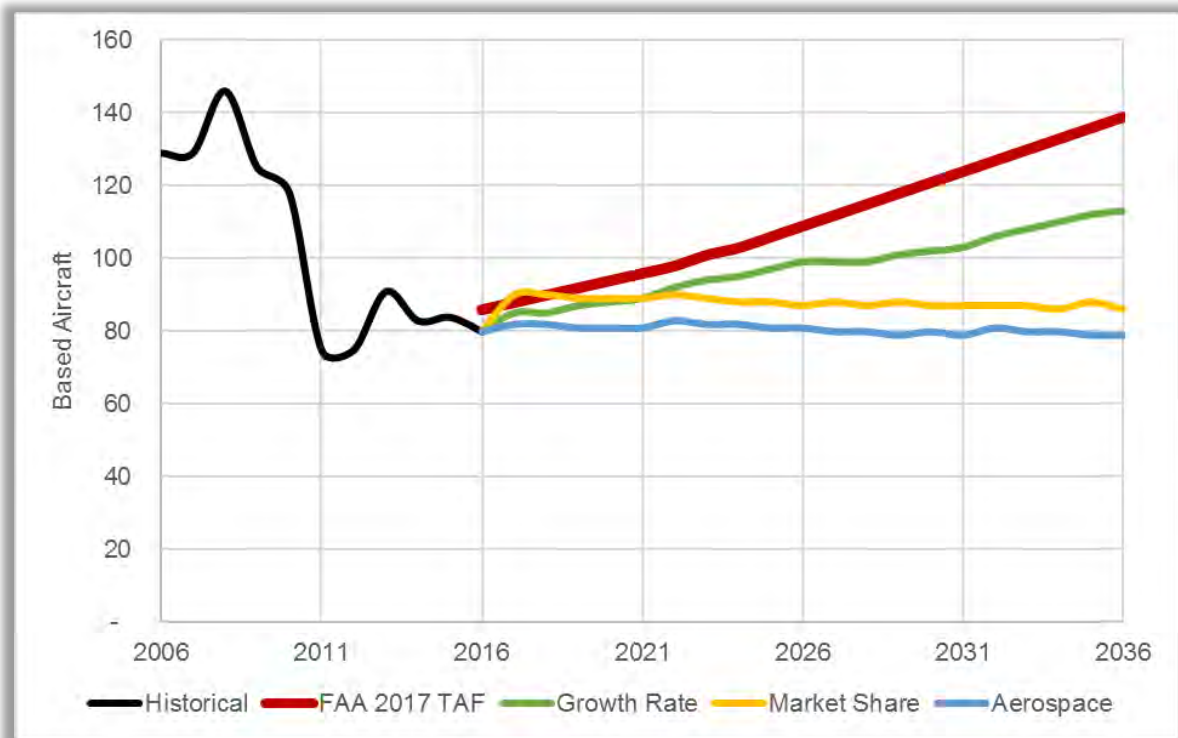
The market share forecast expects that SEP will decline, jet will remain level, and MEP, helicopter, and Other categories will grow. The MEP projection is likely thrown off because RDM had as many as 14 based MEP over the past five years. Since the market share forecast is based on an average market share over the last five years, it may be projecting higher MEP than appropriate.

The 2017 TAF for based aircraft at RDM is uncharacteristically high when compared to the TAF for local and itinerant general aviation operations. While the TAF expects that operations will largely remain flat, the number of aircraft is expected to grow by 2.4 percent per year. As stated in **Section 2**, the TAF based aircraft counts do not match airport management records. The TAF has 86 based aircraft at RDM in 2016 while airport management reports 80. Based aircraft forecasts are shown in **Table 2-36**.



Table 2-36: Based Aircraft Forecasts

Year	Growth Rate	Market Share	Aerospace	TAF
2016	80	80	80	86
2021	89	89	81	96
2026	99	87	81	109
2031	103	87	79	124
2036	113	86	79	139
CAGR	1.7%	0.4%	-0.1%	2.4%



CAGR = Compound Annual Growth Rate. Source: FAA Terminal Area Forecast

Based aircraft forecasts are ultimately determined by the amount of space available to park and store new planes. RDM hangars were full in 2016 and the Airport has a waiting list for new space. Although the Airport has held over 140 based aircraft in the past, many of these were parked outside and exposed to the elements. New aircraft have sensitive avionics and are more expensive than their older counterparts were. Aircraft owners prefer covered storage, particularly in climates like RDM where the summer sun and winter rain and snow can damage aircraft.



Airport management and tenants have expressed interest in expanding property for general aviation parking and storage. Location and scale of these improvements will be discussed in **Chapter 4**, Improvement Alternatives. Given that future aircraft storage will not always be constrained by a lack of hangars, that the Airport is in a growing community, and that there are growth markets within general aviation the local growth rate forecast is preferred. A breakdown of the local growth rate forecast by aircraft type is shown in **Table 2-37**.

Table 2-37: Preferred Based Aircraft Forecast						
Year	SEP	MEP	Jet	Helicopter	Other	Total
2016	64	4	6	6	-	80
2021	67	3	9	7	3	89
2026	69	3	14	9	4	99
2031	67	2	20	10	4	103
2036	64	2	30	12	5	113
CAGR	0.0%	-3.4%	8.4%	3.5%	N/A	1.7%
SEP: Single Engine Piston MEP: Multi Engine Piston						

The preferred forecast projects strong growth in the number of jets, helicopters, and Other aircraft. The jet category includes both jet and turbo-prop aircraft. The market assessment in **Section 3.6** shows that RDM is the only airport in the region capable of handling large jets on a routine basis. It has the longest runway and only precision approach with a light land in the region, meaning that it offers year-round reliability. **Table 2-38** shows that the preferred forecast is within ten percent of the TAF in five years, and 15 percent of the TAF within ten years.

Table 2-38: Based Aircraft Forecasts – TAF Comparison				
Year	2017 TAF	Forecast	Difference	
2016	86	80	-6	-7.0%
2021	96	89	-7	-7.3%
2026	109	99	-10	-9.2%
2031	124	103	-21	-16.9%
2036	139	113	-26	-18.7%
CAGR	2.4%	1.7%	N/A	N/A
CAGR = Compound Average Growth Rate Source: TAF issued January 2017				



2.6 PEAK FORECASTS AND CRITICAL AIRCRAFT

2.6.1 PEAK PERIOD FORECASTS

Peak forecasts estimate when certain airport facilities will be at their busiest. Peak forecasts are used to assess level of service of airfield and terminal facilities and to right-size improvement projects.

Improvement projects are not typically designed for the busiest hour of the busiest day of the year because such a design would lead to over-building. Instead, peak forecasts look at a typical busy period throughout the year. Forecasts use historical records to project future peaking; therefore, it is essential that peak forecasts be reevaluated if a change in user or aircraft type occurs. **Table 2-39** presents the peak forecasts.

Table 2-39: Peak Period Forecasts							
Category	Period	Factor	2016	2021	2026	2031	2036
Enplanements and Deplanements	Annual	100.0%	298,322	394,500	496,750	595,800	680,750
	Peak Month	10.1%	30,131	39,667	49,948	59,908	68,450
	Peak Day	3.6%	1,085	1,423	1,791	2,148	2,455
	Peak Hour – Enpl. ¹	17.9%	194	219	275	326	388
	Peak Hour – Depl. ¹	15.0%	163	175	252	345	472
Passengers	Annual	100.0%	596,644	789,000	993,500	1,191,600	1,361,500
	Peak Month	10.1%	60,261	79,334	99,897	119,816	136,899
	Peak Day	3.6%	2,169	2,845	3,583	4,297	4,910
	Peak Hour ¹	12.8%	278	393	525	703	940
Aircraft Operations	Annual	100%	40,162	45,540	47,240	47,840	48,940
	Peak Month	10.9%	4,378	4,982	5,168	5,234	5,354
	Peak Day	4.7%	206	233	242	245	251
	Peak Hour	10.0%	21	23	24	25	25

1) Peak hour forecasts adjusted to reflect average load factor, depicted in **Table 2-26**.
 Peak Enplanements / Deplanements / Passengers: Month: FAA T-100 Database. Day and Hour: Airline Schedules
 Peak Aircraft Operations: Peak Month and Day: FAA OPSNET, Peak Hour: ATCT Staff

2.6.2 CRITICAL AIRCRAFT

The critical aircraft is the most demanding type, or group of aircraft with similar characteristics, to operate more than 500 times per year at an airport. Operations by aircraft type come from Traffic Flow Management System Counts (TFMSC), and the data shows that scheduled commercial and freight aircraft are the critical aircraft at RDM. TFMS only captures aircraft that file flight plans; therefore, flight training aircraft that operate more frequently than those listed below are not represented. Because flight training aircraft are smaller and slower than the critical aircraft shown, their absence from the TFMS rankings has no bearing on the critical aircraft selection.



Critical aircraft are categorized by airport reference code (ARC), which is made up of the aircraft approach category (AAC) and airplane design group (ADG), as defined in **Chapter 1** and in the **Terminology** defined in **Section 2.0** of this chapter. The critical aircraft will be used to design and scale improvement projects and setbacks in **Chapter 3, Facility Requirements** and **Chapter 4, Improvement Alternatives**. **Table 2-40** identifies the critical aircraft.

Table 2-40: Existing Critical Aircraft				
Rank	Aircraft	Role	Operations	Reference Code
1	Bombardier Q400	Passenger Airline	5,688	B-III
2	Bombardier CRJ-200	Passenger Airline	4,556	C-II
3	Beech Airliner 99	Cargo Airline	914	TBD
4	Cessna 208 Caravan	Cargo Airline	858	B-II
5	Bombardier CRJ-700	Passenger Airline	506	C-II

The existing critical aircraft is the Bombardier Q400, operated by Alaska Airlines. Alaska has announced that it will supplement its fleet of Q400 aircraft with the Embraer 175 regional jet (E175) (reference code C-III), which operates in the same 76-seat configuration as the Q400. Alaska route planning staff and the airport station manager expect that the Q400 will remain in the fleet for at least the next decade and will continue to connect RDM to Alaska hubs in Seattle and Portland. The California market is expected to transition to the E175 in the next five years, and if RDM sees new Alaska routes to California, they may be served by the E175.

As shown in **Table 2-26** in **Section 5.3**, the average seat capacity for air carrier aircraft at RDM is expected to grow from 74 seats in 2016 to 125 seats in 2036. The average will grow if larger narrow-body aircraft, such as the Boeing 737 and Airbus A320 lines, begin service at RDM. These aircraft are typically C-III aircraft apart from the Boeing 737-900, which is a D-III. Exact composition of the future fleet is unknown. What is known is that new Boeing 737 Max and Airbus A320-NEO aircraft will eventually replace existing narrow-bodies. These new aircraft are designed to be more fuel efficient and technologically advanced than their existing counterparts, and have similar physical characteristics. In terms of regional jets, SkyWest (which flies for Alaska, American, Delta, and United) has placed an order for the Mitsubishi Regional Jet (reference code C-III), which can have up to 90 seats. The Bombardier C-Series and second generation of Embraer E-Jets (reference code C-III) are also in early stages of production.

The future air carrier fleet mix will drive the critical aircraft for RDM in the future. Estimates are developed based on enplanement and commercial operations forecasts, aircraft seating capacity, and expected load factor. This estimate does not use aircraft classified as air taxi (less than 60 seats) as these aircraft are expected to be phased out by 2026. The future critical aircraft for Runway 5-23 will be the 737 and A319 (ARC of C-III), and the future critical aircraft for Runway 11-29 will be the Q400 (ARC of B-III). **Table 2-41** shows the projections for the future fleet mix.



Table 2-41: Future Air Carrier Operations by Aircraft Type

Typical Aircraft	Seats	ARC	2021	2026	2031	2036
CRJ-200	<70	C-II	2,260	0	0	0
Q400/E175/CRJ-900	70-90	B-III/C-II/C-III	8,430	8,200	6,000	3,000
MRJ-90	90-110	C-II	56	1,600	2,000	2,400
737-700	110-130	C-III	286	500	2,000	1,800
A319 (Mainline)	130-150	C-III	204	600	1,000	3,600
A319 (Low Cost), 737-800	150-170	C-III	204	500	1,000	1,500
737-900	>170	D-III	40	200	400	300

Parameters: Based on airline order books and aircraft manufacturer production plans current as of April 2017. Operations growth provides sufficient seats to meet passenger enplanement forecasts at load factors >80%.

2.7 FORECAST SUMMARY

The forecast summary is presented in **Figure 2-7** and **Figure 2-8**. Highlights of the forecast are below.

- ✓ RDM has experienced strong growth in scheduled airline service because of the migration to Central Oregon and growing tourism demand.
- ✓ RDM is the only commercial service airport in central Oregon and retains 75 percent of passengers in its catchment area. The Airport is equipped with an airport traffic control tower, an instrument landing system, two fixed base operators, and two runways that are both over 7,000 feet long. It is the best equipped airport in Central Oregon to handle commercial and business aviation.
- ✓ Population is expected to grow at 1.8 percent annually. Median age will increase as retirees and job seekers move the community. Working age population is more likely to travel by air than other population segments.
- ✓ The local economy is diversifying, adding jobs in healthcare, technical manufacturing and professional service industries. Tourism and hospitality will remain large employers.
- ✓ Passenger enplanement growth is expected to remain strong, driven by population growth and economic development in Deschutes County. Airlines achieve load factors near and above industry averages at RDM, which helps the Airport market the airlines to attract additional routes and frequencies.
- ✓ Airlines will continue to increase the average number of seats per departure. This will hold commercial operations steady, which the total number of seats offered increases. Air taxi aircraft (less than 60 seats) will exit the market within 10 years.
- ✓ Air cargo will remain level at 1,000 tons a year. Trucks, security screening requirements, and electronic mail substitutes hamper the need for more air cargo.
- ✓ Local and itinerant general aviation operations will remain flat; however, if nearby Bend Airport continues to approach capacity on its single runway, RDM may see an increase in general aviation operations.



- ✓ Flight schools have expressed interest in locating at RDM as they did in the past. If the Airport develops property to accommodate a flight school, general aviation activity will increase.
- ✓ Single-engine and multi-engine piston aircraft will be retired faster than they are replaced. Jet, turbo-prop, helicopter, light sport, and experimental aircraft are growing segments. Growth in based aircraft is largely dependent on the Airport or a private developer preparing a site for new hangars. Existing hangars are at capacity.
- ✓ The future ARCs for Runways 5-23 and 11-29 will remain the same. The critical aircraft for Runway 5-23 will be the Boeing 737 and Airbus A319 with ARCs of C-III. The critical aircraft for Runway 11-29 will be the Bombardier Q400 with an ARC of B-III.

Figure 2-7: Forecast / TAF Comparison

AIRPORT NAME:		REDMOND MUNICIPAL AIRPORT		
	<u>Year</u>	<u>Airport Forecast</u>	<u>TAF</u>	<u>AF/TAF (% Difference)</u>
Passenger Enplanements				
Base yr.	2016	298,322	298,322	0.0%
Base yr. + 5yrs.	2021	431,978	394,570	9.5%
Base yr. + 10yrs.	2026	496,750	434,335	14.4%
Base yr. + 15yrs.	2031	595,800	476,868	24.9%
Commercial Operations				
Base yr.	2016	11,467	11,467	0.0%
Base yr. + 5yrs.	2021	14,640	13,838	5.8%
Base yr. + 10yrs.	2026	14,240	15,024	-5.2%
Base yr. + 15yrs.	2031	15,040	16,374	-8.1%
Total Operations				
Base yr.	2016	40,162	40,162	0.0%
Base yr. + 5yrs.	2021	44,840	41,531	8.0%
Base yr. + 10yrs.	2026	45,440	43,004	5.7%
Base yr. + 15yrs.	2031	47,040	44,644	5.4%
NOTES: TAF data is on a U.S. Government fiscal year basis (October through September).				



Figure 2-7: TAF Forecast Worksheet

AIRPORT NAME:	REDMOND MUNICIPAL AIRPORT	Specify base year:				2016	Average Annual Compound Growth Rates			
	<u>Base Yr. Level</u>	<u>Base Yr. + 1yr.</u>	<u>Base Yr. + 5yrs.</u>	<u>Base Yr. + 10yrs.</u>	<u>Base Yr. + 15yrs.</u>	<u>Base yr. to +1</u>	<u>Base yr. to +5</u>	<u>Base yr. to +10</u>	<u>Base yr. to +15</u>	
Passenger Enplanements										
Air Carrier	536	22,200	27,600	77,100	211,400	4041.8%	120.0%	64.4%	49.0%	
Commuter	297,786	324,200	404,378	419,650	384,400	8.9%	6.3%	3.5%	1.7%	
TOTAL	298,322	346,400	431,978	496,750	595,800	16.1%	7.7%	5.2%	4.7%	
Operations										
<u>Itinerant</u>										
Air carrier	5,127	8,940	10,540	12,140	12,940	74.4%	15.5%	9.0%	6.4%	
Commuter/air taxi	6,340	5,700	4,100	2,100	2,100	-10.1%	-8.3%	-10.5%	-7.1%	
Total Commercial Operations	11,467	14,640	14,640	14,240	15,040	27.7%	5.0%	2.2%	1.8%	
General aviation	10,985	12,100	12,500	13,000	13,500	10.2%	2.6%	1.7%	1.4%	
Military	341	300	300	300	300	-12.0%	-2.5%	-1.3%	-0.9%	
<u>Local</u>										
General aviation	16,829	16,800	16,900	17,400	17,700	-0.2%	0.1%	0.3%	0.3%	
Military	540	500	500	500	500	-7.4%	-1.5%	-0.8%	-0.5%	
TOTAL OPERATIONS	40,162	44,340	44,840	45,440	47,040	10.4%	2.2%	1.2%	1.1%	
Instrument Operations	14,197	17,621	17,741	17,491	18,410	24.1%	4.6%	2.1%	1.7%	
Peak Hour Operations	21	21	23	23	24	0.0%	1.8%	1.0%	0.9%	
Cargo/mail (enplaned+deplaned tons)	970	1,000	1,000	1,000	1,000	3.1%	0.6%	0.3%	0.2%	
Based Aircraft										
Single Engine (Nonjet)	64	65	67	69	67	1.6%	0.9%	0.8%	0.3%	
Multi Engine (Nonjet)	4	4	3	3	2	0.0%	-5.6%	-2.8%	-4.5%	
Jet Engine	6	7	9	14	20	16.7%	8.4%	8.8%	8.4%	
Helicopter	6	6	7	9	10	0.0%	3.1%	4.1%	3.5%	
Other	0	3	3	4	4	0.0%	0.0%	0.0%	0.0%	
TOTAL	80	85	89	99	103	6.3%	2.2%	2.2%	1.7%	
B. Operational Factors										
	<u>Base Yr. Level</u>	<u>Base Yr. + 1yr.</u>	<u>Base Yr. + 5yrs.</u>	<u>Base Yr. + 10yrs.</u>	<u>Base Yr. + 15yrs.</u>					
Average aircraft size (seats)										
Air carrier	74	76	85	102	110					
Commuter	50	50	50	N/A	N/A					
Average enplaning load factor										
Air carrier	80.5%	85.0%	91.0%	84.0%	87.5%					
Commuter	86.3%	83.0%	90.0%	N/A	N/A					
GA operations per based aircraft	348	340	330	307	303					



3.0 FACILITY REQUIREMENTS

This Facility Requirements Chapter considers the availability and capability of facilities at the Redmond Municipal Airport (RDM or the Airport) to accommodate existing and projected aviation demand over the next 20 years.

3.1 INTRODUCTION TO FACILITY REQUIREMENTS

This chapter compares current and forecasted activity levels (presented in **Chapter 2 Aviation Forecasts**) to the Airport's operational capacity, design requirements, and facility needs. Options for meeting the identified facility needs will be analyzed in **Chapter 4 Alternatives Analysis**.

Facility requirements are presented in the following organizational structure:

- ✓ Airside Facility Requirements
 - Airfield Capacity
 - Airfield Design
 - Runway System
 - Taxiway System
 - General Aviation Facilities
- ✓ Landside Facility Requirements
 - Passenger Terminal Roadway
 - Passenger Terminal Parking Area
 - Rental Car Facilities
 - Non-aviation Revenue Development
- ✓ Terminal Area Facilities
 - Airport Activity
 - Passenger Terminal Building
 - Gate Capacity Requirements
 - Terminal Building Development
 - Conclusions and Recommendations
- ✓ Support Facilities
 - Fixed Base Operators
 - United States Forest Service

Airside Facilities:

Facilities that are accessible to aircraft, such as runways and taxiways.

Landside Facilities:

Facilities that support airside facilities, but are not part of the aircraft movement area, such as terminal buildings, hangars, aprons, access roads, and parking facilities.

Support Facilities:

Facilities that can be either airside or landside facilities that aid in the operation of the airport.



- Cargo Facilities
- Airport Support and Maintenance Facilities
- Conclusions and Recommendations



3.2 AIRSIDE FACILITY REQUIREMENTS

An early step in reviewing an airport's long-term needs is to assess capacity and delay issues because these concerns will influence the direction of airfield planning. An airport's annual capacity, known as the Annual Service Volume (ASV), is the number of flight operations an airfield can accommodate during a year. Existing and forecast annual demand is compared with the ASV to determine the percentage capacity at which the airport is operating and to gauge the timing of future airfield capacity improvements. As annual demand approaches ASV, average delays increase. A typical goal is to construct a new runway prior to time delays averaging 10 to 15 minutes per operation, and this requires the completion of planning, environmental, and design work before delays reach this threshold.

Airfield Capacity:

The maximum number of aircraft operations that a specific airfield configuration can accommodate within a specific time interval of continuous demand.

Annual Service Volume (ASV):

Used by the FAA as an indicator of relative operating capacity, ASV is an estimate of an airport's annual capacity that accounts for differences in runway use, aircraft mix, weather conditions, etc. encountered over a year's time. ASV assumes an acceptable level of aircraft delay as described in FAA Advisory Circular (AC) 150/5060-5, Airport Capacity and Delay.

3.2.1 AIRFIELD CAPACITY

The Airport's ASV and hourly capacity are calculated using the methodology the Federal Aviation Administration (FAA) documented in AC 150/5060-5 *Airport Capacity and Delay*. Calculation in this method requires the mix index and runway-use configuration. The mix index is an equation (C+3D) that determines the percentage of aircraft operations that have a Maximum Takeoff Weight (MTOW) over 12,500 pounds. C represents the percent of aircraft over 12,500 but under 300,000 pounds. D represents the percent of aircraft over 300,000 pounds. Finally, the runway-use configuration for RDM is number 9 for crossing runways, shown in **Figure 3-1. Table 3-1** shows the mix index for RDM.

Table 3-1: Mix Index

Landings*	6,079
Operations (> 12.5k lbs.)**	13,148
General Aviation Operations (>12.5k lbs.)***	975
Total RDM 2016 Operations	40,162
C	35.2
D	0.00
Mix Index	35.2

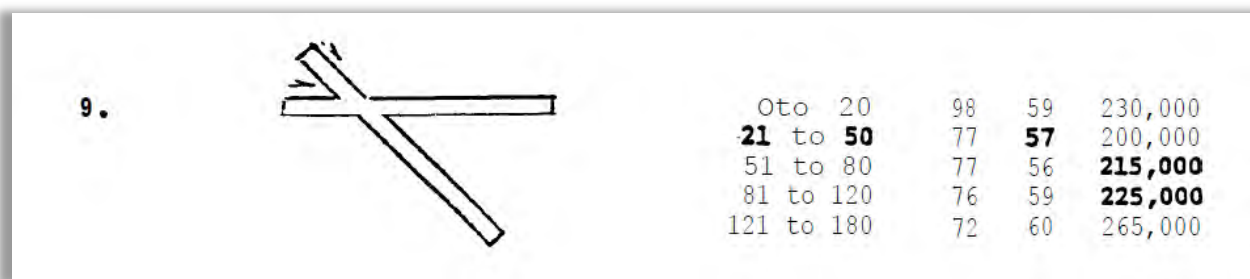
Source: AC 150/5060-5

*Includes air carrier/air taxi/commuter/air tanker/air cargo for aircraft over 12,500 pounds

**Operations = Landings x 2

***GA Ops includes Flight Aware data for aircraft over 12,500 pounds.



Figure 3-1 RUNWAY CONFIGURATION – CAPACITY AND DELAY AC 150/5060-5**Table 3-2: ASV and Hourly Capacity**

Runway Use Configuration	Mix Index (C+3D)	Capacity (Operations/Hour)		Annual Service Volume (Operations/Year)
		VFR	IFR	
#9	0 to 20	98	59	230,000
	21 to 50	77	57	200,000
	51 to 80	77	56	215,000
	81 to 120	76	59	225,000
	121 to 180	72	60	265,000

Source: AC 150/5060-5

Hourly capacity is split into visual flight rules (VFR) and instrument flight rules (IFR) capacity. **Table 3-2** above shows the hourly capacity and ASV for RDM.

AIRFIELD CAPACITY CONCLUSIONS AND RECOMMENDATIONS

The Airport is currently operating at 20 percent of its annual capacity, 27 percent of its VFR hourly capacity, and 36 percent of its IFR hourly capacity. As shown in **Chapter 2 Aviation Activity Forecasts**, the Airport is forecasted to handle 47,740 annual operations by 2036. The associated increases will not significantly change the capacity percentages. No major airfield changes will be required for airport capacity and delay purposes.

Instrument Flight Rules (IFR) Operations:

Aircraft operations conducted by pilots with reference to instruments in the flight deck, with navigation accomplished by reference to electronic signals.

Visual Flight Rules (VFR) Operations:

Operations conducted by pilots with only visual reference to the ground, obstructions, and other aircraft.



3.2.2 AIRFIELD DESIGN

The FAA's design standards, presented in a series of ACs, heavily influence design and construction of airside facilities. The primary AC that addresses airfield design is AC 150/5300-13A, Change 1, *Airport Design* (AC-13A). This section covers the specific design standards that apply to RDM. Additional information related to design standards can be found in **Chapter 1 Introduction**.

DESIGN STANDARDS CONCEPTS AND TERMINOLOGY

The FAA is responsible for the overall safety of civil aviation in the United States; therefore, FAA design standards are primarily driven by safety, with secondary goals including efficiency and utility also reflected in FAA standards and policy. Changes to improve safety and efficiency are constantly evolving as the aviation industry continues to develop, and the expectation is that design standards will continue to evolve alongside technologies and procedures.

CRITICAL AIRCRAFT

The initial step in airside facility planning is to identify the critical aircraft. According to FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, paragraph 3-4, the critical aircraft is the most demanding aircraft that operates at the airport more than 500 times per year or an aircraft used for scheduled passenger service. The characteristics used in facility planning include approach speed, wingspan, tail height, main gear width, cockpit to main gear length, aircraft weight, and takeoff and landing distances.

Critical Aircraft:

This is an aircraft with characteristics that determine the application of airport design standards for a specific runway, taxiway, taxilane, apron, or other facility. This can be a specific aircraft model or a composite of several aircraft currently using, expected to use, or intended to use the airport or part of the airport. This is also called the “design aircraft” or “critical design aircraft.”

The existing critical aircraft are based on historical operations records and current airline schedules. The future critical aircraft is determined based on projections from **Chapter 2 Aviation Activity Forecasts**.

CURRENT CRITICAL AIRCRAFT

The most demanding aircraft currently using the airport is the Bombardier Q400 and Bombardier CRJ-900. Together, these two aircraft are the critical aircraft for Runway 5-23. The Q400 is also the critical aircraft for Runway 11-29.

FORECAST CRITICAL AIRCRAFT

At RDM, critical air carrier aircraft are expected to follow the general trend in airline operations nationwide, leading to a likely shift in aircraft types over the next 20 years. Routes into and out of RDM will likely shift toward increased aircraft size and reduced frequency. For RDM, this means the potential for a transition to narrow body aircraft. As addressed in the **Chapter 2 Aviation Activity Forecasts**, future critical air carrier aircraft are expected to be a combination of narrow-body jet and turboprop aircraft as shown in **Table 3-3** below.



Table 3-3: Future RDM Air Carrier Operations by Aircraft Type

Typical Aircraft	Seats	ARC	2021	2026	2031	2036
CRJ-200	<70	C-II	2,260	0	0	0
Q400/E175/CRJ-900	70-90	B-III/C-III/C-III	8,430	8,200	6,000	3,000
MRJ-90	90-110	C-II	56	1,600	2,000	2,400
B737-700	110-130	C-III	286	500	2,000	1,800
A319 (Mainline)	130-150	C-III	204	600	1,000	3,600
A319 (Low Cost), B737-800	150-170	C-III	204	500	1,000	1,500
B737-900	>170	D-III	40	200	400	300

*Parameters: Based on airline order books and aircraft manufacturer production plans current as of April 2017.
Operations growth provides sufficient seats to meet passenger enplanement forecasts at load factors >80%.*

AIRPORT REFERENCE CODE (ARC)

The FAA AC-13A uses a coding system to determine design standards for an airport. The coding system is shorthand for the physical and operational characteristics of the most demanding aircraft that routinely use the airport.

EXISTING ARC

The existing ARC is designated as C-III (E175).

FUTURE ARC

A change in fleet mix associated with the airlines will occur and the A319 will dictate the future ARC. The future ARC will remain C-III.

Airport Reference Code (ARC):

An airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport. Aircraft in parenthesis are representative of the ARC category.

RUNWAY DESIGN CODE (RDC)

The RDC is a three-component code that defines the design standards applicable to a specific runway. A letter, A-E, depicts the first component and stands for the Aircraft Approach Category (AAC). The AAC relates to the approach speed of the critical aircraft. A Roman numeral, I-VI, depicts the second component, which is the Airplane Design Group (ADG). The ADG relates to the greatest wingspan or tail height of the critical aircraft. The third component relates to runway approach visibility minimums as expressed in Runway Visual Range (RVR) equipment measurements. **Table 3-4** summarizes the RDC classifications. The critical aircraft and RDC determine the scale and setbacks of airfield facilities.

Runway Visual Range (RVR):

The range on the centerline of a runway over which the pilot of an aircraft can see the runway surface markings or lights delineating the runway, reported in hundreds of feet. For example, 2400 RVR is equal to one-half mile.

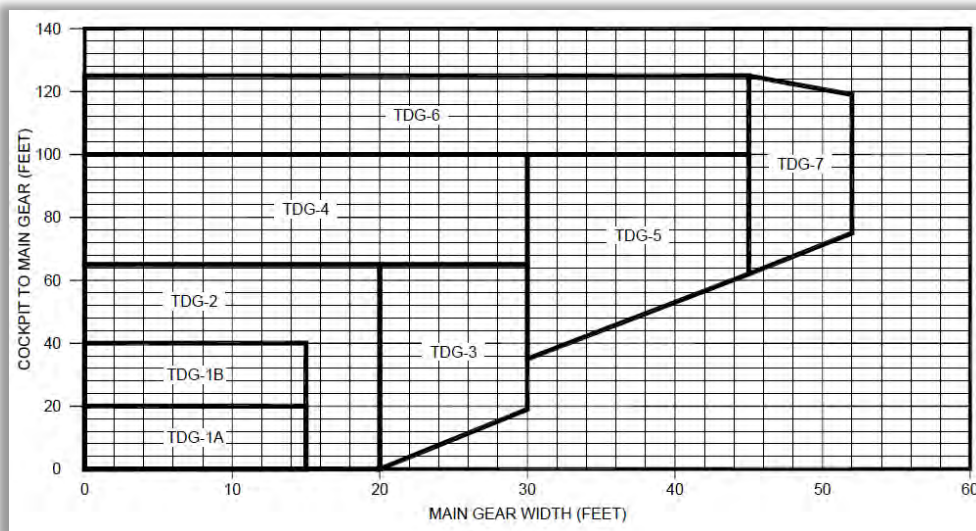


Table 3-4: Runway Design Code

Runway		AAC	ADG	Approach Visibility Minimums	Design Aircraft
11-29	Existing	B	III	7/8 mile (2,400')	Q400
	Future	No Change	No Change	No Change	No Change
5-23	Existing	C	III	½ mile (2,500')	E175
	Future	No Change	No Change	No Change	A319

TAXIWAY DESIGN GROUP (TDG)

The TDG criteria are a new design standard incorporated into AC-13A. The previous RDM Airport Layout Plan (ALP) and Master Plan did not address this standard. The TDG takes into account the dimensions of the aircraft landing gear to determine taxiway widths and pavement fillets to be provided at taxiway intersections. Fillet pavement accommodates the inner wheel of the airplane as it turns. There are seven (1-7) TDG classifications distinguished by width of the main gear and wheel base (the distance from nose gear to main gear). TDG classifications are presented in **Figure 3-2**.

Figure 3-2 TAXIWAY DESIGN GROUPS

Source: Figure 3-2 from AC 5300-13a, Change 1

EXISTING TDG

The Bombardier Q400 is the existing critical aircraft for all taxiways serving the runways. Due to its wide main landing gear, it is a TDG-5 aircraft. No other aircraft now operating at the Airport is above TDG-3.



FUTURE TDG

The aviation activity forecasts indicate the Airbus A319 will become the future critical aircraft if the Q400 is no longer in the fleet. These future aircraft have a narrower main landing gear width, and are both in TDG-3. As of 2017, Alaska has announced it will supplement its fleet of Q400 aircraft with the Embraer 175 regional jet (E175), which operates in the same 76-seat configuration as the Q400. Alaska route planning staff and the airport station manager expect that the Q400 will remain in the fleet for at least the next decade. Alaska Airlines will likely still operate a limited number of Q400s for short haul routes (e.g. RDM-Portland International Airport [PDX]) beyond the next decade. Exactly when the Q400 will be retired from Alaska's fleet is unknown.

There is currently a taxiway construction project for fiscal year 2018 to change the connector taxiways of Runway 11/29 to TDG 4. TDG 4 has the minimum fillet dimensions that will allow the Q400 to taxi at RDM. This allows the Q400 to continue operating at RDM until it retires from service and allows the future critical aircraft (A319) to dictate the future TDG. Therefore, it is recommended that TDG-3 be used for planning, and that standards for TDG-3 should be applied to both runways and all taxiways serving the runways once the Q400 no longer operates at RDM.

WIND COVERAGE

The primary factor influencing runway orientation is wind. The preferred design for runways is to align them so that airplanes take-off and land into a headwind. This minimizes the challenges associated with crosswinds, and provides for more efficient aircraft performance. Small, light aircraft are more affected by crosswinds than larger, heavier ones. FAA runway design criteria state that runway orientation must satisfy 95 percent wind coverage based on annual wind conditions. A crosswind runway may be justified to satisfy the 95 percent wind coverage requirement for the combined runways.

Observations for wind coverage are categorized into all weather, instrument meteorological conditions (IMC), and visual meteorological conditions (VMC). Depending upon the RDC, runways must meet the allowable crosswind component of 10.5, 13, 16, or 20 knots. Runways 5-23 and 11-29 have RDCs of C-III and B-III respectively, and both must meet an allowable crosswind component of 16 knots.



Table 3-5: Wind Coverage				
All Weather				
Runway	10.5 Knots (12 M.P.H.)	13 Knots (15 M.P.H.)	16 Knots (18.5 M.P.H.)	20 Knots (28 M.P.H.)
11-29	89.63%	94.34%	98.83%	99.87%
5-23	94.85%	97.17%	99.06%	99.79%
Combined	97.65%	99.39%	99.88%	99.99%
Calm Wind Percentage (0-3 knots)			37.40%	
Number of Observations			86,755	
IMC				
Runway	10.5 Knots (12 M.P.H.)	13 Knots (15 M.P.H.)	16 Knots (18.5 M.P.H.)	20 Knots (28 M.P.H.)
11-29	98.18%	99.12%	99.77%	99.95%
5-23	94.67%	96.94%	99.36%	99.91%
Combined	99.32%	99.83%	99.97%	100.00%
Calm Wind Percentage (0-3 knots)			49.70%	
Number of Observations			7,457	
VMC				
Runway	10.5 Knots (12 M.P.H.)	13 Knots (15 M.P.H.)	16 Knots (18.5 M.P.H.)	20 Knots (28 M.P.H.)
11-29	94.55%	96.99%	99.00%	99.78%
5-23	89.17%	94.10%	98.78%	99.87%
Combined	97.49%	99.35%	99.88%	99.99%
Calm Wind Percentage (0-3 knots)			36.30%	
Number of Observations			79,413	

Table 3-5 shows annual average wind coverage for each runway direction during three weather conditions: all weather, VMC, and IMC. When calculated individually, neither runway alignment provides 95 percent coverage for operations during 10.5 knots under the three weather conditions. The alignment of Runway 11-29 does not provide the required coverage during 13-knot all weather conditions and Runway 5-23's alignment does not provide the required coverage during 13-knot VMC weather conditions. However, the combined alignment of the two runways provides over 97 percent coverage during each weather condition, justifying the need for continued FAA investment in secondary Runway 11-29 to maintain the required wind coverage.

According to current FAA design standards, the historical wind data reported above does not justify a B-III RDC on the crosswind runway (11-29), however, the Airport has the intention of maintaining the B-III designation throughout the planning period covered under this Master Plan.



OTHER DESIGN CONSIDERATIONS

- ✓ Airspace (approach and departure protection, terrain, and obstructions): Instrument flight procedure minimum descent altitudes, glide paths, and climb gradients are determined by obstacle clearances. Obstacle clearance surfaces extend along the extended runway centerline. Runways are typically aligned to avoid terrain and tall structures that existed at the time of design; however, tall objects and terrain can impose restrictions on aircraft operations if they inhibit the ability for aircraft to safely arrive and depart. Ideally, airports work with nearby communities to adopt land use planning techniques to minimize incompatible development.
- ✓ Independent versus dependent operating streams: Runways that intersect or that have intersecting approach and departure corridors are dependent on each other. During high levels of activity, these dependencies cause delay. As delays increase, establishment of an independent operating stream may be necessary. This can be accomplished by providing a new parallel runway with sufficient lateral separation from existing runways. Airplane wake turbulence and instrument landing capabilities are considerations when determining the amount of space needed between parallel runways.
- ✓ ATCT Line of Sight: Air traffic controllers require an uninterrupted line of sight between the air traffic control tower (ATCT) and approach and departure corridors, runways, taxiways, and aprons. Protection of controller line of sight is considered in airport development.
- ✓ NAVAID critical areas: Electronic equipment used for navigation, communication, security, and surveillance are commonly found throughout airport property. In order to function properly, most of these items require clear and graded areas, setbacks from certain objects and construction materials, and a clear corridor between transmitters and receivers. Development and most activities are restricted in these areas.
- ✓ Visual aids to navigation: Certain visual aids, including the airport beacon, runway approach lighting, and runway glide path indicator lights require unobstructed line of sight from aircraft in flight. This line of sight is considered in the planning and design of airport facilities.

3.2.3 RUNWAY SYSTEM

RUNWAY DESIGN STANDARDS

FAA AC-13A stipulates the design criteria, surfaces, and dimensions for each runway. Dimensions for the design surfaces are based upon the critical aircraft and reference code plus the type of approach instrumentation available. A brief explanation of each design surface is presented below. All runway design surfaces and instrument landing system critical areas are illustrated on **Figure 3-3**. Summary matrices (**Tables 3-7** and **3-8**) are included following the explanations.



RUNWAY SAFETY AREA (RSA)

The RSA provides a graded, clear area for aircraft in case of a runway excursion, and provides greater accessibility for firefighting and rescue equipment during such incidents. The RSA must be clear of all objects and capable of supporting aircraft, maintenance vehicles, and rescue vehicles. The FAA does not grant modifications to RSA standards, meaning that non-standard RSAs must be corrected as soon as possible. RSAs are illustrated with a red line in **Figure 3-3**.

Runway Safety Area (RSA):

A rectangular area surrounding a runway suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway.

Object Free Area (OFA):

A rectangular area centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by remaining clear of objects.

The RSA for each runway meets FAA design standards for the existing configuration. Impacts to the RSA from a potential runway extension will be explored in the **Chapter 4 Alternatives Analysis**. The Airport is required to continue to maintain a clear and graded area for each RSA lateral to, and beyond the runway end. Response to inspections by the FAA Runway Safety Action Team, who conducts inspections on a regular basis, will help maintain required grading. Runway 5-23 has published declared distances of 7,031 feet for the accelerate stop distance available (ASDA) and landing distance available (LDA). Declared distances that do not equal the full length of a runway mean the RSA has a penetration. The object identified as penetrating the RSA was the localizer on Runway End 5. Survey data collected for this master plan shows no objects penetrating any design surfaces of Runway 5-23. The latitude and longitude for the localizer and Runway End 5 were used in the inverse computation provided by the National Geodetic Survey website to determine the distance between the survey points. The distance between both points was greater than 1,000 feet, meaning the localizer did not penetrate the RSA. It is recommended that the declared distances change to the full length of Runway 5-23, 7,038 feet, due to the RSA being clear of objects.

RUNWAY OBJECT FREE AREA (ROFA)

ROFA standards require clearing of above-ground objects protruding above the nearest point of the RSA. Objects non-essential for air navigation must not be placed in the ROFA. Except where precluded by other standards, objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes are allowed to penetrate the ROFA. The ROFAs at RDM are illustrated with a purple line in **Figure 3-3**. The ROFAs for both runways currently meet standards.

RUNWAY OBSTACLE FREE ZONE (ROFZ)

ROFZs are defined three-dimensional volumes of airspace centered above the runway centerline that must be kept clear during aircraft operations. The shape and size of the ROFZ is dependent on the size of aircraft using the runway and the approach minimums for a specific runway end. The ROFZ extends 200 feet beyond each end of each runway. The width of the ROFZs for both runways at RDM is 400 feet. The ROFZs at RDM are illustrated with a black line in **Figure 3-3**. The ROFZs for both runways at RDM meet FAA standards.



INNER-APPROACH OBSTACLE FREE ZONE (IAOFZ)

The IAOFZ only applies to the ends of runways that have an approach lighting system. Therefore, at RDM an IAOFZ only exists in the area before the threshold for Runway 23. IAOFZs begin 200 feet beyond the runway threshold at the same elevation as the runway threshold and extends 200 feet beyond the last light unit in the approach lighting system. The width is the same as the ROFZ (400 feet) and rises at a slope of 50 (horizontal) to 1 (vertical). The IAOFZ is shown with a black line in **Figure 3-3**. The IAOFZ for Runway 23 at RDM meets FAA standards.



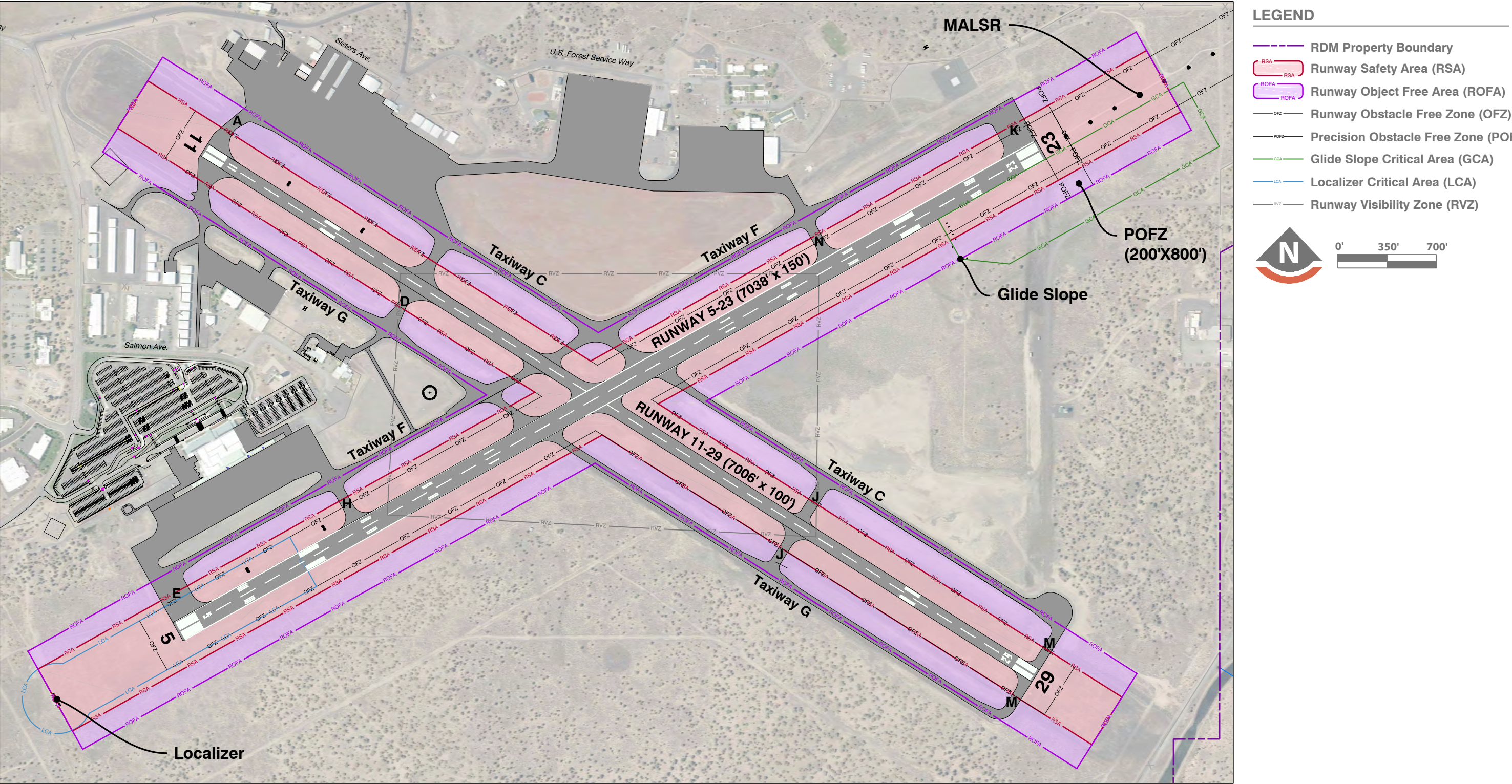
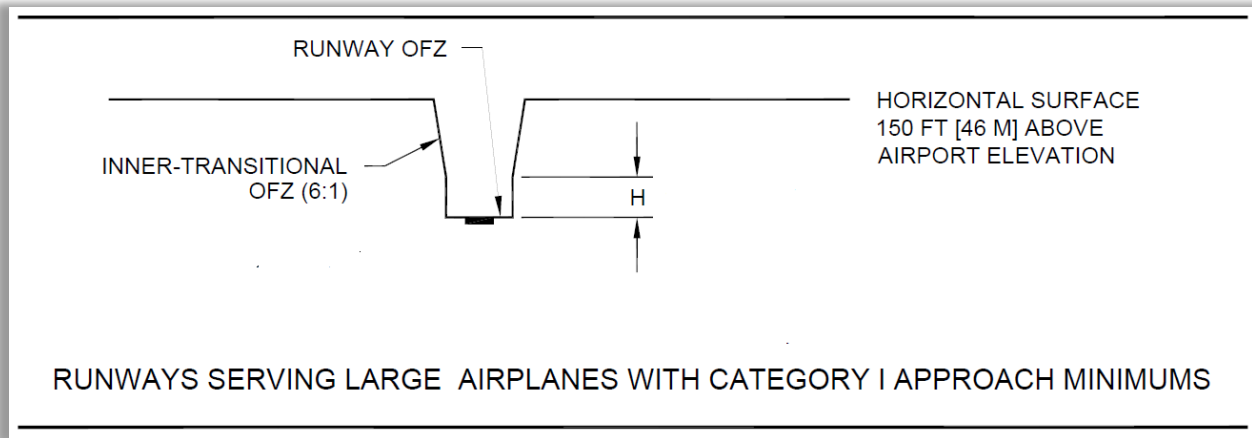


Figure 3-3
RUNWAY DESIGN SURFACES

INNER-TRANSITIONAL OBSTACLE FREE ZONE (ITOFZ)

An ITOFZ exists only for runways with instrument approach visibility minimums of less than $\frac{3}{4}$ mile. Therefore, at RDM an ITOFZ only applies to Runway 5-23. The ITOFZ is a defined volume of airspace along the sides of the ROFZ and IAOFZ. **Figure 3-4** illustrates the shape of the ITOFZ. The ITOFZ will be shown and analyzed on the Airspace Plan sheets of the ALP, after the alternatives analysis. The ITOFZ meets FAA standards.

Figure 3-4 INNER-TRANSITIONAL OFZ



PRECISION OBSTACLE FREE ZONE (POFZ)

The POFZ is defined as a volume of airspace above an area beginning at the landing threshold, at the elevation of the landing threshold, and centered on the extended runway centerline (200 feet long by 800 feet wide), illustrated on **Figure 3-3** in black. The POFZ is in effect when all three of the following criteria are met:

- ✓ The approach includes vertical guidance;
- ✓ The reported ceiling is below 250 feet or visibility is less than $\frac{3}{4}$ statute miles (or RVR is below 4,000 feet); and
- ✓ An aircraft is on final approach within two miles of the runway threshold.

When the POFZ is in effect, the wing of an aircraft on a taxiway waiting for runway clearance may penetrate the POFZ, but the fuselage and tail may not. Runway 23 is the only runway end with a POFZ. It meets FAA standards.



RUNWAY PROTECTION ZONES (RPZ)

The RPZ is a trapezoidal area at the end of the runway, the purpose of which is to enhance safety for aircraft operations and for people and objects on the ground. The FAA requests that incompatible land uses, objects, and activities be located outside of the RPZ. The FAA also requests that an airport operator maintain full control of an RPZ, ideally through fee simple property acquisition. If this is not feasible, land use control may be achieved through the use easements.

Runway Protection Zone (RPZ):

The RPZ is a trapezoidal area with the intention of enhancing the protection of people and property on the ground.

Total acres for the existing RPZs located on and off RDM property are called out in **Figure 3-5**, and documented in summary **Tables 3-7** and **3-8** at the end of this section. The RPZs within the existing airport property and under Airport control are shaded green, and those outside Airport property boundaries are shaded orange.

The FAA provides guidance on RPZ land use compatibility in AC-13A and more extensive guidance in the 2012 memorandum *Interim Guidance on Land Uses within a Runway Protection Zone*. Land uses and structures that are not inherently compatible in the RPZ include: buildings, especially habitable structures or structures of assembly; fuel facilities; hazardous material storage; recreational land uses; and transportation facilities and roads.

The City of Redmond is currently in the design process for a realignment of the intersection of SE Veterans Way and SE Airport Way. This intersection is currently located in the central *controlled access* portion of the Runway 11 approach RPZ (see **Figure 3-6**). FAA standards discourage intersections located in this portion of an RPZ. The design for the proposed realignment shifts the intersection to outside of the controlled access portion of the RPZ and replaces a three-way stop intersection with a roundabout.

The FAA does not have the authority to regulate local land use, so it relies on the airport sponsor to work with local jurisdictions to promote compatible development within the RPZ. Airport actions that introduce incompatible land uses into the RPZ, either by moving a runway end or increasing the size of the RPZ, require coordination with FAA headquarters. This coordination is not needed for existing incompatible land uses if the RPZ does not move or change size. The analysis of runway extension alternatives presented in **Chapter 4** addresses property acquisition that would be required to support each alternative.



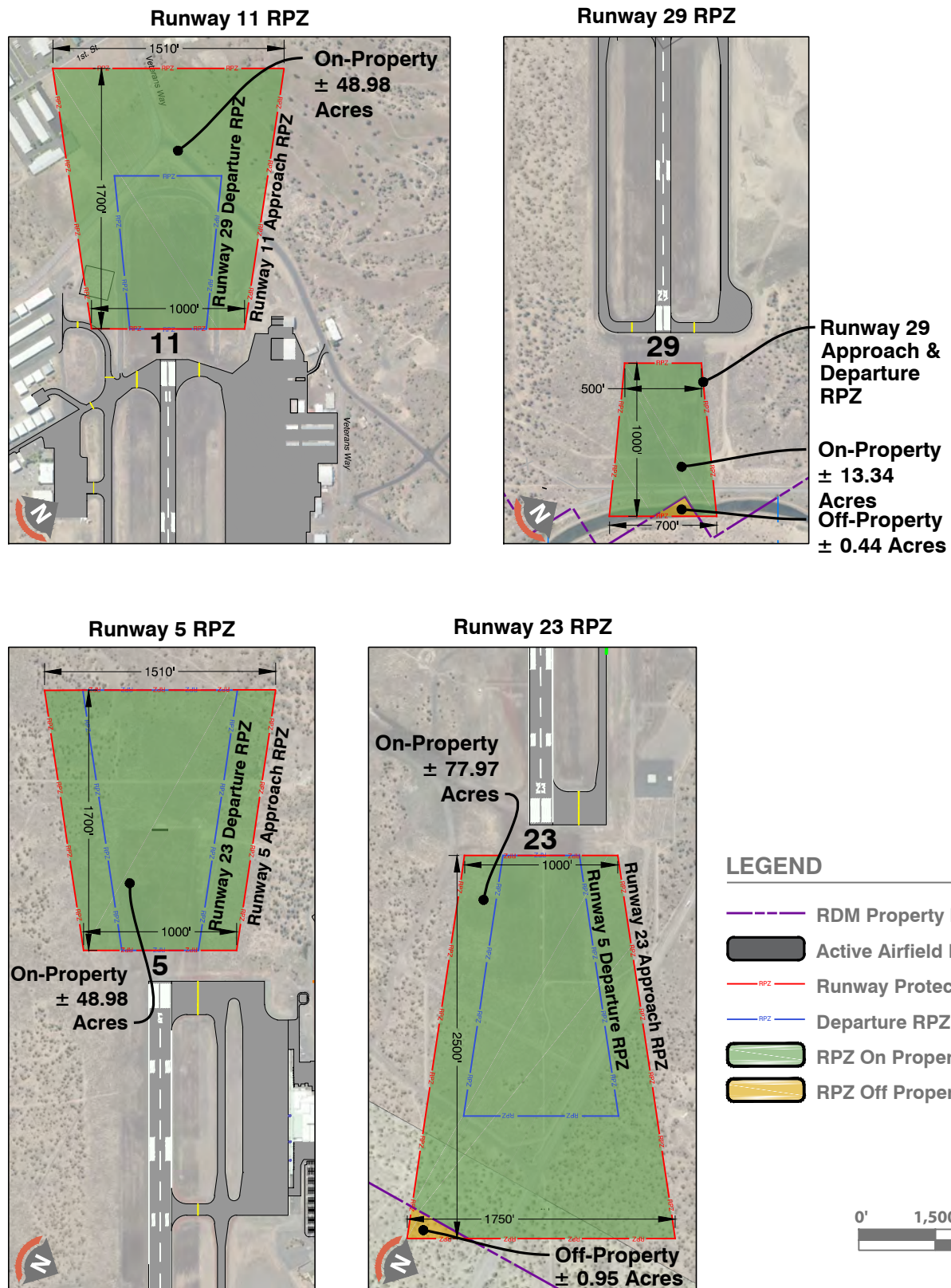
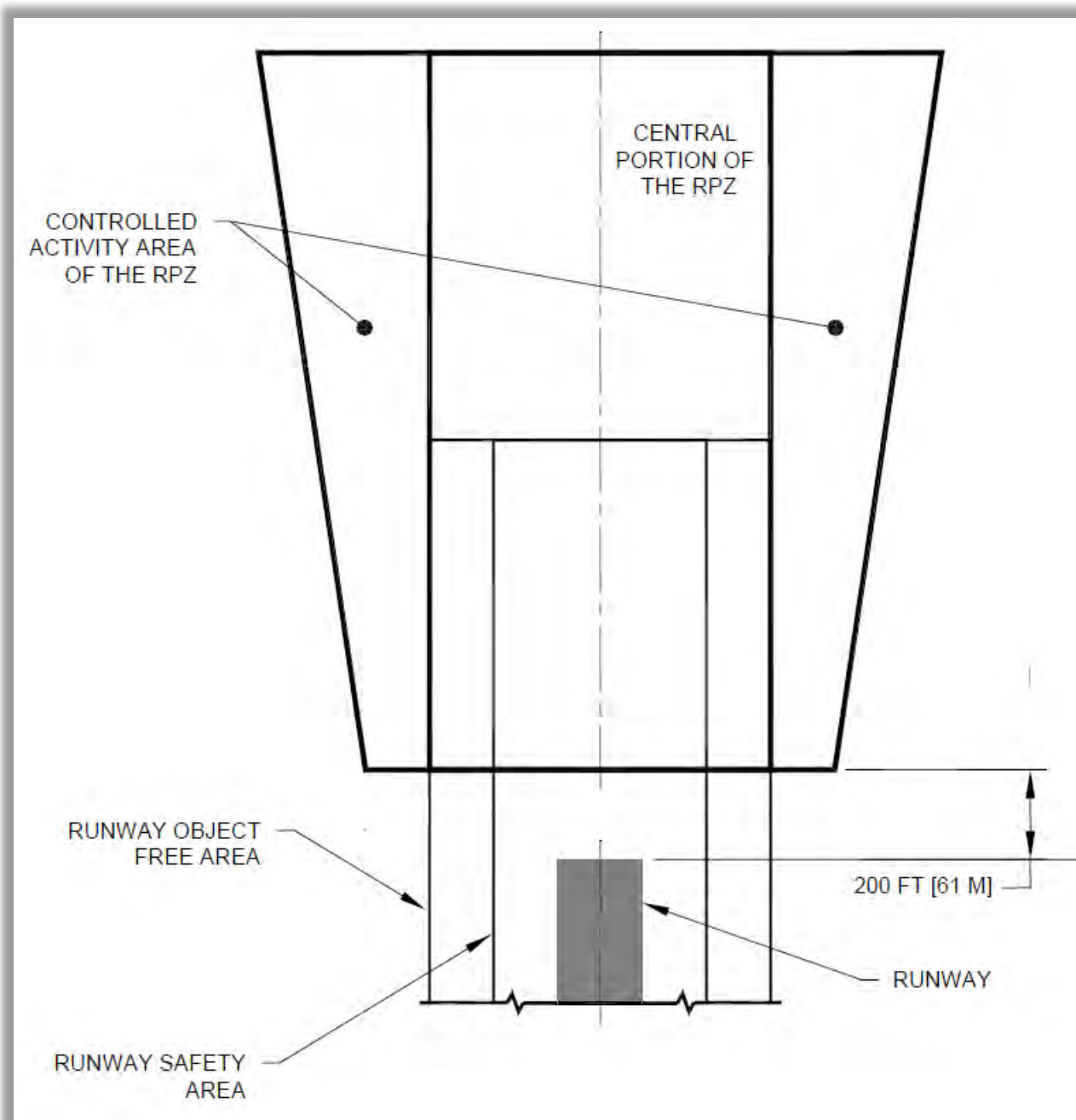


Figure 3-5
RUNWAY PROTECTION ZONES



Figure 3-6 RUNWAY PROTECTION ZONE SUBAREAS

RUNWAY VISIBILITY ZONE (RVZ)

Runway line-of-sight standards indicate intersecting runways must maintain an unobstructed line of sight from any point five feet above the runway centerline to any other point five feet above the intersecting runway centerline within the runway visibility zone (RVZ). The RVZ at RDM is established by points located equidistant from the intersection and the runway ends. The RVZ precludes any fixed or movable objects that may limit line of sight between the runways, and is shown as a blue line in **Figure 3-3**. The RVZ line-of-sight at RDM is unobstructed. It is recommended that RDM continue to limit any permanent structures with the RVZ.

HOLD POSITIONS

RDC determines the holding position distance on each connector taxiway from the runway centerline. AC-13A shows that, for RDC C-III runways such as Runway 5-23, the holding position is 250 feet from the runway centerline. In addition, the distance is increased 1 foot for each 100 feet the airport is above sea level. Using this formula, at 3,080 feet mean sea level (MSL), the required distance for hold positions from the runway centerline is 281 feet on taxiways connecting to Runway 5-23. Currently, the hold lines for Runway 5-23 are located at 200 feet from centerline and do not meet the 281-foot requirement.

As Runway 11-29 is designated as RDC B-III, the elevation factor does not apply and the hold positions should be located 200 feet from the runway centerline. For Runway 11-29, the hold lines are currently located at 206 feet from runway centerline, slightly exceeding the requirement AC-13A.

NAVAID CRITICAL AREAS

Runway 23 is equipped with a glide slope and localizer as part of the instrument landing system (ILS) to the approach end of Runway 23. The FAA requires a critical area at each runway end to remain clear of objects to ensure aircraft using the equipment receive undistorted signals. The critical areas for Runway 23 are the localizer critical area (LCA) and the glide slope critical area (GCA). Dimensions of the GCA are for the “null reference” facility type glide slope. **Table 3-6** shows the dimensions for the LCA and GCA for an ILS category I defined by FAA Order 6750.16D, *Siting Criteria for ILS*. There are no known penetrations to the GCA and LCA (additional information will be provided in the AGIS survey). The FAA requires vegetation not exceed twelve inches in height in the ILS critical areas.

BLAST PADS

Paved runway blast pads provide blast erosion protection beyond runway ends during jet aircraft operations. AC-13A recommends runways serving ADG-III have full-length paved shoulders. In effect, blast pads are an extension of the full-length paved shoulders beyond the runway end.

Table 3-6. Critical Area Dimensions

Area	Length	Width
Localizer Critical Area	2,000 feet	400 feet
Glideslope Critical Area	2,000 feet	200 feet

Source: Order 6750.16D, *Siting Criteria for ILS*



RDM does not currently have blast pads. Should the Airport determine blast pads to be beneficial in the future, for runways supporting ADG C-III aircraft, blast pads should be 200 feet by 200 feet. For runways supporting ADG B-III aircraft, blast pads should be 140 feet wide and 200 feet long.

The tables below summarize design standards, existing conditions, and any proposed disposition.

Table 3-7. Runway 11-29 Design Standards Matrix

Runway 11-29 RDC: Design Standards matrix					B-III	
Item	Existing Conditions		FAA Design Standards ¹		Meets Standards?	Disposition
Runway Design						
Width	100 ft.		100 ft.		Yes	No Action
Shoulder Width	20 ft.		20 ft.		Yes	No Action
Blast Pad Width	N/A		140 ft.		No	Add to ALP
Blast Pad Length	N/A		200 ft.		No	Add to ALP
Crosswind Component (all weather)	99.13% @ 16 knots		95% @ 16 knots		Yes	No Action
Gradient (maximum)	0.51%		1.5%		Yes	No Action
Runway Protection						
Runway Safety Area (RSA)						
Length beyond departure end	600 ft.		600 ft.		Yes	No Action
Length prior to threshold	600 ft.		600 ft.		Yes	No Action
Width	300 ft.		300 ft.		Yes	No Action
Runway Object Free Area (ROFA)						
Length beyond departure end	600 ft.		600 ft.		Yes	No Action
Length prior to threshold	600 ft.		600 ft.		Yes	No Action
Width	800 ft.		800 ft.		Yes	No Action
Runway Obstacle Free Zone (OFZ)						
Length prior to threshold	200 ft.		200 ft.		Yes	No Action
Width	400 ft.		400 ft.		Yes	No Action
Inner Approach OFZ	N/A		N/A		N/A	N/A
Inner Transitional OFZ	N/A		N/A		N/A	N/A
Precision Obstacle Free Zone (POFZ)	N/A		N/A		N/A	N/A
Approach Runway Protection Zone (RPZ)						
Length	11: 1700 ft.	29: 1000	11: 1700 ft.	29: 1000	Yes	N/A
Inner Width	11: 1000 ft.	29: 500	11 :1000 ft.	29: 500		
Outer Width	11: 1510 ft.	29: 700	11: 1510 ft.	29: 700		
Departure Runway Protection Zone (RPZ)						
Length	1000 ft.		1000 ft.		Yes	No Action
Inner Width	500 ft.		500 ft.		Yes	No Action
Outer Width	700 ft.		700 ft.		Yes	No Action
Runway Separation						
From Runway Centerline to:						
Parallel Runway Centerline	N/A		700 ft.		Yes	No Parallel RWY
Hold Line ²	200 ft.		200 ft.		Yes	No Action
Parallel Taxiway Centerline	400 ft.		300 ft.		Yes	No Action
Aircraft Parking Area	425 ft.		400 ft.		Yes	No Action

Source: FAA Advisory Circular 150/5300-13A, Change 1 Airport Design (February 2014)



Table 3-8. Runway 5-23 Design Standards Matrix

Runway 5-23 RDC:				C-III			
Item		Existing Conditions		FAA Design Standards ¹		Meets Standards?	Disposition
Runway Design							
Width		150 ft.		150 ft.		Yes	No Action
Shoulder Width		25 ft.		25 ft.		Yes	No Action
Blast Pad Width		N/A		200 ft.		No	Add to ALP
Blast Pad Length		N/A		200 ft.		No	Add to ALP
Crosswind Component (all weather)		99.07% @ 16 knots		95% @ 16 knots		Yes	No Action
Gradient (maximum)		0.29%		1.5%		Yes	No Action
Runway Protection							
Runway Safety Area (RSA)							
Length beyond departure end		1000 ft.		1000 ft.		Yes	No Action
Length prior to threshold		600 ft.		600 ft.		Yes	No Action
Width		500 ft.		500 ft.		Yes	No Action
Runway Object Free Area (ROFA)							
Length beyond departure end		1000 ft.		1000 ft.		Yes	No Action
Length prior to threshold		600 ft.		600 ft.		Yes	No Action
Width		800 ft.		800 ft.		Yes	No Action
Runway Obstacle Free Zone (OFZ)							
Length prior to threshold		200 ft.		200 ft.		Yes	No Action
Width		400 ft.		400 ft.		Yes	No Action
Inner Approach OFZ		23: 2500 ft. x 400 ft.		N/A		N/A	N/A
Inner Transitional OFZ		23: 1991 ft		N/A		N/A	N/A
Precision Obstacle Free Zone (POFZ) (Runway 23 only)							
Length		200 ft.		200 ft.		Yes	No Action
Width		800 ft.		800 ft.		Yes	No Action
Approach Runway Protection Zone (RPZ)							
Length		5: 1700 ft.	23: 2500	5: 1700 ft.	23: 2500 ft.	Yes	N/A
Inner Width		5: 1000 ft.	23: 1000	5 :1000 ft.	23: 1000 ft.		
Outer Width		5: 1510 ft.	23: 1750	5: 1510 ft.	23: 1750 ft.		
Departure Runway Protection Zone (RPZ)							
Length		1,700 ft.		1700 ft.		Yes	No Action
Inner Width		500 ft.		500 ft.		Yes	No Action
Outer Width		1,010 ft.		1010 ft.		Yes	No Action
Runway Separation							
From Runway Centerline to:							
Parallel Runway Centerline		N/A		700 ft.		No	No Parallel RWY
Hold Line ²		250 ft.		250 ft.		Yes	No Action
Parallel Taxiway Centerline		400 ft.		400 ft.		Yes	No Action
Aircraft Parking Area		540 ft.		500 ft.		Yes	No Action
Source: FAA Advisory Circular 150/5300-13A, Change 1 Airport Design (February 2014)							

Source: FAA Advisory Circular 150/5300-13A, Change 1 Airport Design (February 2014)



RUNWAY LENGTH

The performance requirements of the critical aircraft designated for a runway determine an airport's recommended runway length. Performance capabilities of individual aircraft are, in turn, affected by factors including the aircraft payload and fuel load, the runway elevation, wind conditions, and air temperature.

Currently, Runway 5-23 is 7,038 feet long and Runway 11-29 is 7,006 feet long. At these lengths, the runways adequately serve the range of piston and jet aircraft now operating at the Airport. RDM has direct flights to seven airline hubs, all under 1,000 nautical miles (nm) from the Airport. With a few aircraft and time of year exceptions, the runway length is generally sufficient¹ for current aircraft and current destinations. However, as new airlines begin serving RDM, and existing airlines change fleets and add new destinations, a wide range of aircraft could serve the Airport in the future. As noted in the discussion of critical aircraft earlier in this chapter, specific fleet mix changes anticipated at the Airport include:

- ✓ Replacement of Q4002 with ERJ-175
- ✓ Regional jet (CRJ-200, 700 and 900) replacement with narrow body aircraft (A319 and B737)

This section examines whether the available runway length meets the needs not only of existing users, but also those of future critical aircraft serving future destinations. To analyze the runway requirements for these new aircraft types, an understanding of the factors that impact aircraft performance is necessary. The following paragraphs explain the terminology and variables used in the runway length assessment.

ELEVATION

RDM has four runway ends from which aircraft can operate, ranging from 3,044 feet above mean sea level (AMSL) to 3,080 feet AMSL, which is the official airport elevation.

INTERNATIONAL STANDARD ATMOSPHERE (ISA)

This mathematical model describes how the earth's atmosphere, or air pressure and density, change depending on altitude. The atmosphere is less dense at higher elevations. ISA is frequently used in aircraft performance calculations because deviation from ISA will change how an aircraft performs. ISA at sea level occurs when the temperature is 59°F. ISA at RDM's 3,080 feet AMSL occurs when the temperature is 48°F.

¹ CRJ-200 operations to certain destinations during summer months are occasionally weight restricted on departure from RDM.

² Some Q400 operations associated with short haul routes such as RDM-PDX will remain into the future.



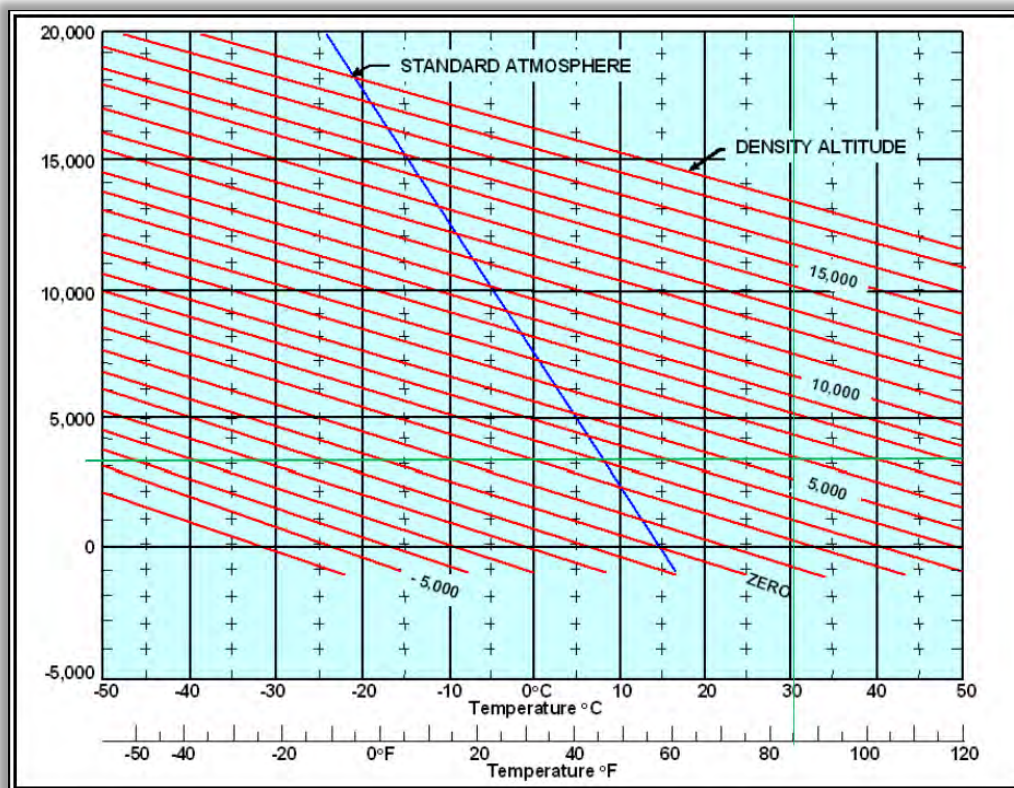
DENSITY ALTITUDE (DA)

This measurement comparing air density at a point in time and specific location to ISA is a critical component of aircraft performance calculations. DA is used to understand how aircraft performance differs than the performance that would be expected under ISA. DA is primarily influenced by elevation and air temperature. To examine the effect of changes to either variable, this calculation holds the other variable constant.

- ✓ When elevation is constant: When air temperature increases, DA increases. When air temperature decreases, DA decreases. This comparison is often used when analyzing aircraft performance at an airport during different times of the day and different days of the year.
- ✓ When temperature is constant: When elevation increases, DA increases. When elevation decreases, DA decreases. This comparison, which is not often used, can be employed to compare aircraft performance at different airports under identical climate conditions.

Figure 3-7 illustrates how DA is impacted when factoring in the average maximum temperature (85.5°F) for Redmond. The result is a density altitude increased to approximately 5,800 feet MSL.

Figure 3-7 DENSITY ALTITUDE FOR RDM AVERAGE MAXIMUM TEMPERATURE



For year-round planning purposes, density altitude of 5,800 feet MSL is assumed for the aircraft performance-based runway length analysis here.



FUTURE FLEET AND DESTINATIONS

DA, aircraft takeoff weight, and aircraft performance are the three primary factors to be considered when determining runway length requirements. Aircraft takeoff weight is directly related to the distance of the flight. For shorter distances, aircraft may be able to depart with a full passenger cabin and less than full fuel tanks. In those instances, the aircraft will typically be departing below MTOW and experience better takeoff performance. Aircraft will typically require a full load of fuel for longer trips. A full passenger cabin and full load of fuel will be close to the aircraft's MTOW.

This runway length analysis looks at the future fleet changes as discussed in **Chapter 2** in conjunction with destinations likely to be served from RDM in the future. Destination distance is a critical factor in this analysis. RDM currently sees non-stop service to the airline hubs within 1,000 nm distance (Seattle-Tacoma International Airport, Portland International Airport, Salt Lake City International Airport, San Francisco International Airport, Los Angeles International Airport, Phoenix Sky Harbor International Airport). The next step beyond those hubs would be direct flights to Midwest or midcontinent hubs such as Minneapolis-Saint Paul, Minnesota; Denver, Colorado; and Houston and Dallas/Fort Worth, Texas. Those cities are all within 1,500 nm, which is a reasonable range for the forecast airline fleet, and likely destinations within the 20-year planning window.

The following analysis documents calculated takeoff weights for each of the air carrier aircraft types to reach a 1,500 nm destination. Those takeoff weights are then used with the aircraft manufacturer's performance tables contained in their respective airport planning manuals to determine a runway length requirement for the future.

RUNWAY LENGTH RECOMMENDATION

Using the 1,500 nm destination, as mentioned above, results in varying takeoff length requirements for the different aircraft types, as shown in **Table 3-9**. The CRJ-200 is not capable of flying for 1,500 nm. For the CRJ-700, 1,500 nm is near the range limits of the aircraft, and it must be weight restricted in order to carry enough fuel for the trip.

The B737-700 and A319 can make the trip with a full passenger load, but not with the current RDM runway length. The CRJ-900, B737-800, and EMB-175 would require some weight adjustments (e.g., blocked seats) in order to make the 1,500 nm trip.

The 1,500 nm destination is near the range limit of the EMB-175. No additional runway length would improve the passenger carrying capacity for the EMB-175 at RDM when adjusted for DA.



Table 3-9. Runway Length Requirements	
Aircraft Type	Takeoff Length Required for 1,500 NM Trip
Existing Fleet¹	
CRJ-200	Out of Range
CRJ-700	9,100 feet ²
Future Fleet	
CRJ-900	11,000 feet
EMB-175	10,000 feet ³
B737-700	8,500 feet
B737-800	12,000 feet
A319	9,800 feet
¹ The Q400 has been excluded from this analysis since they will be eliminated from service except for very short haul flights (RDM-PDX). ² Weight restricted with a reduction of 10 passengers. ³ Weight restricted with a reduction of 13 passengers.	

Figures 3-8, 3-9, and 3-10 show three options to be considered in preliminary discussions for locating a runway extension: a split extension, northeast extension, and southwest extension. Variations of a 10,000-foot runway are explored in further detail in the **Chapter 4 Alternatives Analysis**.

RUNWAY WIDTH

Table 3-10 summarizes the runway width requirements according to RDC compared with the current runway widths.

Table 3-10. Runway Width Requirements					
Runway 11-29			Runway 5-23		
B-III Design Width	Existing Width	Meets Standards?	C-III Design Width	Existing Width	Meets Standards?
100'	100'	Yes	150'	150'	Yes

As no changes in RDC code are anticipated within the 20-year planning period, no changes in runway width are required.

RUNWAY PAVEMENT STRENGTH

The FAA provides guidance for classifying and reporting pavement strength in AC 150/5335-5C, *Standardized Method of Reporting Airport Pavement Strength – PCN*. The pavement strength is represented by a value called the Pavement Classification Number (PCN). The PCN is calculated based upon the pavement section, total aircraft operations, and operations by the most demanding aircraft anticipated to utilize the pavement.



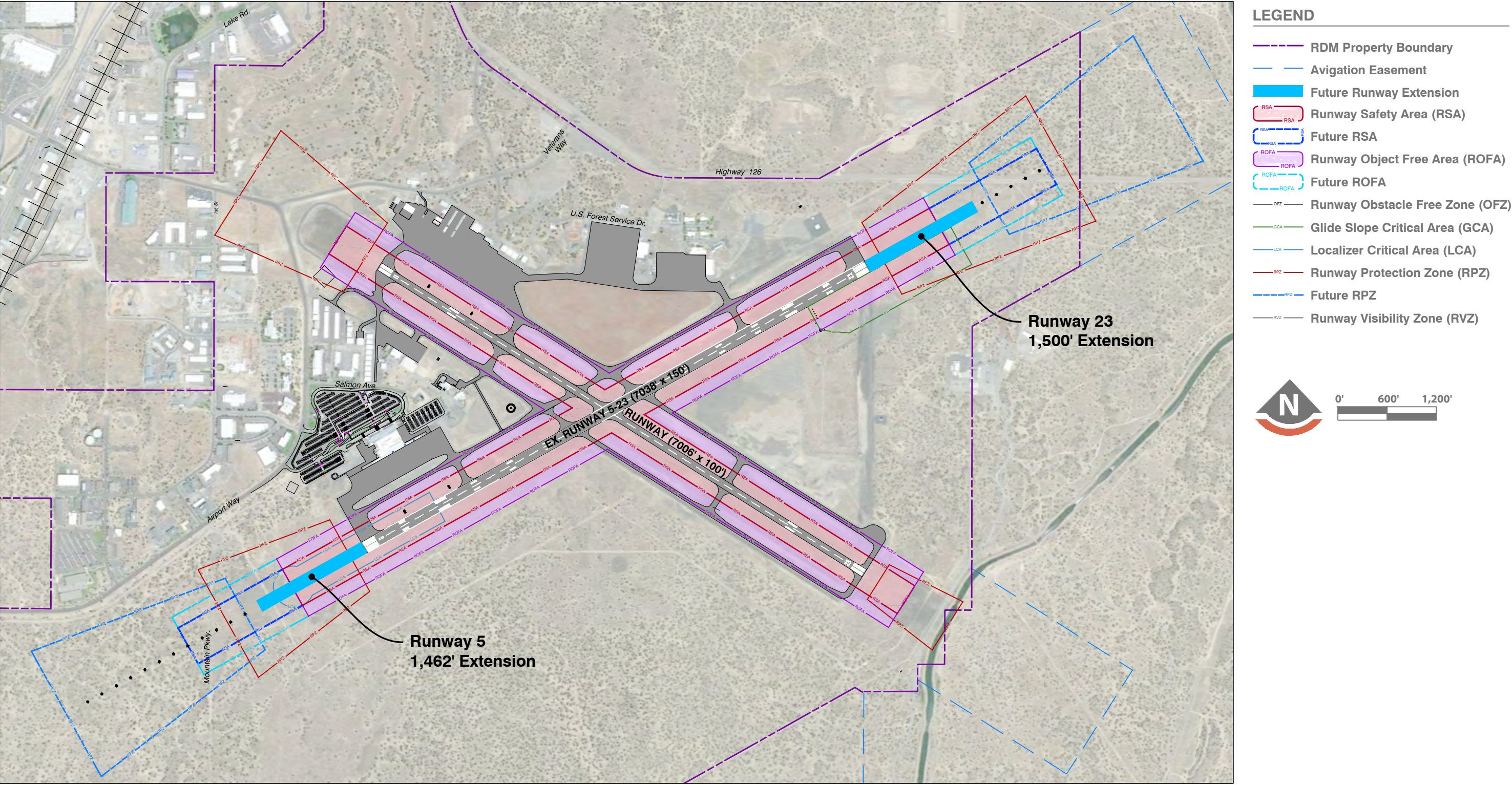
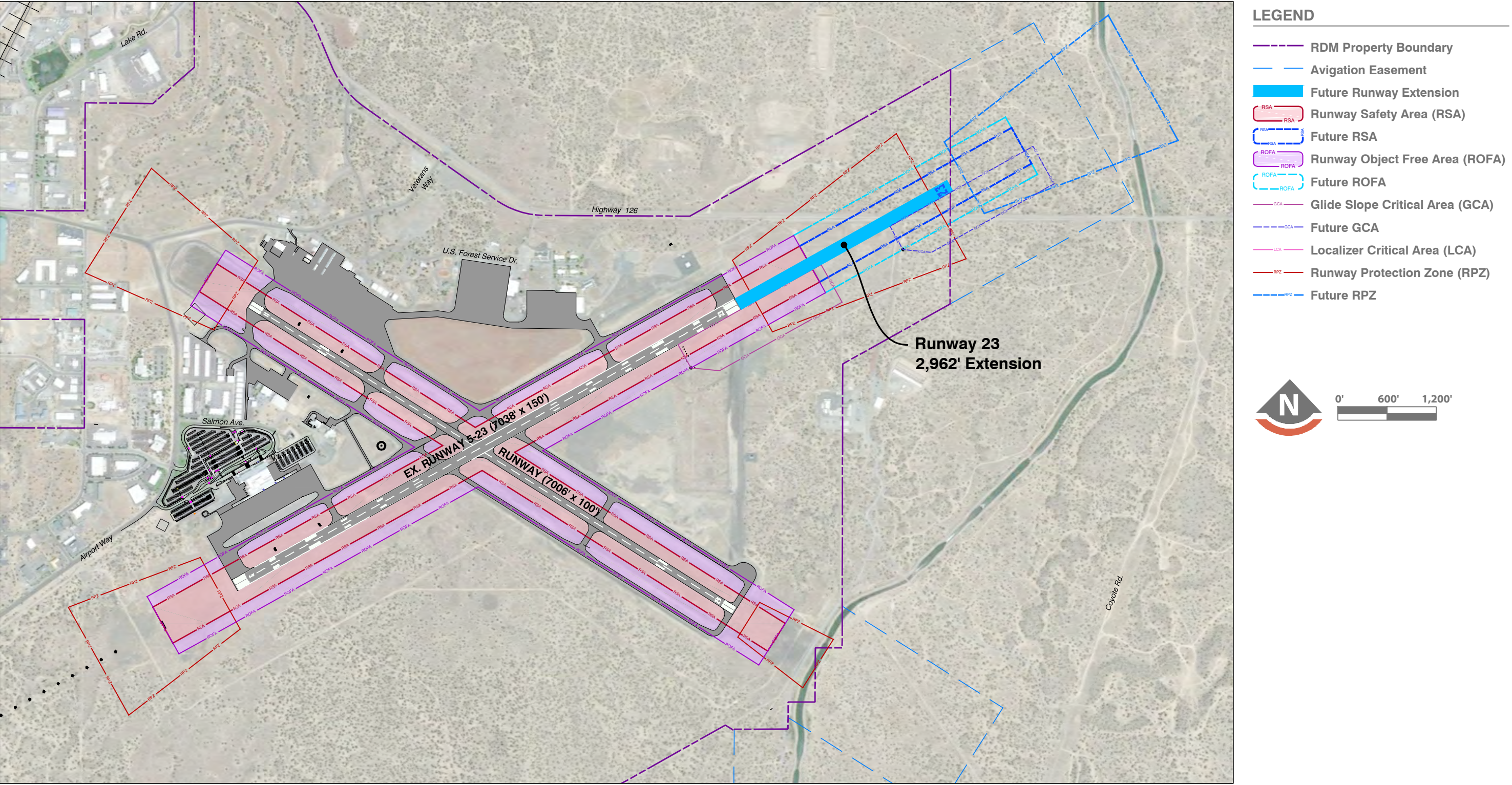


Figure 3-8
RUNWAY EXTENSION - SPLIT



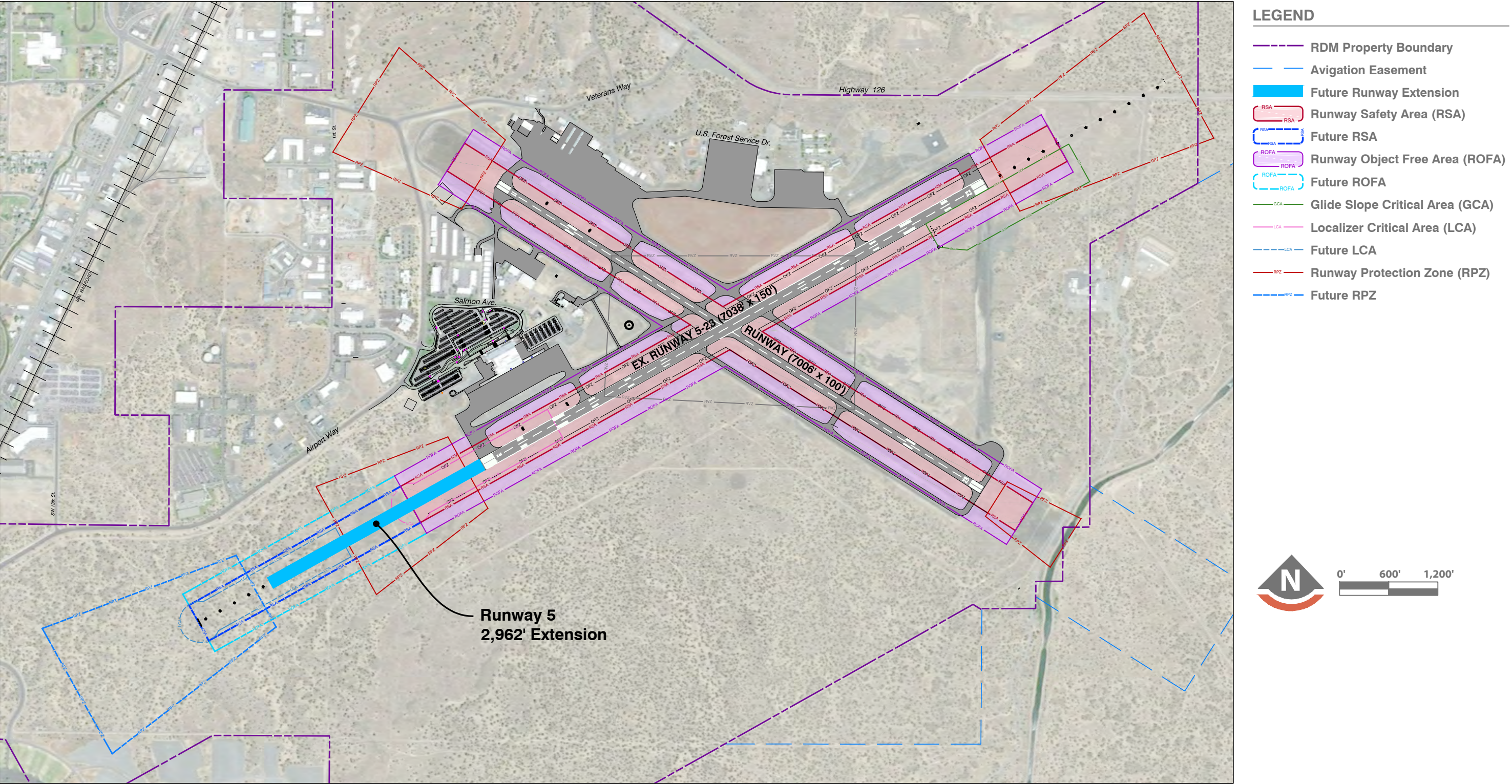


Figure 3-10
RUNWAY EXTENSION - WEST

Airfield pavements strengths are detailed in **Chapter 1 Airport Inventory**. The aircraft types that currently operate at the airport are under the pavement strength limits for their respective areas on the airfield. However, as the airline fleet transitions away from regional jets to narrow body aircraft (B737 and A319), the pavement ratings will be exceeded. Pavement strength ratings are not necessarily a limit, but rather a design rating. That means aircraft weighing over the design rating will not cause the pavement to immediately fail, but with continued use, the life cycle of the pavement will be reduced. When the Airport does see these larger narrow body airline aircraft increasing in frequency at the airport, pavement strengthening projects should be studied.

INSTRUMENT APPROACHES AND DESIGN SURFACES

Instrument approaches in effect at RDM are described in the **Chapter 1 Airport Inventory**. A summary of the lowest minimum approach procedures are included in **Table 3-11**. The glide slope antenna, localizer antenna and medium intensity approach lighting systems (MALSRs) facilities make up the ILS. This system supports precision instrument approaches to Runway 23. More discussion on these facilities is provided in the Airside Facilities Section of **Chapter 1**.

Table 3-11. Lowest Minimums – Instrument Approach Procedures		
Approach Procedures	Visibility (NM)	Descent Minimums (Feet)
ILS OR LOC RWY 23	1/2	200
RNAV (GPS) RWY 11	7/8	250
RNAV (GPS) Y RWY 05	3/4	250
RNAV (GPS) Z RWY 29	1	286

There are three principal standards used to protect the flight corridors to and from runways:

- ✓ Title 14 of the Code of Federal Regulation, Part 77, *Safe, Efficient Use, and Preservation of Navigable Airspace* (Part 77)
- ✓ FAA Order 8260.3C, United States Standard for Terminal Instrument Procedures (TERPS)
- ✓ Threshold siting surfaces (TSS) described in AC-13A

Part 77 and TSS deal with runway threshold location and compatible land use and are used in airport planning. TERPS surfaces deal with instrument procedure development and are not commonly used in airport planning. The TERPS instrument departure surface is cross-referenced as a TSS in AC-13A.

Part 77 imaginary airspace surfaces are determined by the runway type and the type of instrument approach procedure (e.g. visual, non-precision, and precision). Part 77 surfaces are notification surfaces designed to identify and determine obstructions to air navigation. They are advisory, not regulatory; however, Oregon State Code (ORS) 836.530 provides regulatory authority for the State to enforce the standards. Penetrations to Part 77 surfaces can make it difficult for airports to extend or relocate runways, or to add new instrument procedures.



TERPS surfaces are determined by the type of instrument approach procedure (e.g. ILS, global positioning system [GPS], VHF Omnidirectional Range [VOR]). TERPS surfaces are regulatory, and penetrations to TERPS surfaces will result in the modification or cancelation of an instrument approach procedure.

TSS, also known as obstacle clearance surfaces, are determined by the type of instrument procedure and critical aircraft on each runway, and the visibility minimums of the lowest instrument approach. TSS apply to both approach and departure ends of the runway, and determine the location of the runway thresholds. Penetration of TSS will require modification of departure climb gradient for penetrations to departure TSS, and/or relocation of landing thresholds or reduction in approach procedure capability for penetrations to approach TSS. Airspace surfaces are drawn and analyzed as part of the ALP set development.

At this time, an upgraded approach to runway end 5 that supports LPV approach capabilities, similar to the localizer and glideslope of an instrument landing system (ILS) approach into runway end 23, is under consideration.

RUNWAY LIGHTING AND MARKING

Runway 5-23 is equipped with high-intensity runway edge lighting, runway end identifier lights, and a MALSR to the approach end of Runway 23.

Runway 11-29 is equipped with medium-intensity runway edge lighting and runway end identifier lights. No approach lighting system serves either end of Runway 11-29.

Runway 11-29 is marked with non-precision markings and Runway 5-23 is marked with precision markings in accordance with FAA AC 150/5340-1L, *Standards for Airport Markings*.

No major changes, other than periodic maintenance and updates, to the runway markings or lighting systems are recommended within the 20-year planning period.

RUNWAY SYSTEM CONCLUSION AND RECOMMENDATIONS

Runway 5-23 will need an extension to a length of about 10,000 feet to accommodate the future airlines passenger fleet. Alternative means of serving this fleet are explored in the next chapter.

3.2.4 TAXIWAY SYSTEM

Taxiways enable circulation of aircraft from the runways to terminal area facilities and between facilities within the terminal area. FAA design standards and guidelines intended to enhance safety and pilot situational awareness serve as the basis for this review of the adequacy of the RDM taxiway system.



RDM already has full-length parallel taxiways and regularly spaced exit taxiways serving both runways. Therefore, the focus in this master plan has been on refining the layout to meet current FAA design standards and address hot spots (defined below).

TAXIWAY DESIGN STANDARDS

As with runways, taxiways standards are based upon the critical aircraft expected to use each taxiway. The existing critical aircraft are the E175 for Runway 5-23 and the Q400 for Runway 11-29. The E175 is in TDG 3 and the Q400 in TDG 5. Due to the higher TDG of the Q400 and the Q400 operating on both runways, TDG 5 is the existing design standard. As mentioned in section **3.2.2 Airfield Design**, a taxiway construction project for Fiscal Year 2018 will change the connector taxiways of Runway 11-29 to TDG 4 to allow the Q400 to continue operating at RDM until the Q400 is no longer in service and while the future critical aircraft changes to the A319. The A319 is in TDG 3 and will dictate future taxiway design standards. Once the Q400 is no longer in service, the parallel taxiways serving both runways (Taxiway F, G, and C) and all connector/exit taxiways should be designed to accommodate TDG 3. Taxiway standards are shown in **Table 3-11**.

Table 3-11. Taxiway Standards

Taxiway Design Group	Width	Taxiway Edge Safety Margin	Shoulder Width
TDG 5	75	15	30
TDG 4*	50	10	20
TDG 3*	50	10	20

**: Please see AC 150/5300-13A for differences in taxiway fillet dimensions.*

TAXIWAY GEOMETRY ANALYSIS

AC-13A includes taxiway design recommendations for reducing the potential for runway incursions. The section that follows provides a review of those design standards relevant to the current airfield configuration.

Runway Incursions:

Runway incursions are events when an aircraft or vehicle inadvertently proceeds onto an active runway without air traffic control clearance.

DIRECT ACCESS TO RUNWAYS

One of the ways to reduce runway incursions is to require pilots taxiing aircraft to make distinct, purposeful turns between leaving an apron area and accessing a runway. That is to say, there should not be direct straight-line taxiways leading from an apron to a runway and taxiway turns should be right-angle connectors. An example of the direct access issue and resolution is shown below in **Figure 3-11**. An example of a right-angle connector is shown in Figure 3-12. There are several areas on the Airport where direct access currently occurs. These areas are listed below and identified on **Figure 3-13**.

- ✓ **Taxiway A (north side):** a taxiway centerline stripe leads directly from a tiedown apron across Taxiway C to the threshold for Runway 11



- ✓ Taxiway A (south side): a taxiway centerline stripe leads directly from a row of box hangars across Taxiway G to the threshold for Runway 11
- ✓ Taxiway E: a taxiway centerline stripe leads directly from the commercial apron to the threshold for Runway 5
- ✓ Taxiway H: a taxiway centerline stripe leads directly from the commercial apron to Runway 5-23

Figure 3-11. Example of Direct Access Issue and Resolution

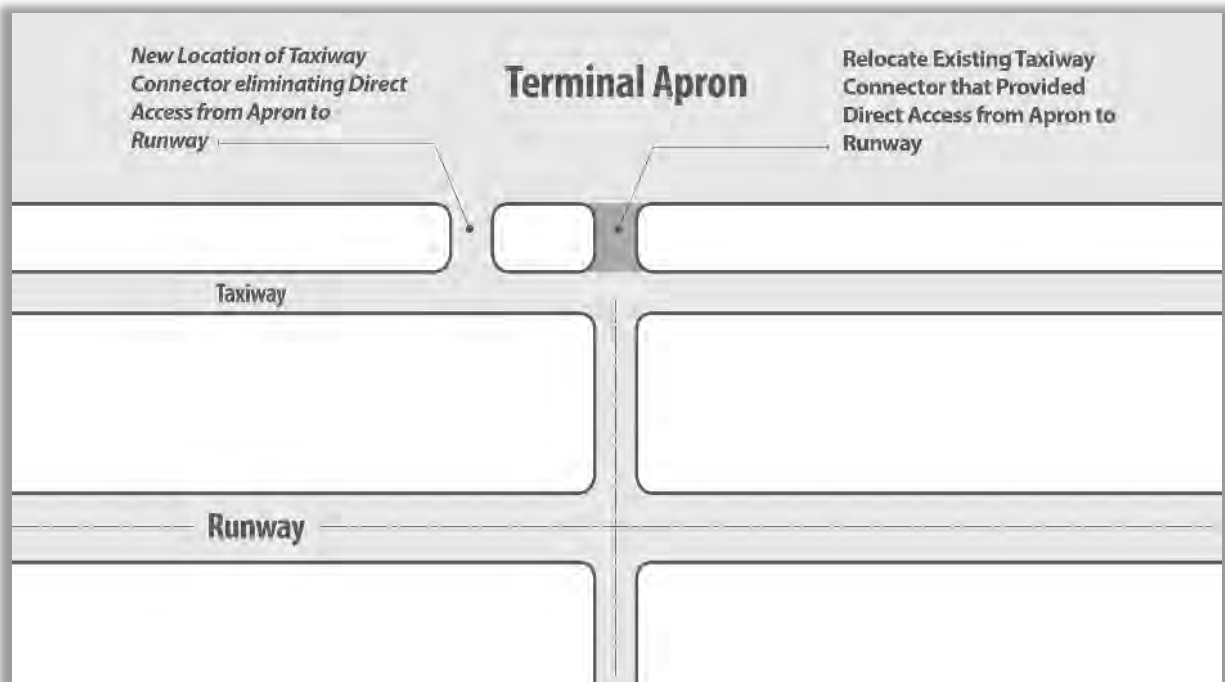
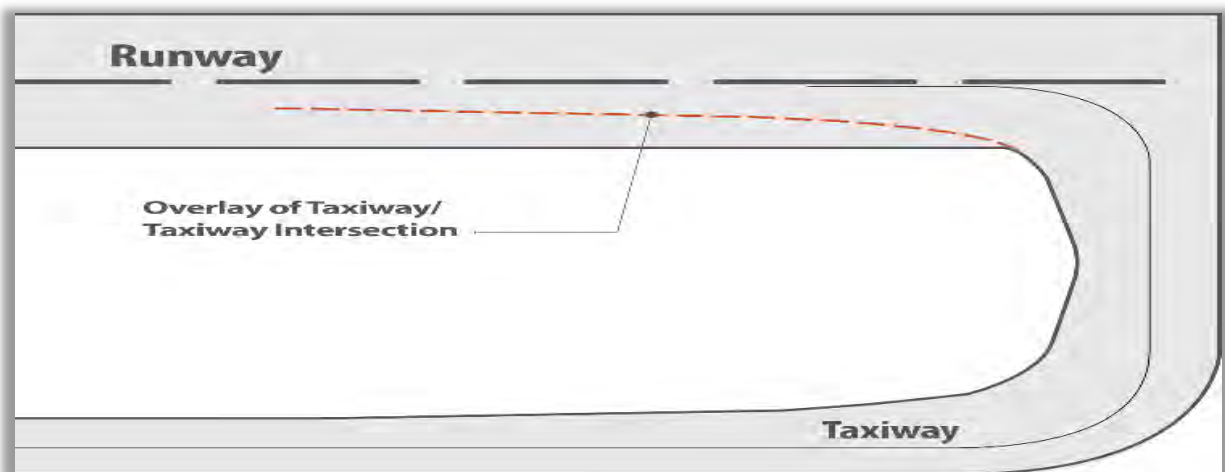


Figure 3-12 Example of Right-Angle Connector



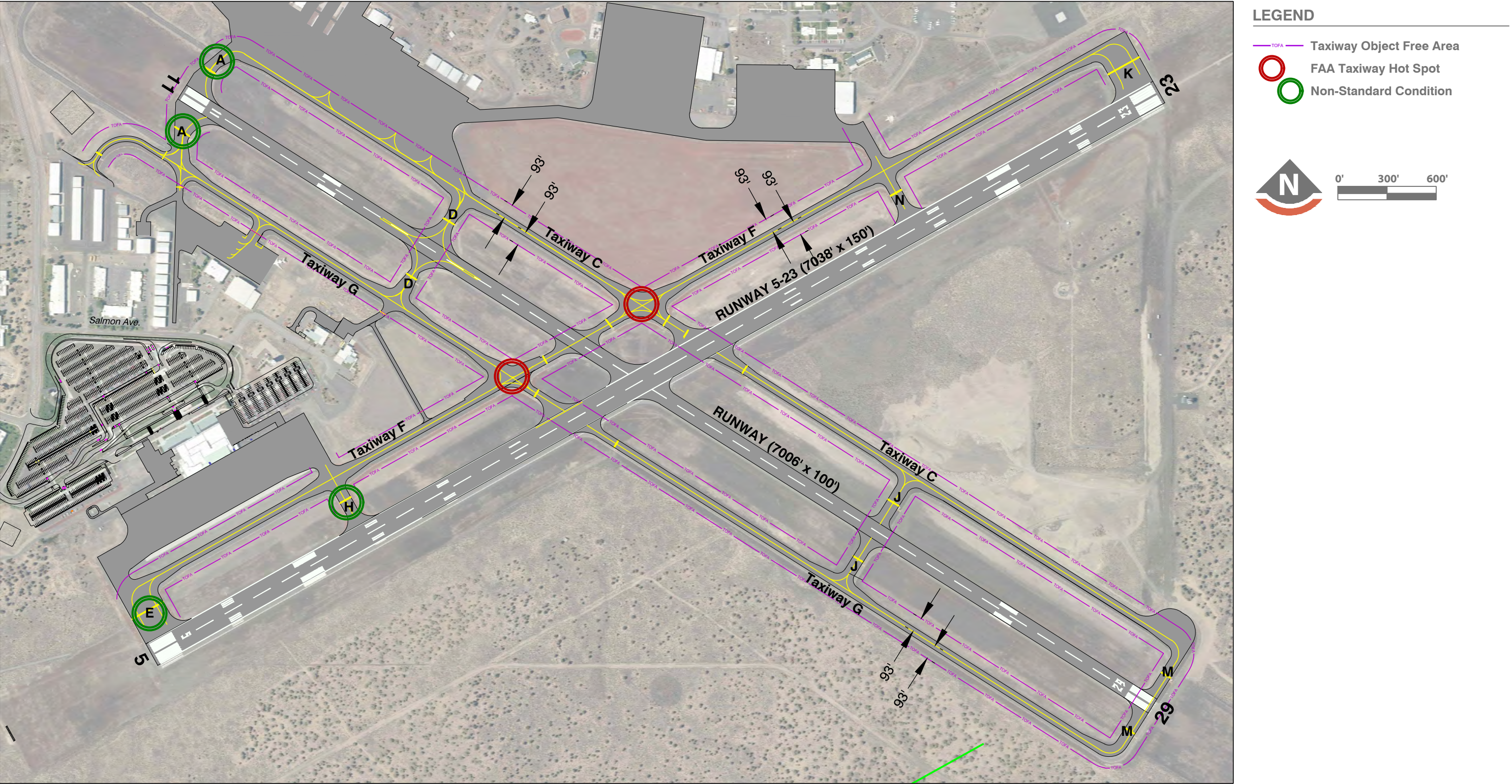


Figure 3-13
TAXIWAY DESIGN

COMPLEX INTERSECTIONS

The AC-13A also recommends simplifying complex taxiway intersections. The AC defines complex taxiway intersections as those with more than three nodes (more than three possible directions of travel). No taxiway junctions on the RDM airfield are complex intersections. No changes are required.

HOT SPOT ANALYSIS

Two areas of the airfield have been designated by the FAA as Hot Spots: the Taxiway C intersection with Taxiway F, and the Taxiway F intersection with Taxiway G. Ultimately the FAA will likely require proposed resolutions to these two areas to reduce the risk of runway incursions. **Chapter 4 Alternatives Analysis** will include analysis of potential designs.

Hot Spot:

A hot spot is defined as a location on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary.

RUNWAY END CONNECTORS

Another design standard introduced in AC-13A was intended to reduce or eliminate wide expanses of pavement, especially at runway crossing locations. Until recently Taxiway E and K had dual entrance taxiways without “no taxi” islands painted on the pavement. This nonstandard condition was corrected in 2017.

RIGHT-ANGLE TAXIWAY CONNECTORS

The AC recommends that all taxiway connections to runways be 90-degree angles, except for high speed exit taxiways and parallel taxiways associated with one runway crossing another runway. The north and south segments of Taxiway A are both oblique-angled taxiways that do not fall into either of the exception categories just discussed. The modifications to these two segments described above under the **Direct Access to Runways** section will provide the recommended right-angle taxiways. An example of a right-angle taxiway connector is shown in **Figure 3-12**.

EXIT TAXIWAY ANALYSIS

The location of exit taxiways can impact a runway’s capacity. The quicker an aircraft can slow to a safe speed and exit the runway, the sooner another can land or takeoff. AC-13A states that, in general, each 100-foot reduction of the distance from the threshold to the exit taxiway reduces the runway occupancy time by approximately 0.75 second for each aircraft using the exit. Conversely, the opposite is true as well, each every 100-foot increase in the distance from the threshold to the exit taxiway increases the runway occupancy time by approximately 0.75 second for each aircraft using the exit. **Table 3-12** below contains the exit taxiway distance from landing threshold for each of the four runways and the corresponding percentage able to use each exit taxiway. The information below is for dry runways only. When wet, the percent of aircraft able to use each taxiway will be reduced as the landing lengths will be increased. Since RDM does not currently and is not forecast to experience a capacity or delay problem, there is no need to adjust the current locations of these exit taxiways.



3-12. Taxiway Exit Utilization (Dry)					
Runway 23					
Taxiway	Distance	Percent Able			
		Small Single Engine	Small Twin Engine	Large	Heavy
N	1,660'	40%	0%	0%	0%
C	3,085'	100%	39%	0%	0%
G	4,070'	100%	98%	8%	0%
H	5,476'	100%	100%	75%	24%
E	6,850'	100%	100%	95%	90%
Runway 5					
Taxiway	Distance	Percent Able			
		Small Single Engine	Small Twin Engine	Large	Heavy
H	1,450'	39%	0%	0%	0%
G	2,800'	95%	35%	0%	0%
C	3,750'	100%	89%	5%	0%
N	5,275'	100%	100%	40%	5%
K	6,850'	100%	100%	95%	90%
Runway 11					
Taxiway	Distance	Percent Able			
		Small Single Engine	Small Twin Engine	Large	Heavy
D	1,700'	80%	1%	0%	0%
F	2,750'	100%	35%	0%	0%
J	5,000'	100%	100%	49%	9%
M	6,850'	100%	100%	95%	90%
Runway 11					
Taxiway	Distance	Percent Able			
		Small Single Engine	Small Twin Engine	Large	Heavy
J	1,950'	84%	1%	0%	0%
F	4,050'	100%	98%	8%	0%
D	5,100'	100%	100%	49%	9%
A	6,850'	100%	100%	95%	90%
*Small Single Engine = 12,000 lbs or less Small Twin Engine = 12,500 lbs or less Large = 12,500 lbs to 300,000 lbs Heavy = Greater than 300,000 lbs					

TAXIWAY PAVEMENT STRENGTH

As discussed under the **Runway Pavement Strength** section above, the forecast airline fleet transitions to narrow body aircraft will exceed the existing pavement strength ratings. When the Airport does see these larger narrow body airline aircraft increasing in frequency at the airport, pavement strengthening projects should be studied.

TAXIWAY SYSTEM CONCLUSION AND RECOMMENDATIONS

The existing taxiway system serves the RDM Airport users well. No major inadequacies exist for the current airfield configuration or activity levels. Some areas are identified below that do not comply with the latest geometry guidance from the FAA. Those areas are analyzed in **Chapter 4** and depicted with solutions on the ALP.

- ✓ Taxiway A (north side): add pavement and restripe to provide a right-angle taxiway



- ✓ Taxiway A (south side): add pavement and restripe to provide a right-angle taxiway
- ✓ Taxiway E: replace existing taxiway segment between the apron and Taxiway F with a new connector taxiway located about 400 feet east of the existing taxiway
- ✓ Taxiway H: replace the existing taxiway segment between the apron and Taxiway F with a new connector taxiway located about 175 feet east of the existing taxiway
- ✓ Taxiway C hot spot: shift segment that crosses Runway 5-23 to the east
- ✓ Taxiway G hot spot: shift segment that crosses Runway 5-23 to the west
- ✓ Runway exit taxiways: retain current locations
- ✓ Pavement strength: evaluate pavement strength requirements when narrow body airline aircraft begin regularly scheduled operations at the Airport

As presented below in the **General Aviation Facilities** section, if the Airport moves forward with developing a new east field GA complex, the airport could ultimately benefit from a full-length parallel taxiway to the east of Runway 5-23. The existing GA facilities at RDM are constrained and a full-length parallel taxiway east of Runway 5-23 will provide access to the airfield for a new GA complex and allow for future airport development on property that is adjacent to the parallel taxiway.

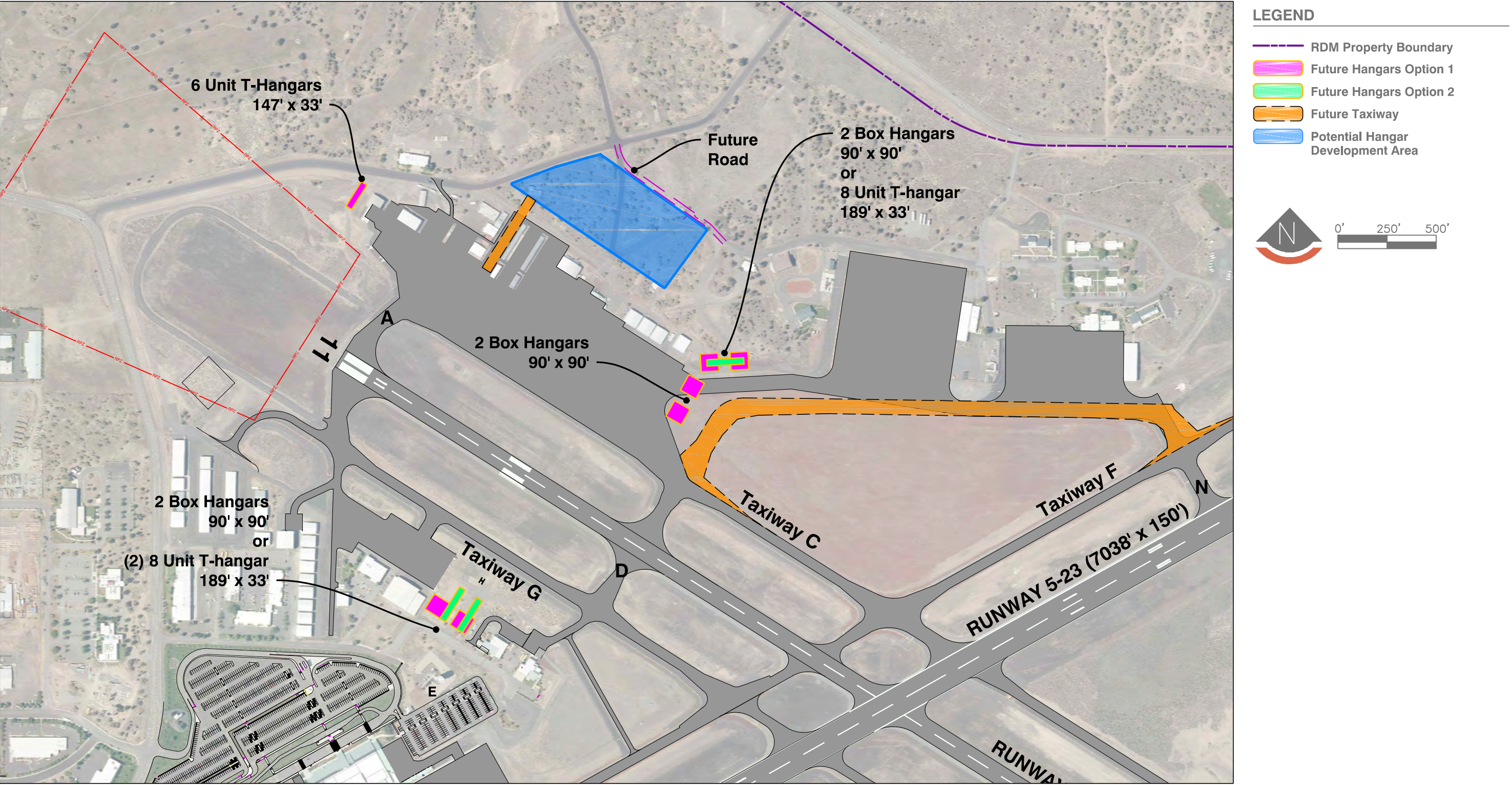
Figure 3-13 (above) highlights non-compliant areas of the airfield.

3.2.5 GENERAL AVIATION FACILITIES

Growth in GA based aircraft at the Airport is contingent upon adequate facilities and easily developable areas. Currently, the general aviation facilities at the airport are somewhat constrained. With a few exceptions, the easily developable areas with access to the airfield are occupied. The remaining areas available can be used for infill hangar development in an effort to accommodate some of the projected 33 new based aircraft at the Airport, which are forecast within the 20-year planning period.

Figure 3-14 depicts conceptual hangar infill sites and one new development area on the north side of the airfield.





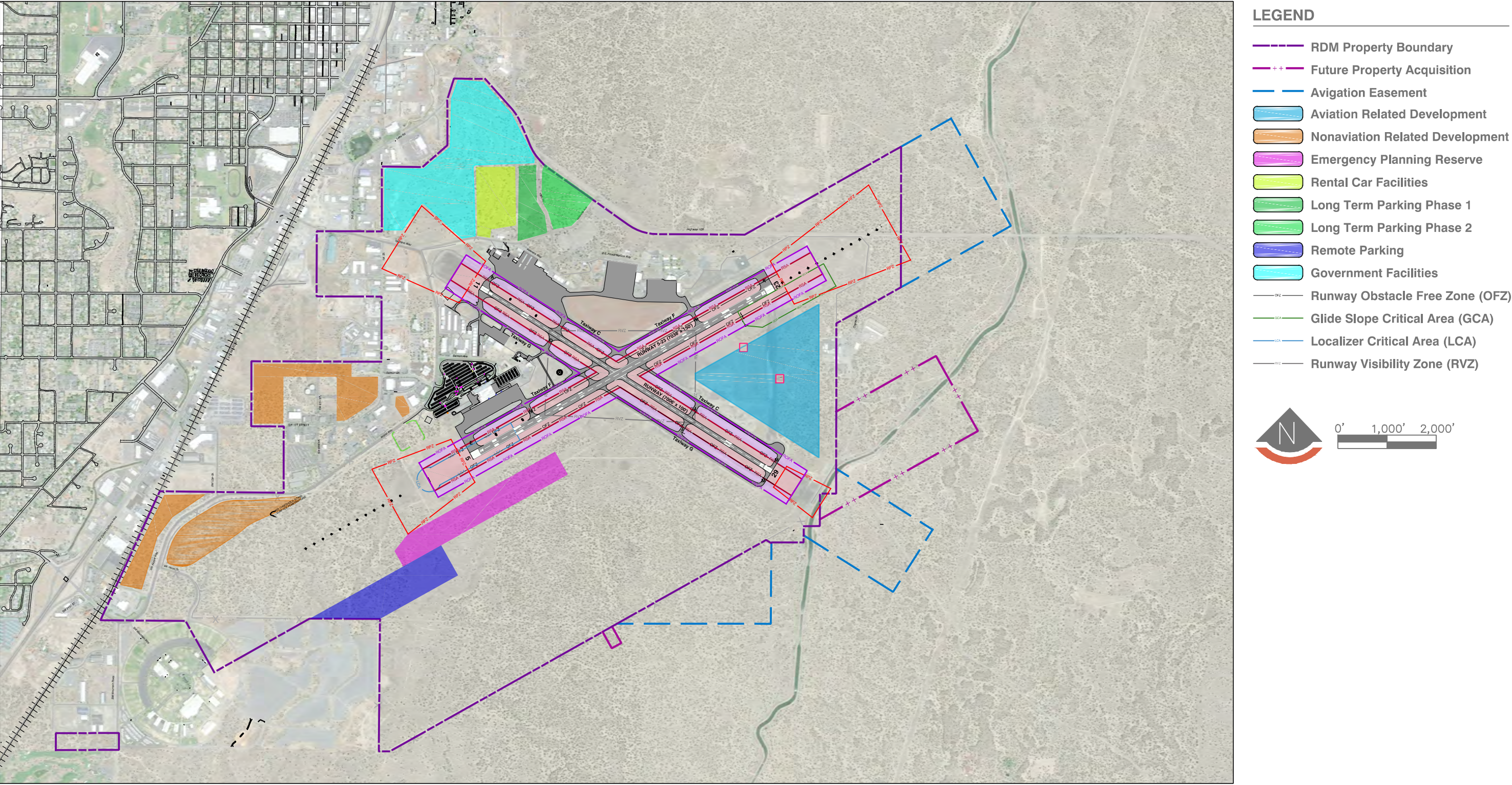


Figure 3-15
DEVELOPMENT AREAS

Chapter 2 Aviation Activity Forecast identifies an increase of 5 single-engine aircraft, 24 jet aircraft, 6 helicopters, and 5 other type aircraft relocating to the Airport within the 20-year planning period. Some of these aircraft could be located in the infill sites as shown in **Figure 3-14**, however, in order to accommodate all 33 aircraft, at least one new GA development area should be planned.

To protect for GA development beyond the 20-year planning period or growth exceeding this plan's forecast, an aviation reserve area is proposed in the east quadrant of the airport between the two runways. **Figure 3-15** shows this location. If another Fixed Base Operator (FBO) is looking to serve the Airport, this would be a suitable location. However, development in this area will be costly due to the lack of infrastructure and the high cost of site preparation.

Variations and alternative configurations of the hangar infill sites and GA development area will be further explored in the **Chapter 4 Alternatives Analysis**.

Itinerant operations are also relevant to this master plan. The Airport is forecast to experience an increase of approximately 3,000 itinerant general aviation operations within the 20-year planning period. The 3,000 annual operations equate to approximately 8 operations per day, or 4 aircraft visiting the airport. The existing FBO can accommodate the increase as currently configured.

Additional support facilities are discussed later in this chapter.

CONCLUSIONS AND RECOMMENDATIONS

To accommodate the forecast increase in general aviation based aircraft, the following facility improvements should be made:

- ✓ Identification of hangar site alternatives
- ✓ Locate long-term general aviation development area

PASSENGER TERMINAL APRON

The passenger terminal apron is approximately 1,528 feet wide and 297 feet deep (453,816 square feet). Taxiway connectors H and E provide access to parallel taxiway F and Runway 5-23.

The apron accommodates seven aircraft parked at terminal gate positions and one additional parking position. Based on current airline schedules, up to eight aircraft each day are scheduled to remain overnight (RON). As airline operations increase and schedules change this number may increase to 10 RON aircraft. Given that the passenger terminal apron is currently at capacity for RON aircraft, the airport should plan for an apron expansion as soon as practical. **Figure 3-16** illustrates a conceptual apron expansion to accommodate the projected RON demand. Specific locations and alternatives will be explored in the following **Chapter 4 Alternatives Analysis**.



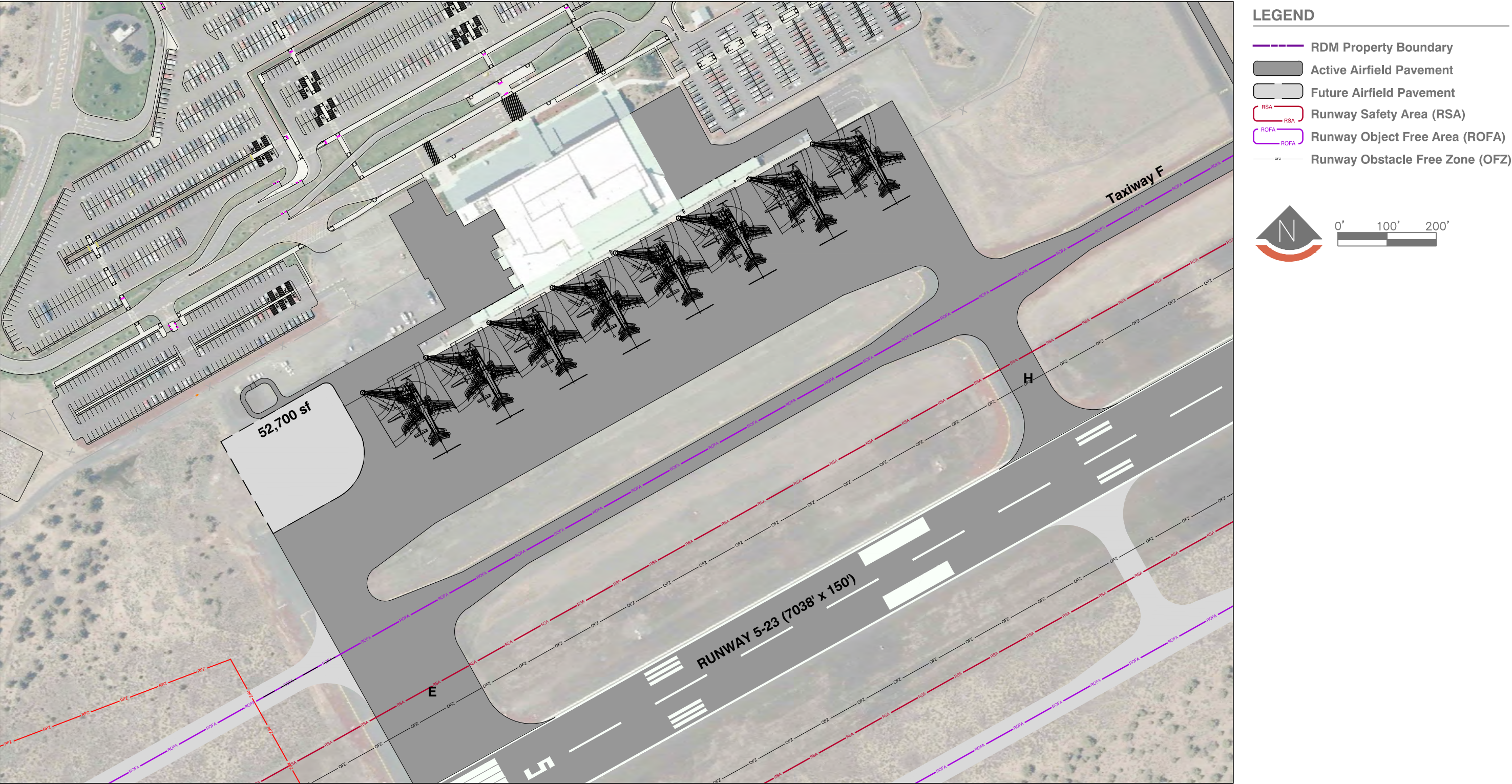


Figure 3-16
TERMINAL AND AIRLINE
APRON EXPANSION

3.3 LANDSIDE FACILITY REQUIREMENTS

3.3.1 PASSENGER TERMINAL ROADWAY

With the advent of Transportation Network Companies (TNC) such as Uber and Lyft, the Airport has identified a need for a separate curbside area to consolidate TNC vehicles dropping off and picking up passengers. **Chapter 4 Alternatives Analysis** will include various locations and options for this service.

3.3.2 PASSENGER TERMINAL PARKING AREA – PUBLIC PARKING

At RDM public parking is a single-level uncovered parking lot that accommodates both short- and long-term parking. As of 2017, the terminal parking lot accommodates 1,083 vehicles. This analysis compares parking spaces against enplaned passengers for forecast scenarios to determine whether the parking facilities will require expansion.

ACRP Report No. 25: Airport Passenger Terminal and Design recommends that public parking supply should range from 900 to 1,400 spaces per million enplaned passengers. Based on this guidance, total public parking spaces at RDM exceed the recommended range for current enplanement levels and fall within the recommended range through 2036. However, based on first-hand information supplied by the Airport, the parking lot has exceeded capacity several times in the last year. Given this information, it appears the suggested ratio of 900 to 1,400 spaces per million enplaned passengers is not appropriate for RDM.

Airports Cooperative Research Program (ACRP):

An industry-driven, applied research program managed by the Transportation Research Board (TRB) that develops near-term, practical solutions to problems faced by airport operators.

The Airport has reached parking capacity with current enplaned passenger levels of 322,176. A ratio of 330 parking positions for every 100,000 enplaned passengers is based on capacity being reached in 2016 plus a 10 percent buffer. The Airport's parking lot requires expansion as soon as practical to meet existing demand, as well as projected future growth. Based on the airport-specific ratio of 330:100,000 enplanements, RDM should plan to accommodate an additional 1,100 parking spaces to accommodate demand through the 20-year planning period, shown in **Table 3-13**. The parking expansion can be accomplished with phased development, allowing the Airport to develop smaller portions of the parking expansion as needed. Auto parking areas are shown on **Figure 3-17**. Specific locations and alternatives will be explored in the following **Chapter 4 Alternatives Analysis**.



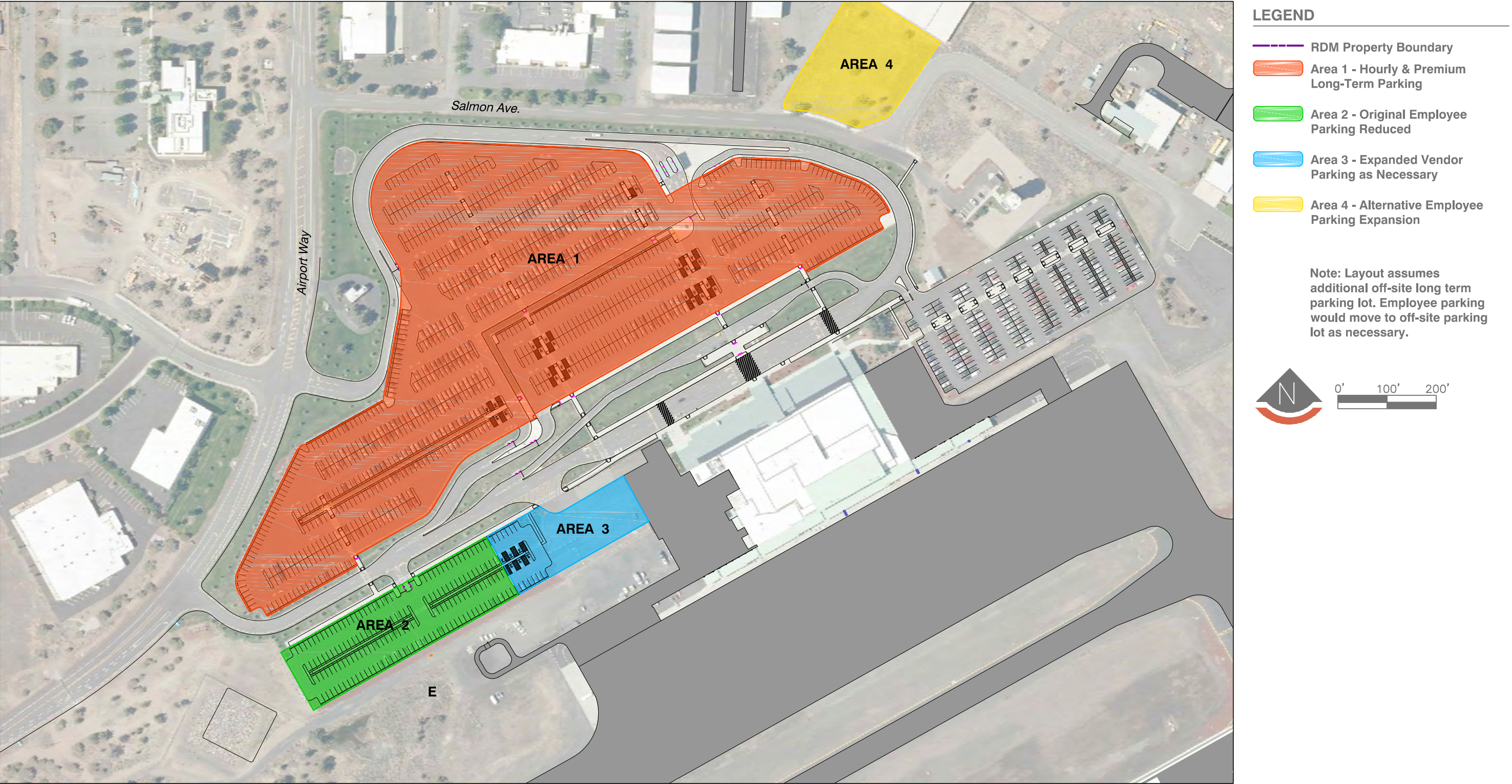


Figure 3-17
AUTO PARKING AREAS

Table 3-13. Recommended Parking Improvements

	2016	2021	2026	2031	2036
Enplanements	322,176	391,450	484,300	575,350	661,600
Parking Required³	1,083	1,292	1,598	1,899	2,183
Capacity (Deficiency)	0	(209)	(515)	(816)	(1,100)

ACRP recommends 1,000 feet as the maximum walking distance from a parking space to the terminal building before shuttle service should be offered. The farthest point at the northwest end of the parking lot is approximately 1,000 feet, while the farthest point at the southwest end is 1,250 feet. The far limits of the existing parking area are within the limits of pedestrian travel; however, the long walk from the southwest end of the parking lot is farther than desirable.

EMPLOYEE/TENANT PARKING

The employee and tenant parking lot is immediately adjacent to the terminal building on the southwest side and accommodates 195 vehicles. Currently the airport has issued 277 employee and tenant parking passes. If conditions dictate all employees must be present on the same day, the parking lot will be over capacity. As the Airport continues to experience record growth in enplaned passengers, employee and tenant numbers will grow. Additional parking for employees and tenants should be identified. For reference, the current ratio of parking passes allocated is 85.9 passes per 100,000 enplanements. Projecting this ratio out with the forecast enplanements results in a requirement of approximately 500 employee and tenant parking spaces in 20 years. Specific locations and alternatives for employee parking will be explored in the following **Chapter 4 Alternatives Analysis**.

3.3.3 RENTAL CAR FACILITIES

Alamo, Avis, Budget, Enterprise, Hertz, and National car rental agencies offer rental vehicles at the Redmond Airport. Vehicles are picked-up and dropped-off in a 224-space parking lot located immediately northwest of the terminal building. The Airport has near-term development plans for an offsite rental car facility that will include cleaning, storage, and a fueling station. The rental car agencies plan to continue using the 224 parking spaces next to the terminal building for the pick-up and return location. Long-term storage and support services will be accomplished at the future offsite location. Specific locations and alternatives will be explored in the following **Chapter 4 Alternatives Analysis**.

³ Ratio of parking spots to enplanements is 330 parking positions for every 100,000 enplanements and based off of 2016 enplanements and assumption of a full parking lot with a 10% buffer. Ratio was then applied to forecast enplanement numbers.



3.3.4 NON-AVIATION REVENUE DEVELOPMENT

The consultant conducted an analysis to identify the facility requirements for non-aviation businesses that complement the airport operations and are appropriate for the Redmond market, given local economic conditions. The analysis in its entirety is contained in the Appendix J. A summary of recommended infrastructure upgrades to help facilitate the revenue development are described below.

Non-Aviation Development Target Industries:

- ✓ Accommodation and Food Services
- ✓ Speculative Light Industrial Buildings
- ✓ Construction
- ✓ Manufacturing
- ✓ Wholesalers and Warehousing
- ✓ Public Administration

RECOMMENDED UPGRADES

The following recommendations are offered based on a comparison of the existing utility and transportation facilities and the corresponding demands of the target industries. **Figure 3-18** depicts the nine subareas that are the focus of this section. In all subareas, sewer lines would need to be extended from nearby mains and storm water management facilities would need to be constructed in conjunction with site development. Local streets should be constructed to the local industrial street standard (40-foot paved width with sidewalks) to accommodate necessary truck access for most of the target industry sectors. Improved access to Oregon Route 126 will eventually be required to accommodate future growth with any of the target industry sectors and will likely include added turn lanes and traffic signals. Turn lanes at major intersections may also be needed to serve future development. Necessary improvements would be identified with the preparation of traffic impact studies for specific development proposals.

Specific upgrade requirements for each subarea are noted below.

- ✓ North Development Parcel Subarea: The existing water lines between Lake Road and Veterans Way are not well-connected. A loop system is recommended throughout the subarea to maintain necessary flows for high-demand industrial users. This subarea currently has no existing transportation infrastructure and will need to rely on the construction of new streets. Transportation improvements associated with the Airport Runway Extension will eventually provide access through the subarea. Local streets that provide direct site access will need to be constructed to local industrial standard (40-foot paved width with sidewalks).
- ✓ North Business Park Subarea: The existing water lines between Veterans Way and OR 126 are not well-connected. A loop system is recommended to supply necessary flows for high-demand users. The local streets (10th Street, Sisters Avenue, Ochoco Way) need to be upgraded to current local industrial standard (40-foot paved width with sidewalks). Veterans Way needs to be upgraded to meet the major collector standard (36-foot paved width with sidewalks). At the Veterans Way intersection with OR 126, an eastbound right-turn deceleration lane on OR 126 may be necessary as volumes increase, and separate left- and right-turn lanes may be necessary on the Veterans Way approach. Left-turn lanes on Veterans Way at other intersecting roadways may also be needed.



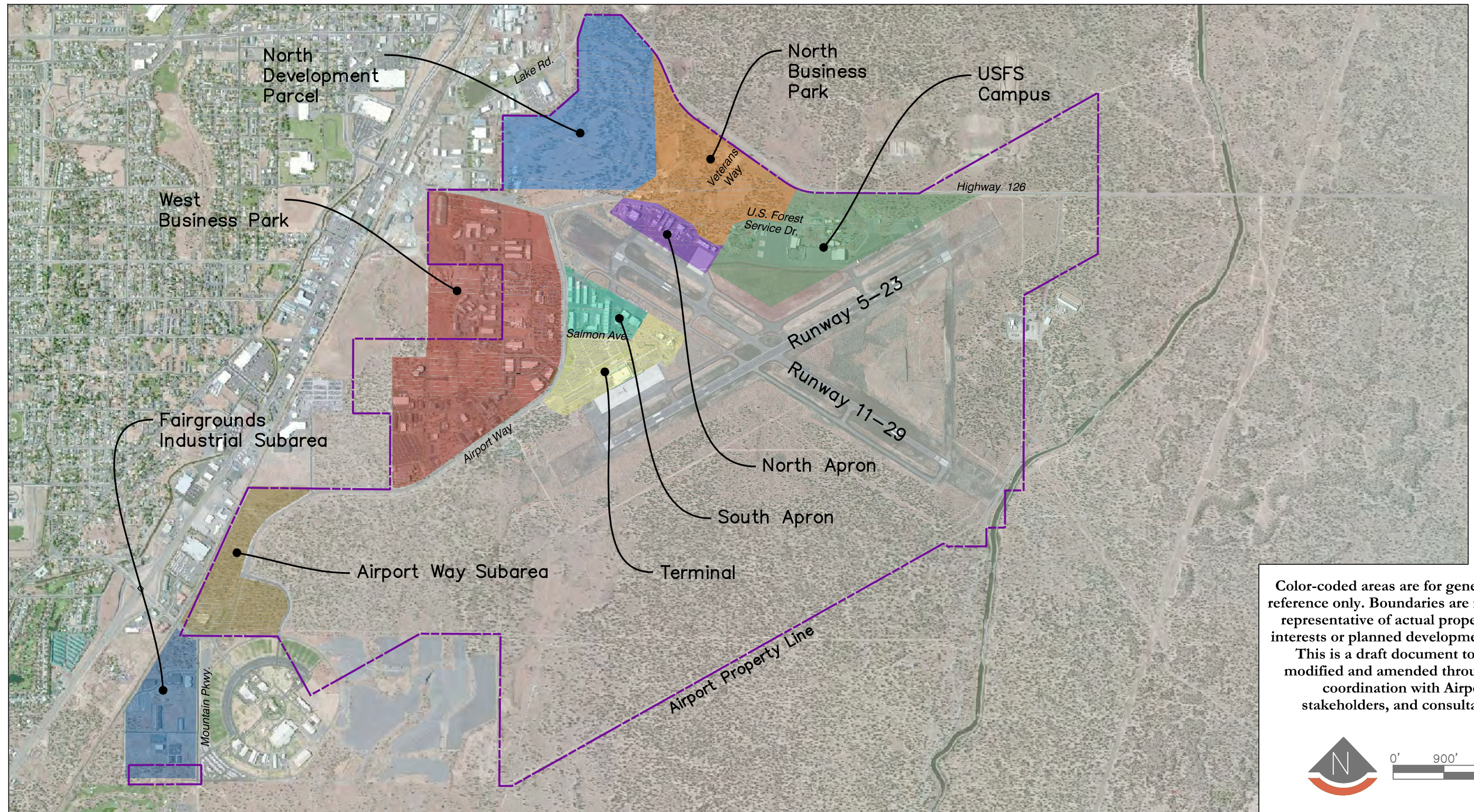


Figure 3-18
Development Areas

- ✓ South Apron Subarea: Salmon Avenue needs sidewalks on the north side of the street.
- ✓ West Business Park Subarea: Airport Way and Veterans Way need sidewalk infill, primarily along undeveloped property.
- ✓ Airport Way Subarea: Airport Way needs sidewalk infill on both sides of the street. Mt. Hood Drive needs sidewalks along both sides of the street. Wickiup Avenue needs to be constructed or upgraded to current local industrial standard (40-foot paved width with sidewalks).
- ✓ Fairgrounds Industrial Subarea: Airport Way needs sidewalks on the south side of the street.

3.4 TERMINAL AREA FACILITIES

The existing terminal is a relatively new facility constructed in 2010 to meet the requirements of the community in support of a modernization program that would both attract travelers from the region, including Redmond, and provide a better operating environment for the airlines.

3.4.1 AIRPORT ACTIVITY

The focus of the terminal area facility master plan is to develop additional capacity to meet current trends in airline operations reflected in the activity forecast. A migration to larger aircraft over the planning period is the primary trend. Airlines have been in the process of retiring smaller aircraft, the 35- to 50-seat jet aircraft that have served commuter operations since the mid-1990s, and replacing them with larger 65- to 90-seat aircraft. This trend has also included larger narrow-body aircraft that serve small hub destination airports on specific high demand and seasonal flights.

This section addresses terminal area facility improvements over the next 20 years. Level of service modifications and upgrades to these facilities areas can be built as a series of projects that meet specific needs during the period. **Table 3-14** provides the basis of design for this development, a summary of major airline peaking activity for 2016 and 2036 derived from the aviation forecasts. These peaking characteristics define the operation and are used to calculate operations-based program requirements.



Table 3-14. Airline Operations Peaking Characteristics – 2016 – 2036 Forecast		
Airline Activity Component	Existing (2016)	Forecast (2036)
Aircraft		
Aircraft	CRJ-700	B737/A319
Average Aircraft Seat Size	69	119
Load Factor	84%	84%
Passengers		
Total Passengers [Enplaned + Deplaned]	644,352	1,323,200
Peak Month Passengers - Enplaned	32,395	66,524
Peak Month Passengers - Enplaned - Percent	10.10%	10.10%
Peak Month Passengers - Deplaned	32,395	66,524
Peak Month Passengers - Deplaned - Percent	10.10%	10.10%
Total Average Day Passengers [Enplaned + Deplaned]	1,765	3,625
Total Peak Day Passengers [Enplaned + Deplaned]	2,324	7,122
Total Peak Hour Passengers	289	1,060
Peak Hour Enplaned Passengers [PHEP]	208	580
Peak Hour Deplaned Passengers [PHDP]	144	560
Enplanements Per Departure [E/D] - Average Annual Day	58	105
Enplanements Per Departure [E/D] - Average Day of Peak Month	60	115
Aircraft Operations		
Total Annual Airline Operations	11,200	12,600
Peak Week Air Carrier Operations	290	414
Total Daily Operations	42	60
Total Daily Flight Departures	21	30

Source: Mead & Hunt Airline Activity Forecasts

3.4.2 PASSENGER TERMINAL BUILDING

Airlines embarked on a program of consolidation and capacity constraint during and after the 2007–2009 recession. Capacity constraint served to move fuel-inefficient aircraft out of airline fleets, replacing them with aircraft that would provide both fuel savings and increased seating capacity. As the industry recovered and then began to grow, airlines have replaced commuter aircraft with larger narrow-body aircraft. Airport terminal facilities have been straining to meet the demands generated by the new aircraft for landside, terminal building, and ramp apron capacity.

The Redmond terminal building was designed for smaller commuter aircraft, those operating in the 50- to 70-seat range of seat capacity. It was also designed in a more traditional layout, in which a main departures hall serves as a waiting area, similar to a train station, where passengers await a boarding call and then proceed to their designated platform. In the airport terminal, tickets are lifted prior to entering the boarding corridor, which serves as the platform from which passengers are boarded onto the aircraft. These design elements place more limitations on capacity for passenger departures lounges than on other terminal components. One disadvantage to the current layout is that expansion requires moving other components. Expansion of the upper level concourse departures lounge is possible, and would have less impact on functional components, but that expansion is limited to either side, as moving into the ramp apron would reduce space required for larger aircraft.



While this layout has merit in a smaller terminal, it can be counterintuitive to travelers who prefer to be as close to their transport as possible prior to boarding. Proximity provides a sense of calm, as passengers can see their scheduled departure posted at the gate and be readily aware of any airline operations interruption that would require their response. It is more than information, though, as passengers in close physical proximity to their transport often believe they will have some control over responding to any disruption in their schedules.

The present terminal layout might have served the operation longer had the airline industry not evolved so quickly, creating additional demand on terminal buildings throughout the country as well as at Redmond. Terminal expansion in 2010 provided much needed space, which has allowed the facility to absorb an increase in demand at almost all functional components. Future growth forecast for Redmond will require more terminal space to meet passenger demand. Terminal area ramp apron space can be reconfigured to accommodate larger aircraft at more gates than the present six commuter gate hardstands. A summary of the building improvements identified for the planning period are listed by functional component in **Table 3-15**. The recommended areas, when complete, represent a program for the year 2036. Some components will take priority over others in phased development and are listed from higher to lower priority based on passenger demand and available capacity.

Table 3-15. Program Requirements Summary	
Second floor concourse and passenger departures lounges	An eight-gate reconfiguration of the second level concourse level including vertical circulation and relocated concessions and toilets. This development will be phased in smaller projects. Vertical circulation for the eight-gate development will be built in the first phase, requiring reconfiguration of the lower level departures lounge and concessions areas.
Ramp apron gate hardstands and passenger boarding bridges	A total of eight ramp apron gate hardstand positions, with corresponding passenger boarding bridges. The ramp apron area contains 243,205 square feet. Each hardstand position will accommodate the largest narrow body aircraft. The boarding bridges will be capable of handling EMB-145/CRJ-200 aircraft, larger commuter jets and up to B737-900Max/A321neo aircraft. These component areas and equipment will be phased in smaller projects over the 20-year period to 2036.
Concessions	Car rental, retail and gifts, food and beverage, goods, stock and cold storage on the non-secure and secure sides of the terminal. Concessions will also include a small, dedicated receiving and security screening area for all concessions stores delivered to the terminal building, plus a small office break room for the concessionaire.
Continued on the next page.	



Table 3-15 - continued. Program Requirements Summary	
Departures/Ticket Hall	Ticket hall expansion will involve both ticketing facility and main concourse expansion; the former to meet current and near-term demand in airline ticket office space and greater ticket counter capacity to meet growth in demand, and the latter to meet increases in queueing and gathering of passengers in the main departures hall during seasonal peak travel. Given limits at the terminal curb and roadway, this space could initially be met by relocating some of the functions from the front of the departures hall. Toward the end of the planning period, this requirement can be met through ticket hall expansion and roadway relocation.
Outbound Baggage Make-up	The outbound baggage make-up facility will become constrained as more flights are added to the schedule, requiring more cart staging at the baggage make-up device. Expansion of this area will include an additional make-up device adjacent to the existing device.

Terminal programmatic requirements were identified and calculated for functional components only.

Table 3-16 lists program requirements based on the major components. Administration and ancillary area requirements are included as a percentage of the total programmed space. This includes facilities maintenance and services, workrooms, storage, and janitor closets. Mechanical and electrical support has been programmed as a percentage of the total additional programmed space above the 140,000-square-foot existing building. Other equipment space such as vertical circulation elevators, escalators, and stairs have been identified and included as line items in the program, as their footprints are quantifiable.

Table 3-16. Terminal Building Program Functional Components					
Functional Component	Basis of Analysis	Capacity	Demand	Additional Requirements	Number of Processors
Entrance Hall	25 SF/Passenger	420	638	6,000 SF	N/A
Ticket Hall	Queue, Counter, ATO	10	15	5	15
Checked Baggage Screening	Screening Capacity	600 BPH	465 BPH	None	N/A
Outbound Baggage Make-Up	NB EQVFlights	3	8	5	2
Passenger Security Screening	150 Passengers/Hour	300	550	2	2
Passenger Departures Lounge	Peak Hour Seats	220	656	436	N/A
Second Level Concourse Corridor	Peak Hour Passengers	N/A	760	19,000	N/A
Second Level Concourse Toilets	Arriving Passengers	3 Fxt/Gate/Gender	48	48	N/A
Concessions	Individual Airport	N/A	12,800 SF	9,300 SF	N/A
Baggage Claim & Inbound Drop	Checked Baggage	2 NB EQA	4 NB EQA	2 NB EQA	2
Vertical Circulation	2 Esc/Elev/Direction	1 Elevator	2 / Direction	2 Esc/Elev/Direction	N/A



3.4.3 GATE CAPACITY REQUIREMENTS

The airport terminal currently has six commuter aircraft gate hardstand positions, of which five are assigned to air carriers. Future gate requirements have been determined through formulas for growth based on historical measures of annual enplanements and operations per gate. For destination airports such as Redmond, a practical gate capacity can be set based on precedent, geography, markets served, and airline hub operations. Geography marks the distance from major hub markets, which affect the number of flights that can reasonably be scheduled into the airport. Airline hubs operate arrivals and departures banks throughout the day, and flights to and from Redmond are coordinated with these operations. Historical precedent represents airlines' preferences for scheduling at Redmond to take best advantage of hub operations. Adding flights into other periods of the day should follow precedent and can be achieved through limited and/or seasonal scheduling to test markets.

Determining a practical gate capacity provides a framework to indicate a need for additional gates so airlines can schedule into preferred periods of the day. Large hub airports will typically schedule eight to ten turns per gate or more, depending upon airlines' minimum objective ground time and aircraft size. With longer periods of no activity at small hub destination airports, an achievable number of operations per gate may be indicated with as few as five or six before additional gates may be required.

Enplanements and operations per gate show there is more than sufficient capacity through the operating day to add flights. Forecast activity builds on the schedule carriers operate today. Using six aircraft as the current gate requirement, enplanements per gate calculations show that six will serve into the future. With the early morning departures bank activity, a higher number of gates would be supported.

Table 3-17. Airline Gate Demand Forecast - Enplanements Per Gate					
Year	Annual Enplaned Passengers	Annual Departures	No. of Gates	Enplanements Per Gate	Enplanements Per Departure
2014	255,654	5,789	6	42,600	44
2015	280,823	4,860	6	46,800	58
2016	322,176	5,600	6	53,700	58
Future Years					
2021	391,450	5,740	6	63,700	68
2026	484,300	5,800	6	78,000	84
2031	575,350	6,200	7	86,700	93
2036	661,600	6,300	7	98,100	105
<i>Source: Mead & Hunt Airline Activity Forecasts & Analysis</i>					

Table 3-17 shows a requirement of seven gates based on a measure of enplanements per gate. Using forecasts for the four planning horizons within the period, six gates to represent current airline schedule activity, and enplanements per gate yields a total requirement of seven gates, which supports a close range of variance to meet airline schedule preference. Operations per gate yields a smaller total number of gates based on a higher efficiency in gate use. This method does not take into consideration multiple departures within a short window.



The use of historical precedent is a primary factor in forecasting future operations growth. Current airline schedules serve as records of how airlines prefer to operate based on hub schedules. Airlines may change schedules to manage seasonal time changes, adjusting flight departures and arrivals to meet operational requirements, but their core schedules remain relatively steady over time.

From the airline activity schedule for current operations, early morning comprises the largest block of outbound activity, with seven departures over two hours and eight total during the period. Six of these departures occur within one hour. Overnight there are eight aircraft on the ground. This is anticipated to increase to nine aircraft by the end of the planning period. The terminal building has six gates, five of which are used by the carriers to manage eight aircraft operations in the first departures bank. Based on this schedule precedent and an increase in aircraft size, eight gates would be supported through the planning period. The airlines can manage this activity by towing aircraft from hardstand positions to contact gate positions; however, because there would be closely spaced departures within a limited operations area, a safer option would be to provide additional contact gates. **Table 3-18** shows the design day forecast early morning departures bank.

Table 3-18. Future Schedule Forecast - Early Morning Departures – 2036

RDM	Equipment	Destination	Airline	Aircraft Seat Capacity (Average Number of Seats)	Aircraft Seat Configuration
0510	EMBRAER-175	PDX	ALASKA	70-90	76
0530	AIRBUS-319	SFO	UNITED	130-150	138
0550	MITSUBISHI-90	DEN	UNITED	90-110	100
0555	BOEING-737	SEA	ALASKA	110-130	130
0600	BOEING-737	LAX	AMERICAN	150-170	150
0600	AIRBUS-319	SEA	DELTA	130-170	138
0625	AIRBUS-319	SLC	DELTA	130-170	138
0700	AIRBUS-319	SJC	ALASKA	130-150	138
0722	EMBRAER-175	PDX	ALASKA	70-90	76

Source: Mead & Hunt Airline Activity Forecasts & Analysis

In meeting demand for future activity, eight contact gates with building departures lounges and passenger boarding bridges are supported. This development can be built in phases, with the first phase comprised of building expansion and reconfiguration of existing space and layouts to prepare for a transition to second-level departures lounges. A full complement of gates, departures lounges, and passenger boarding bridges would be supported by the end of the planning period.

The airlines may be forced to operate larger aircraft into their major hub airports sooner in the period due to limited gate resources at these airports. This will likely be evident in the early morning and late afternoon arrivals and departures banks, eventually migrating to midday periods. During this transition, there will still be a need for ground boarding commuter aircraft at hardstand positions, particularly with Alaska/Horizon operating the Q400 aircraft well into the future. Balancing the needs of the air carriers through gate resource planning will be key to meeting growth demands on the terminal building over time.



3.4.4 TERMINAL BUILDING DEVELOPMENT

Figures 3-19 and 3-20 show development of first and second level building improvements to meet demand, including eight gate plans with corresponding departures lounge and aircraft hardstands.

Figures 3-21 and 3-22 show potential phase one improvements.

Figure 3-19 FIRST LEVEL TERMINAL BUILDING MASTER PLAN EXPANSION

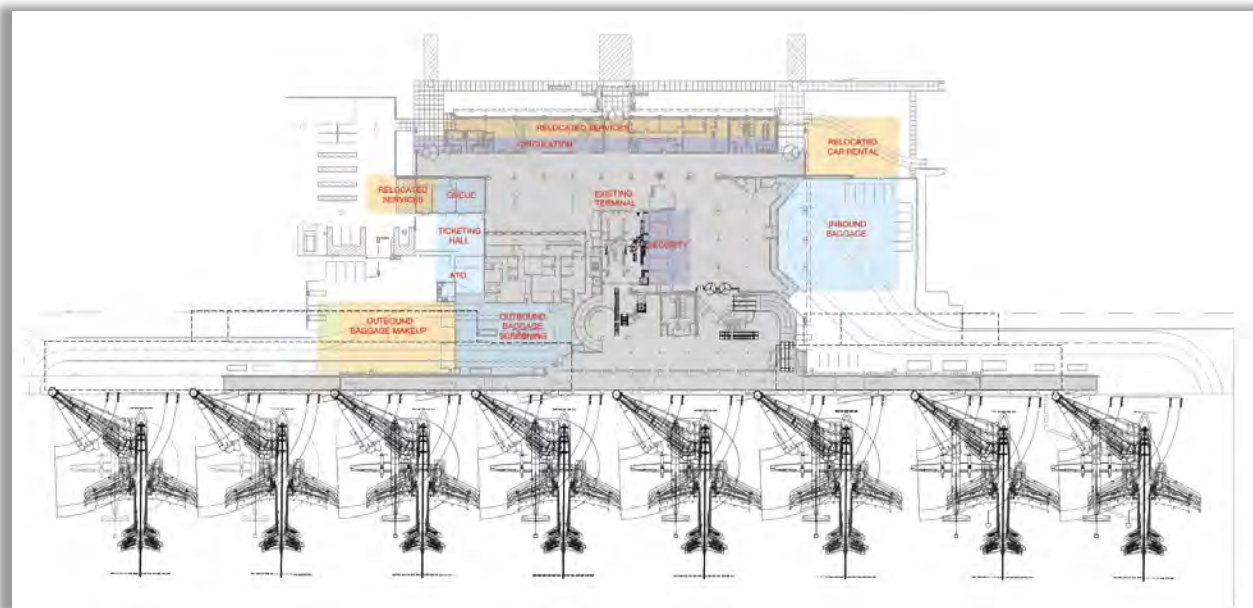


Figure 3-20 SECOND LEVEL TERMINAL BUILDING MASTER PLAN EXPANSION

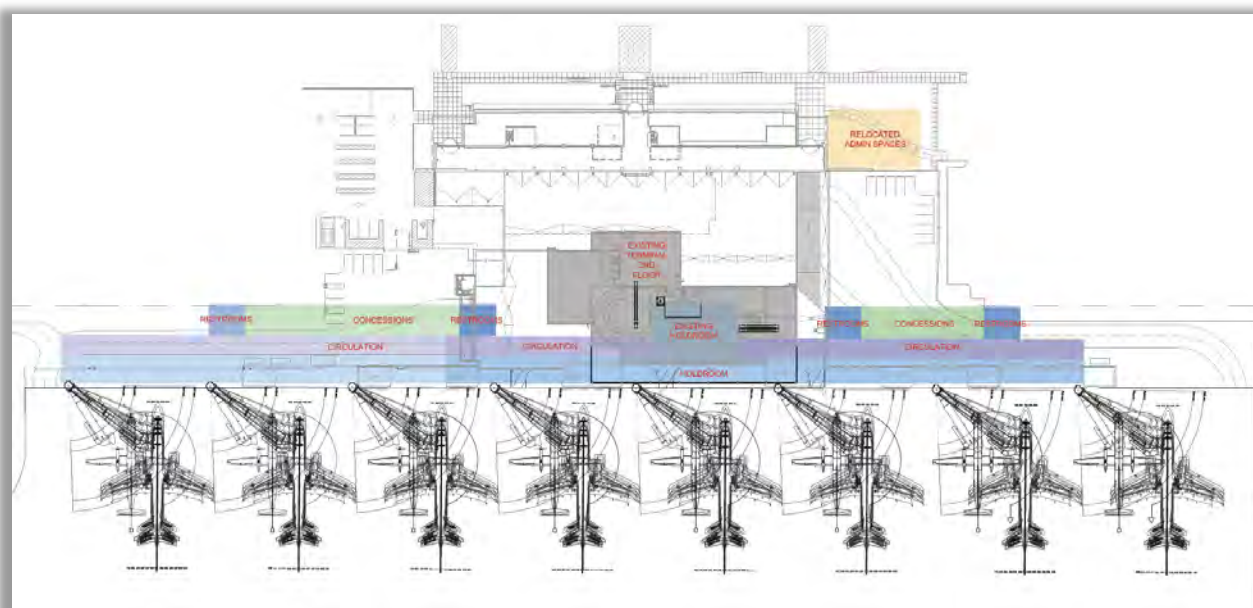
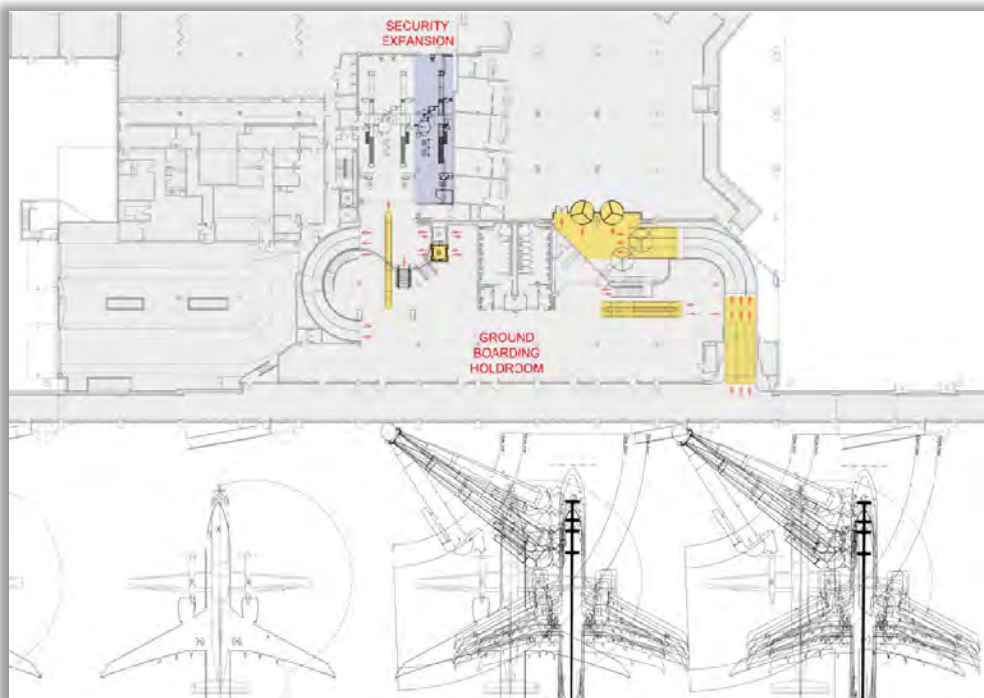
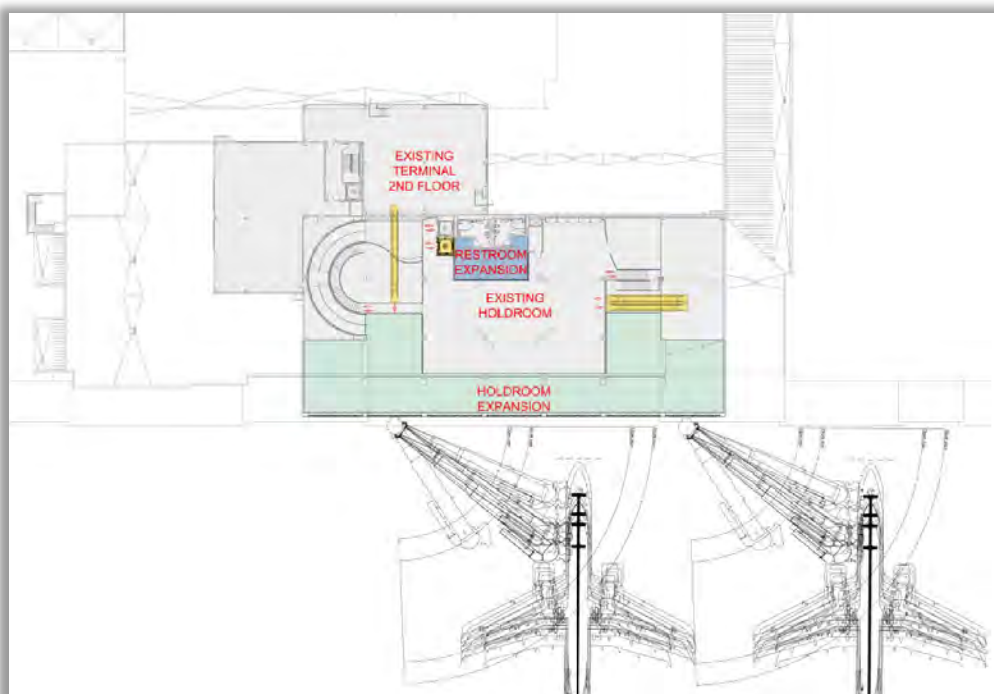


Figure 3-21 FIRST LEVEL TERMINAL BUILDING MASTER PLAN EXPANSION – PHASE ONE**Figure 3-22 SECOND LEVEL TERMINAL BUILDING MASTER PLAN EXPANSION – PHASE ONE**

3.4.5 CONCLUSIONS AND RECOMMENDATIONS

- ✓ Reconfigure second floor concourse and passenger departure lounges
- ✓ Construct a total of eight ramp gate hardstand positions with passenger boarding bridges
- ✓ Expansion and reconfiguration of concessions
- ✓ Expansion of ticket hall and main concourse
- ✓ Expansion of the outbound baggage make-up area

3.5 SUPPORT FACILITY REQUIREMENTS

3.5.1 FIXED BASE OPERATOR (FBO)

The Airport is served by one FBO, located on either side of Runway 11-29. The FBO has expressed a desire for expanded facilities, however, the development potential for both areas are limited due to other existing development in the area. The north apron area has the potential for expanded airside development behind the existing building line, but would likely be expensive due to site development costs.

As mentioned previously, the concept of a new separate general aviation development in the east quadrant of the airport could provide multiple new avenues for additional FBOs to be located at the airport.

3.5.2 UNITED STATES FOREST SERVICE (USFS)

The USFS has plans for expansion of their facilities to include additional training facilities, hangars and miscellaneous support facilities. All current plans fall within the USFS leasehold and are not expected to require additional land availability from the Airport.

3.5.3 CARGO FACILITIES

Air cargo operators performed 1,929 operations in 2016 and the forecast shows air cargo remaining flat at 2,100 annual operations through 2036. The proximity to major trucking routes and lack of demand for overnight shipments has not dictated a high amount of air freight. Air cargo operators use the general aviation apron north of Runway 11-29 to load and unload cargo, and handle processing off-site. No need for additional facilities for air cargo purposes are anticipated.



3.5.4 AIR SUPPORT AND MAINTENANCE FACILITIES

SNOW REMOVAL EQUIPMENT (SRE)

The Airport has plans underway to replace and relocate the SRE building to the north side of the airfield. The relocation will allow for an expanded building size and also open up valuable airside land for future aviation related development. The future size and location are being evaluated as of April 2017. The details will be incorporated into the **Chapter 4 Alternatives Analysis**.

AIRPORT RESCUE AND FIRE FIGHTING (ARFF)

The ARFF facility is centrally located northeast of the terminal building. Since RDM is certified under 14 CFR Part 139, it must comply with ARFF equipment, staff, and operational requirements developed by the FAA and the International Civil Aviation Organization Rescue and Fire Fighting Panel. According to Part 139 and FAA AC 150/5220-10E, ARFF equipment and staff requirements are based upon the length of the largest air carrier aircraft that serves an airport with an average of five or more daily departures.

Table 3-20 presents the ARFF Index, aircraft length criteria, and representative air carrier aircraft.

Table 3-20. ARFF Index Requirements		
ARFF Index	Aircraft Length Criteria	Representative Aircraft
A	Less than 90 feet	CRJ-200
B	90 feet but less than 126 feet	Q400, B-737, A-319, ERJ-145
C	126 feet but less than 159 feet	B-757, MD-80, A-310
D	159 feet but less than 200 feet	B-767, DC-10
E	More than 200 feet	B-747, A-380
Source: Code of Federal Regulations, Part 139.315		

RDM currently falls under ARFF Index B based on the longest aircraft operating at the Airport with an average of five or more daily departures. The Airport currently meets the ARFF Index B requirements. No change to the ARFF Index is expected within the 20-year planning window.

AIR TRAFFIC CONTROL TOWER (ATCT)

No changes to the location, size, or function of the existing ATCT are anticipated within the 20-year planning timeframe. The existing ATCT line-of-sight is depicted on **Figure 3-23**. Several known areas of line-of-sight blockage have been depicted. ATC has an operational way of addressing these blocked areas. No new line-of-sight blockages should be created through future on-airport development. The ATCT line-of-sight will be an evaluation factor used in the **Chapter 4 Alternatives Analysis**.



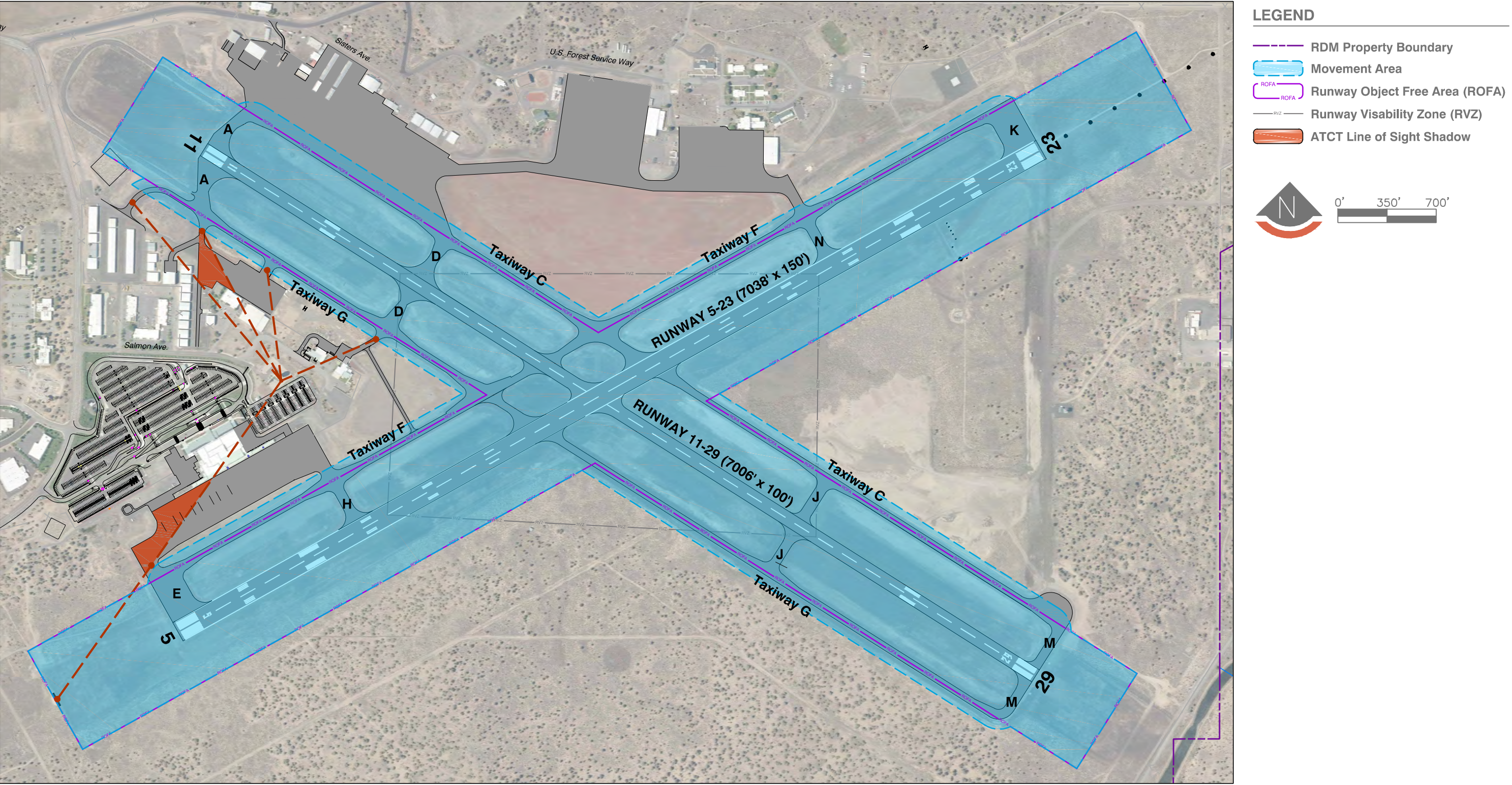


Figure 3-23
ATCT Line Of Sight

AIRPORT SERVICE ROADS

The Airport currently has a well-established network of perimeter service roads of varying types. A combination of dirt and paved service roads allow airport personnel to access all areas of the existing airfield. No changes to the airport service roads are anticipated for the existing airfield layout.

Should the **Chapter 4 Alternatives Analysis** recommend a runway extension or the protection for an ultimate third runway, service roads would need to be reevaluated for those planned improvements.

SECURITY GATES

The perimeter fence line contains multiple gates. There are several types of gates used according to their purpose and need. Gates are located primarily near the north and south general aviation areas of the airport providing access to and from hangars, businesses and general aviation users. No areas of improvement have been identified for the existing airport configuration. As alternative airfield layouts are addressed in Chapter 4, so will the requirements for additional airfield access points.

DISASTER PLANNING FACILITY REQUIREMENTS

In the event of a Cascadia Subduction earthquake event or other similar magnitude disaster event, the Airport could very likely be called to serve as a critical transportation link to help supply people, equipment and supplies necessary to manage the event's aftermath. Preliminary discussion with personnel from the Office of Emergency Management and Oregon Air National Guard have indicated that the Airport could be used as a forward operating base where supplies and people would arrive by air and be redistributed where necessary. Inbound supplies would likely arrive via C-17 and C-130 military transport aircraft. Depending on the source, personnel could also arrive on those military transport aircraft or on chartered commercial flights.

Physical space for both supplies and aircraft will likely be at a premium in the immediate days/weeks following an event. Long-term development plans generated in this Master Plan will consider what areas of the Airport could be used to accommodate the mobilization following a disaster event where RDM serves a critical role.

In the days/weeks immediately following a Cascadia event or similar disaster, it is likely that scheduled airline service would be halted.

3.5.5 CONCLUSIONS AND RECOMMENDATIONS

- ✓ Identify location for relocated SRE building
- ✓ Identify on-airport areas for storage of supplies to assist with the response to a Cascadia Subduction event



3.6 FACILITY REQUIREMENTS SUMMARY

The following summarizes the facility requirements necessary for the Airport to accommodate its projected 20-year growth, increase aviation and non-aviation related revenue generating development, and comply with required airfield design standards.

- ✓ Runway 5-23 will need an extension to a length of about 10,000 feet to accommodate the future airlines passenger fleet
- ✓ The parallel taxiways and runway connector taxiways will be designated as TDG3
- ✓ Taxiway system geometry improvements:
 - Taxiway A (north side): add pavement and restripe to provide a right angel taxiway
 - Taxiway A (south side): add pavement and restripe to provide a right angel taxiway
 - Taxiway E: replace existing taxiway segment between the apron and Taxiway F with a new connector taxiway located about 400 feet east of the existing taxiway
 - Taxiway H: replace the existing taxiway segment between the apron and Taxiway F with a new connector taxiway located about 175 feet east of the existing taxiway
 - Taxiway C hot spot: shift segment that crosses Runway 5-23 to the east
 - Taxiway G hot spot: shift segment that crosses Runway 5-23 to the west
 - Runway exit taxiways: retain current locations
 - Pavement strength: evaluate pavement strength requirements when narrow body airline aircraft begin regularly scheduled operations at the Airport
- ✓ General aviation development:
 - Site aircraft storage hangars to accommodate at least 33 aircraft.
 - Locate additional long-term general aviation development area for future hangars and/or future FBOs
- ✓ Expand passenger terminal apron.
- ✓ Identify an area within the terminal loop road for transportation network companies to pick-up and drop-off passengers
- ✓ Locate parking lot expansion for up to 1,100 parking spaces
- ✓ Locate parking lot expansion for up to 500 employee and tenant parking spaces
- ✓ Evaluate alternative sites for off-site rental car service center



- ✓ Non-aviation revenue generating improvements:
 - North Development Parcel Subarea: Install a loop water line system between Lake Road and Veterans Way are not well-connected. Construct new streets.
 - North Business Park Subarea: Install a loop water system between Veterans Way and Oregon Route 126. Upgrade the local streets (10th Street, Sisters Avenue, Ochoco Way) to current local industrial standard (40-foot paved width with sidewalks). Upgrade Veterans Way to meet the major collector standard (36-foot paved width with sidewalks).
 - South Apron Subarea: Construct sidewalks on the north side of Salmon Avenue
 - West Business Park Subarea: Install sidewalk infill as necessary along Airport Way and Veterans Way
 - Airport Way Subarea: Install sidewalk on both sides of Airport Way and Mt. Hood Drive. Upgrade Wickiup Avenue to current local industrial standard (40-foot paved width with sidewalks).
 - Fairgrounds Industrial Subarea: Install sidewalks on south side of Airport Way
- ✓ Terminal Improvements:
 - Reconfigure second floor concourse and passenger departure lounges
 - Construct a total of eight ramp gate hardstand positions with passenger boarding bridges
 - Expansion and reconfiguration of concessions
 - Expansion of ticket hall and main concourse
 - Expansion of the outbound baggage make-up area
- ✓ Identify location for relocated SRE building
- ✓ Identify on-airport areas for storage of supplies to assist with the response to a Cascadia Subduction event

Chapter 4 details alternative evaluations for each of the above facility requirements.



CHAPTER SUMMARY

This chapter evaluates a series of alternative solutions to satisfy the Redmond Municipal Airport's (RDM or "the Airport") facility requirements, which are described in **Chapter 3 – Facility Requirements**. The purpose of this analysis is to enable development of airport facilities that can realistically accommodate forecasted demand. The process of defining and evaluating alternatives is iterative, beginning with a broad range of possibilities that are then refined based on alternative evaluation criteria and Airport development goals. The alternatives evaluation process is structured to systematically evaluate options and provide the technical basis for arriving at a preferred development concept. Criteria utilized to evaluate development alternatives include:

- ✓ Operational performance
- ✓ Environmental considerations
- ✓ Construction feasibility
- ✓ Financial impacts
- ✓ Stakeholder feedback

Various sets of improvement plans were developed for the Airport's airside, landside and terminal areas to accommodate projected needs throughout the planning period. Although they do not exhaust all the variations, the developed alternatives form an appropriate base to produce a "preferred" plan of development for the airport. The preferred alternative serves as a guide for capital improvement planning and is the basis of the Airport Layout Plan (ALP). A summary of the recommended alternatives is included below. The analysis that led to the selection of a preferred alternative is described in this chapter.

✓ **Runway Alternative – Alternative 1**

The recommended alternative extends Runway 5-23 2,962 feet to the southwest for a total runway length of 10,000 feet, as shown in **Figure 4-2**. The runway extension of Runway End 5 would occur on airport-owned property, requires no additional land acquisition or easements, and does not require building demolition or relocation of existing highways and roads. It is assumed that Runway 5-23 would have an upgraded approach that supports area navigation (RNAV) and localizer performance with vertical guidance (LPV) approach capabilities.

✓ **Taxiway Alternative – Alternative 1**

The recommended alternative, as shown in **Figure 4-8** identifies a new full-length parallel taxiway east of Runway 5-23, addresses Federal Aviation Administration (FAA) "Hot Spots" One and Two, and can be constructed in multiple phases as demand dictates. Improvements to Taxiway A and Taxiway F are identified to comply with FAA Advisory Circular (AC) 150/5300-13A, Change 1, *Airport Design*.



✓ **Vehicle Parking Alternative – Alternative 1**

The recommended alternative, as shown in **Figure 4-10**, adds 4,000 parking stalls and converts the existing hourly terminal parking lot in front of the terminal into a combination of hourly and premium long-term parking. The existing employee vehicle parking lot to the west of the passenger terminal would be reduced to accommodate expanded vendor vehicle parking. A second employee vehicle parking lot would be developed within the central passenger terminal area. Additional long-term vehicle parking would be developed west of SE Airport Way and a remote vehicle parking lot would be developed north of the Deschutes County Fairgrounds Expo Center, along the west side of SE Airport Way. Rental car facilities would be developed just north of the additional long-term vehicle parking lot.

✓ **General Aviation Development Alternative – Alternative 2**

The recommended alternative, as shown in **Figure 4-15**, identifies the expansion of aeronautical and non-aeronautical development north from the existing north development area. The resultant expansion would support a new flight school, hangar expansion for both corporate and general aviation users, and support non-aeronautical development.

✓ **Passenger Terminal Alternative – Alternative 3**

The recommended alternative, as shown in **Figures 4-24, 4-25, and 4-26**, identifies expansion of the existing terminal to the west and will expand passenger boarding and holdroom areas, outbound and inbound baggage operations, Transportation Security Administration (TSA) security screening, rental car counters and offices, ticket counters, queuing and airline ticketing offices, administration space, and mechanical support spaces. The terminal expansion supports seven new aircraft gates, with the ability to add an eighth gate, that accommodate Aircraft Design Group (ADG)-III aircraft (Airbus A320 or Boeing B737) served through passenger boarding bridges (PBBs). The proposed expansion stays clear of the Airport's Runway Visibility Zone (RVZ).

4.0 INTRODUCTION

This chapter introduces a variety of alternatives related to the Airport's runways, taxiways, vehicle parking, general aviation (GA) development, location of support facilities, passenger terminal and non-aeronautical development. Alternatives are analyzed using evaluation criteria developed for the Master Plan and were agreed upon during the initial scoping of the project. The outcome of the analysis and the public process is the selection of a preferred alternative for the Master Plan. Each alternative was evaluated according to five categories: alignment with operational performance, environmental considerations, constructability, financial impacts/cost to the Airport, and stakeholder feedback. Feedback was collected throughout the planning process from the Master Plan Planning Advisory Committee (PAC) and the public. The PAC is a diverse group made up of elected officials, on- and off-airport businesses, and members of the broader community. The PAC's role is to help shape the Master Plan into a document that is reflective of community goals and interests while satisfying FAA requirements for airport



development. The preferred alternative identified in **Section 4.6** is used to prepare the implementation plan described in a subsequent chapter. The implementation plan includes phasing of improvements, expected capital costs, and key decision points where the Airport will reevaluate implementation assumptions prior to further development. The preferred alternatives will be shown on the ALP.

The chapter is organized as follows:

- 4.1 Airport Development Objectives
- 4.2 Alternatives Development Process
- 4.3 Evaluation Categories
- 4.4 Evaluation Process
- 4.5 Airport Development Alternatives
- 4.6 Alternatives Summary

4.1 AIRPORT DEVELOPMENT OBJECTIVES

The Master Plan is intended to produce a cohesive set of alternatives that position the Airport to accommodate the forecasted demand over the next 20 years. Prior to developing and evaluating specific alternatives, the Airport's development objectives must be understood. Development objectives for this Master Plan include:

- ✓ Accommodate future demand over the next 20 years and position the Airport to attract additional tenants and businesses
- ✓ Increase revenue generation through the development of non-aeronautical land
- ✓ Provide development area for GA and United States Forest Service (USFS) activities
- ✓ Develop the passenger terminal and associated facilities to provide high levels of service
- ✓ Develop facilities in an environmentally compatible manner
- ✓ Develop facilities in accordance with all federal, state, and local regulations
- ✓ Develop facilities consistent with Stakeholder needs

Development to meet long-term demand requires consideration of both the airside and landside needs of the Airport. Airside facilities include runways, taxiways, support facilities, and non-terminal building areas, while landside facilities include vehicle parking areas, walkways, public access roads, rental car facilities, taxi and ground transportation, hotels, and any other areas accessible to the public. Those needs are presented in the following airside and landside planning sections.



4.1.1 AIRSIDE PLANNING

Airside needs include:

- ✓ Analyze the ability of the Airport to meet design standards identified in the FAA AC 150/5300-13A, Change 1, *Airport Design*
- ✓ Address FAA identified Hot Spots on the taxiways
- ✓ Analyze existing and future capacity constraints, which include an expanded passenger terminal and apron area, additional supporting taxiways, runway extension, and a future parallel runway
- ✓ Provide a variety of aircraft storage options including t-hangars, box hangars, and corporate hangars
- ✓ Identify location for a new fuel farm to support passenger airline and GA operations, and define fuel truck haul routes to minimize taxiway crossings
- ✓ Incorporate a flight school into proposed development
- ✓ Expand property available for development by GA and corporate aviation tenants
- ✓ Identify a storage location for emergency preparedness in support of the Federal Emergency Management Agency (FEMA) or other emergency responding agencies
- ✓ Identify strategic land acquisition to support airport operation and future development

4.1.2 LANDSIDE PLANNING

Landside needs include:

- ✓ Remove roadways within the existing and future runway protection zones (RPZs) when feasible
- ✓ Maximize buildable property for aeronautical and non-aeronautical development
- ✓ Analyze locations for expanded short- and long-term passenger vehicle parking, rental car operators and associated support facilities, Airport employee and vendor parking, and overflow parking
- ✓ Analyze existing landside access and roadway networks to support future development
- ✓ Identify strategic land acquisition to support proposed improvements



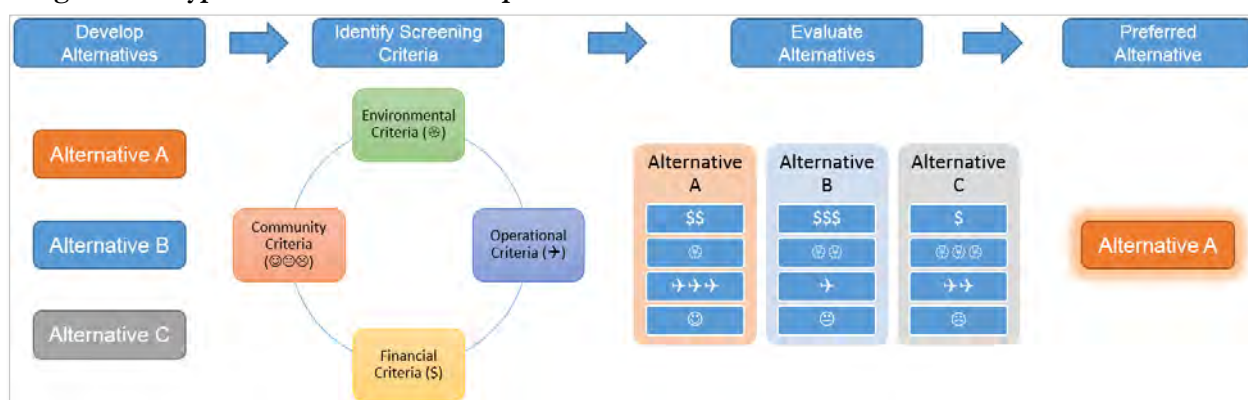
4.2 ALTERNATIVES DEVELOPMENT PROCESS

The framework for the alternatives development was established in **Chapter 1 – Inventory**, **Chapter 2 – Forecast**, and **Chapter 3 – Facilities Requirements**. Information contained in these chapters was used to develop layouts that support the Airport's ability to accommodate forecasted demand and prepare a 20-year facility plan for the Airport moving forward. Developing the alternatives included examining:

- ✓ FAA Airport Design Standards
- ✓ Land Development Strategies
- ✓ Revenue Producing Opportunities
- ✓ Aircraft Operations
- ✓ Passenger Enplanements

These factors provide the framework necessary to formulate feasible development alternatives to meet future demand. The typical alternatives development and evaluation process is illustrated in the following **Figure 4-1**.

Figure 4-1. Typical Alternatives Development Process



4.2.1 AIRPORT MASTER PLAN ADVISORY COMMITTEE INPUT

Throughout this planning process, public involvement and stakeholder outreach has been a continuous process involving educational, listening, and collaborative components. Stakeholder groups include the PAC, Airport Committee, City of Redmond, and members of the public. The feedback received during the process is used to qualitatively compare the alternatives.



4.3 EVALUATION CATEGORIES

The following evaluation categories provide the basis of analysis for each alternative and support a fact-based comparison:

- ✓ Operational Capabilities (Specific to Functional Area)
- ✓ Performance Requirement Benchmarks (Ability to accommodate demand)
- ✓ Land Use Compatibility
- ✓ Environmental Impacts
- ✓ Stakeholder Feedback
- ✓ Constructability
- ✓ Financial Cost/Impacts

These categories were developed to ensure the selected alternative is consistent with the role of the Airport and are described in the following sections.

4.3.1 OPERATIONAL CAPABILITIES

This evaluation category is applied to the alternatives to determine their ability to satisfy the facility requirements identified in **Chapter 3 – Facility Requirements**. An analysis of the demand and capacity requirements, and geometric and other standards that govern the design of airport components, guided development of the facility requirements.

4.3.2 PERFORMANCE REQUIREMENTS BENCHMARKS

This evaluation category is applied to the alternatives to determine their ability to support demand identified in **Chapter 2 – Aviation Activity Forecasts**. Alternatives aligned with the forecasts if they provided the facilities necessary to meet identified demand through 2036.

4.3.3 LAND USE COMPATABILITY

This category evaluates alternatives based on compatible land use and the potential impacts to land or other environmental factors that could influence an alternative. These include noise exposure, wetlands or stream impacts, or other factors that might be unique to developed alternatives.



4.3.4 ENVIRONMENTAL IMPACTS

This category evaluates alternatives based on compatibility with existing environmental assets with the goal of developing in an environmentally sustainable manner. The following impacts to specific environmental elements were considered:

- ✓ Air Quality
- ✓ Biological Resources (including fish, wildlife, and plants)
- ✓ Climate
- ✓ Coastal Resources
- ✓ Department of Transportation Act, Section 4(f)
- ✓ Farmlands
- ✓ Hazardous Materials, Solid Waste, and Pollution Prevention
- ✓ Historical, Architectural, Archaeological, and Cultural Resources
- ✓ Land Use
- ✓ Natural Resources and Energy Supply
- ✓ Compatible Land Use
- ✓ Socioeconomic, Environmental Justice and Children's Environmental Health and Safety Risks
- ✓ Visual Effects (Including Light Emissions)
- ✓ Water Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)

Early identification of these environmental factors may help avoid impeding future development plans. The analysis is not intended to fulfill the environmental clearance requirements as defined in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, and FAA Order 5050.4B, *National Environmental Policy Act*.



4.3.5 STAKEHOLDER FEEDBACK

Stakeholder input was obtained from the PAC, Airport Advisory Committee, City of Redmond, FAA, various stakeholders, community members, and members of the public to assist in evaluating the alternatives. Public and committee meetings were held on the following dates:

- ✓ Stakeholder Interviews – September 26, 2016
- ✓ Redmond City Council – October 25, 2016
- ✓ PAC Meeting #1 – November 9, 2016
- ✓ Airport Committee – November 10, 2016
- ✓ Redmond City Council – February 7, 2017
- ✓ PAC Meeting #2 – February 8, 2017
- ✓ Redmond City Workshop – April 25, 2017
- ✓ PAC Meeting #3 – June 22, 2017
- ✓ FAA Teleconference – August 4, 2017
- ✓ PAC Meeting #4 and Open House – October 18, 2017
- ✓ Redmond City Council – January 9, 2018
- ✓ PAC Meeting #5 and Open House #2 – Scheduled for Winter 2018

These public meetings were supplemented with presentations, exhibits, and one-on-one interviews. Input was considered and incorporated into the development of the alternatives for RDM.

4.3.6 CONSTRUCTABILITY

This category evaluates alternatives based on implementing the alternative in logical phases. Timing and the sequence of construction can create delays, increase cost, and impact airport operations. Each alternative was examined to determine the degree of its impact on airport operations.

4.3.7 FINANCIAL COSTS/IMPACTS

This category evaluates alternatives based on cost factors to assess feasibility and form a relative basis of comparison. The analysis looks at the following for each alternative:

- ✓ Ability to fund the required capital expenditures
- ✓ Airport operating costs
- ✓ Potential revenues, operating and capital expenses, and potential funding sources for each alternative

Capital expenses include demolition costs, construction and site preparation costs, environmental costs and lease buyouts.



4.4 EVALUATION PROCESS

This section defines the alternatives analysis process utilized in accordance with FAA AC 150/5070-6B, *Airport Master Plans*. Developing multiple alternatives represents the first of a multi-step process that leads to the selection of a preferred alternative. It is important to note that the current FAA-approved ALP identifies future improvements recommended in a prior master planning effort. The master planning process addresses facility needs, but also allows the components of the previous preferred alternative to be retained or modified, if they meet current needs.

Airport development alternatives are created to respond to defined facility needs, with the goal of identifying general preferences for both individual items and the overall concepts being presented. The process will allow the widest range of ideas to be considered and the most effective facility development concept to be defined.

Elements of a preferred alternative will emerge from the evaluation process that can best accommodate all required facility improvements. Parts of the various alternatives will be consolidated into a preferred alternative based on the input of multiple stakeholders. The preferred alternative can be refined further as the City proceeds through the process of finalizing the remaining elements of the airport Master Plan. Public input and coordination with the PAC, FAA, and RDM throughout the evaluation process will also help to shape the preferred alternative.

Once the preferred alternative is selected by RDM, a detailed capital improvement program will be created that identifies and prioritizes specific projects to be implemented. The elements of the preferred alternative will be integrated into the updated ALP drawings that will guide future improvements at the Airport.



4.5 AIRPORT DEVELOPMENT ALTERNATIVES

The initial airport development alternatives are intended to facilitate a discussion and evaluation about the most efficient way to meet the facility needs of the Airport. The facility requirements identified in the previous chapter include a variety of airside, landside, passenger terminal, and other development needs. The airport development alternatives are organized into several groups:

- ✓ Runway Alternatives
- ✓ Taxiway Alternatives
- ✓ GA Development Alternatives
- ✓ Vehicle Parking Alternatives
- ✓ Support Facilities Alternatives
- ✓ Passenger Terminal Alternatives
- ✓ Non-Aeronautical Property Development Alternatives

The airport development alternatives are described below and depicted in **Figures 4-2** through **4-32** to illustrate the key elements of each alternative.

4.5.1 RUNWAY ALTERNATIVES

Runway 5-23 is the Airport's primary runway and is 7,038 feet long and 150 feet wide. The runway has pavement strength of 68,000 pounds for single-wheel gear (SWG) aircraft and 110,000 pounds for dual wheel gear (DWG) aircraft and is designed to C-III Standards. Runway 11-29 is the crosswind runway and is 7,006 feet long and 100 feet wide. The runway has pavement strength of 28,000 pounds for SWG and 40,000 pounds for DWG and is designed to B-III Standards. Additional airfield capacity is not required as the existing primary runway can accommodate future demand through 2036.

Chapter 3 – Facility Requirements explained the potential need for a 2,962-foot-runway extension to Runway 5-23 for a total runway length of 10,000 feet to serve markets in the Midwest. To examine the feasibility of an extension at RDM, six runway extension alternatives have been identified and are evaluated in the following sections. The alternatives assume an upgraded approach to Runway End 5 that supports LPV approach capabilities, similar to the localizer and glideslope of an Instrument Landing System (ILS) approach into Runway End 23. The MALSR (Medium Approach Light System with Runway Alignment Indicator Lights) will remain within the RPZ and on airport property. Earthwork for the runway and supporting taxiway extension alternatives to the southwest requires significant fill due to the uneven terrain and requirements to match existing grades of the runway and taxiway. **Chapter 3** also explained how the existing Runway 5-23 RSA had no penetrations and a recommendation was made to change declared distances to the full length of the runway. To ensure that there are no future RSA penetrations



and that declared distances can stay at 10,000 feet, the RSA around any future extension must remain clear of objects.

None of the alternatives would impact night operations.

Runway extension alternatives consider RPZ requirements in FAA AC 150/5300-13A, Change 1, *Airport Design* and the 2012 memorandum *Interim Guidance on Land Uses within a Runway Protection Zone (2012 RPZ Memo)*. Modifications to Runway End 23 will require evaluation of the relocation of Highway 126 to meet FAA design guidance. The alternatives comply with AC 150/5300-13A, Change 1, *Airport Design* standards for the runway safety area (RSA), runway object free area (ROFA), and taxiway object free area (TOFA).

ALTERNATIVE 1 – EXTEND RUNWAY 5-23 SOUTHWEST

This alternative provides a 10,000- foot- long runway by extending Runway 5-23 to the southwest, as shown in **Figure 4-2**. The extension of Runway End 5 will occur on airport-owned property, requires no additional land acquisition or easements, and does not require building demolition or relocation of existing highways and roads. The construction of the proposed runway extension and supporting taxiways would require 79,092 cubic yards (CY) of material excavation and the supporting taxiway would require 10,792 CY of material excavation for 89,884 CY of total material excavation. This alternative would add 77,400 square yards (SY) of additional pavement. FAA runway and taxiway design criteria are met with this alternative.

This alternative is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact on airport operations. The extension would increase the extent of the RVZ by 1,481 feet to the southwest. The aircraft rescue and firefighting (ARFF) building will obstruct the view of aircraft arriving to or from the intersection of the two runways. The ARFF building will relocate to keep the RVZ clear of obstructions.

Four obstructions (trees) have been identified within the future 50:1 Approach Surface, however, these obstructions are on existing airport property and can be mitigated. The extension does not change any instrument approach capabilities and Navigational Aids (NAVAIDs) would be relocated appropriately.

This alternative is estimated at a total project cost of \$48,450,000 and includes engineering, environmental compliance, construction management services, relocation of the ARFF building, and extension of Taxiway F to the new end of Runway 5.

ALTERNATIVE 2A – EXTEND RUNWAY 5-23 NORTHEAST

This alternative involves extending Runway 5-23 2,962 feet to the northeast with a parallel taxiway and separate exit and entrance connectors as shown in **Figure 4-3**. The extension of Runway 23 by 2,962 feet requires the relocation and realignment of Highway 126 by 1.75 miles, and 62 acres of additional



property to comply with AC 150/5300-13A and the *2012 RPZ Memo*. The required acquisition off the end of Runway 23 is located outside City Limits and outside the Redmond urban growth boundary (UGB) in unincorporated Deschutes County. The property is zoned Exclusive Farm Use (EFU), for which state law severely restricts non-agricultural uses. As a result, extending the runway outside the UGB or rerouting a portion of Highway 126 outside the UGB would require seeking an Exception to Statewide Planning Goal 3 (Agricultural Lands) and receiving approval from the Board of County Commissioners. To obtain approval, the City would have to demonstrate that it performed an alternatives analysis demonstrating that other options within the UGB were not viable. This could subject the City and the County to potential appeals and project delays.

The North Unit Main Canal, a Section 4(f) historic resource due to its age, would also be located within the RPZ, and FAA may require potential mitigation measures such as the placement of a cap on the canal in the RPZ area. The extension would increase the extent of the RVZ by 1,481 feet to the northeast; however, there would be no additional inclusions of facilities within the RVZ.

The construction of the proposed runway extension and supporting taxiway and connectors would require 1,693 CY of material excavation and the supporting taxiway would require 718 CY of material excavation for 2,411 CY of total material excavation. This alternative would add 77,400 SY of additional pavement. The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact to airport operations.

The extension does not change any instrument approach capabilities and all NAVAIDs would be relocated appropriately.

No new obstructions to the 50:1 approach surface were identified with the proposed extension.

This alternative is estimated at a total project cost of \$37,550,000 and includes engineering, environmental compliance, and construction management services.

ALTERNATIVE 2B – EXTEND RUNWAY 5-23 NORTHEAST

This alternative is a derivative of Alternative 2A and similarly involves extending Runway 5-23 2,962 feet to the northeast with a parallel taxiway and separate exit and entrance connectors as shown in **Figure 4-4**. Instead of relocating Highway 126 outside of critical runway geometric areas, such as the RPZ, Highway 126 would remain in its current alignment and a tunnel would be constructed underneath the Runway 23 to achieve the 2,962-foot extension. This alternative requires 63 acres of additional property to comply with AC 150/5300-13A and the 2012 memorandum *2012 RPZ Memo*. The required acquisition off the end of Runway 23 is located outside City Limits and outside the Redmond UGB in unincorporated Deschutes County. The property is zoned EFU, for which state law severely restricts non-agricultural uses. As a result, extending the runway outside the UGB or rerouting a portion of Highway 126 outside the UGB would require seeking an Exception to Statewide Planning Goal 3 (Agricultural Lands) and



receiving approval from the Board of County Commissioners. To obtain approval, the City would have to demonstrate that it performed an alternatives analysis of other options within the UGB that were not viable. This would be a high bar to meet and could subject the City and the County to potential appeals and project delays.

The North Unit Main Canal will be located within the Runway 23 RPZ for this alternative as discussed in Alternative 2A.

This alternative will require the same amount of material excavation and additional pavement as Alternative 2A. This alternative will also have no effect on instrument approach capabilities, relocates NAVAIDs appropriately, and has no identified obstructions.

This alternative is estimated at a total project cost of \$58,440,000 and includes engineering, environmental compliance, and construction management services.

ALTERNATIVE 3A – SPLIT RUNWAY 5-23 EXTENSION

This alternative involves extending Runway 5-23 by 400 feet to the northeast and by 2,562 feet to the southwest for a total runway length of 10,000 feet with a parallel taxiway and separate exit and entrance connectors as shown in **Figure 4-5**. This alternative assumes the FAA would not require RPZ compliance for the existing alignment of Highway 126 through Runway 23's RPZ. Extending Runway End 23 to the northeast utilizes an existing aviation easement for a portion of the land that falls within Runway 23's RPZ. Runway 5-23 extends 400 feet to the northeast in this alternative due to the extent of the OFA stopping prior to Highway 126. Extending Runway End 5 to the southwest would occur on existing airport property and requires no additional land acquisition or easements nor any building demolition or relocation of existing highways or roads.

The construction of the proposed split runway extension and supporting taxiway and connectors would require 72,092 CY of material excavation and the supporting taxiway would require 9,416 CY of material excavation for 81,508 CY of total material excavation. This alternative would add 85,300 SY of additional pavement. This extension would however increase the extent of the RVZ by 1,281 feet and include a portion of the existing passenger terminal aircraft apron and the ARFF building. The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact to airport operations.

Four obstructions (trees) have been identified within the future 50:1 Approach Surface for the extended Runway 5; however, these obstructions are on existing airport property and could easily be mitigated. The extension does not change any instrument approach capabilities and all NAVAIDs would be relocated appropriately.



This alternative is estimated at a total project cost of \$29,319,000 and includes engineering, environmental compliance, and construction management services.

ALTERNATIVE 3B – SPLIT RUNWAY 5-23 EXTENSION

This alternative involves equally extending Runway 5-23 by 1,500 feet to the northeast and by 1,462 feet to the southwest with a parallel taxiway and separate exit and entrance connectors as shown in **Figure 4-6**. The extension of Runway End 23 to the northeast requires relocating and realigning 0.8 miles of Highway 126 0.34 miles north and utilizes an existing aviation easement for a portion of the land that falls within Runway 23's RPZ. The realignment of Highway 126 is 1.25 miles and is outside of the future RPZ for Runway End 23. Extending Runway End 5 to the southwest would occur on existing airport property and does not require additional land acquisition, easements, building demolition, or relocation of existing highways or roads.

The North Unit Main Canal, a Section 4(f) historic resource due to its age, would be located within the Runway End 23 RPZ, and FAA may require mitigation measures such as the placement of a cap on the canal in the RPZ. The extension would increase the extent of the RVZ to the southwest by 731 feet and to the northeast by 750 feet; however, there would be no additional inclusions of facilities within the RVZ.

The construction of the proposed runway extensions and supporting taxiway and connectors would require 11,893 CY of material excavation, and the supporting taxiway would require 6,416 CY of material excavation for 18,309 CY of total material excavation. This alternative would add 81,600 SY of additional pavement. The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact to airport operations.

This alternative has the same obstructions and mitigation identified in Alternative 3A and also relocates NAVAIDs as needed.

This alternative is estimated at a total project cost of \$31,555,000 and includes engineering, environmental compliance, and construction management services.



ALTERNATIVE 3C – SPLIT RUNWAY 5-23 EXTENSION

This alternative is a derivative of Alternative 3B and similarly involves extending Runway 5-23 by 1,500 feet to the northeast and by 1,462 feet to the southwest with a parallel taxiway and separate exit and entrance connectors as shown in **Figure 4-7**. The extension of Runway End 23 to the northeast requires relocating and realigning 0.8 miles of Highway 126 0.50 miles north and utilizes an existing aviation easement for a portion of the land that falls within Runway 23's RPZ. The realignment of Highway 126 is 3 miles and is outside of the aviation easement of Runway End 23. Extending Runway End 5 to the southwest would occur on existing airport property and does not require additional land acquisition, easements, building demolition, or relocation of existing highways or roads.

The North Unit Main Canal will be located within the Runway 23 RPZ for this alternative as discussed in Alternative 3B.

The construction of the proposed runway extensions and supporting taxiway and connectors would require 11,893 CY of material excavation, and the supporting taxiway would require 3,416 CY of material excavation for 15,309 CY of total material excavation. This alternative would 81,600 SY of additional pavement. The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact to airport operations.

This alternative has the same obstructions and mitigation identified in Alternative 3A and also relocates NAVAIDs as needed.

This alternative is estimated at a total project cost of \$36,850,000 and includes engineering, environmental compliance, and construction management services.



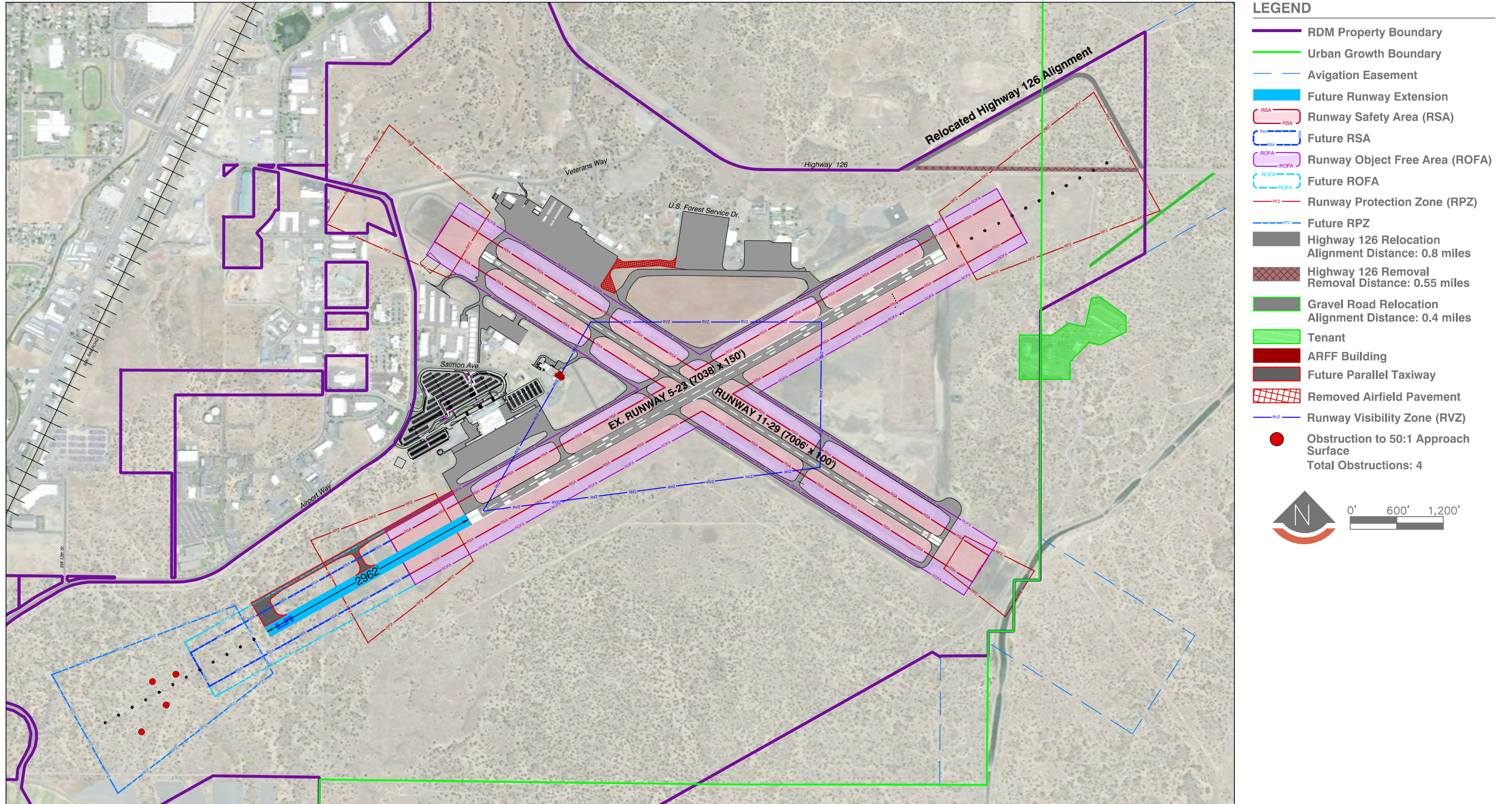


Figure 4-2
Alternative 1 - Extend Runway Southwest

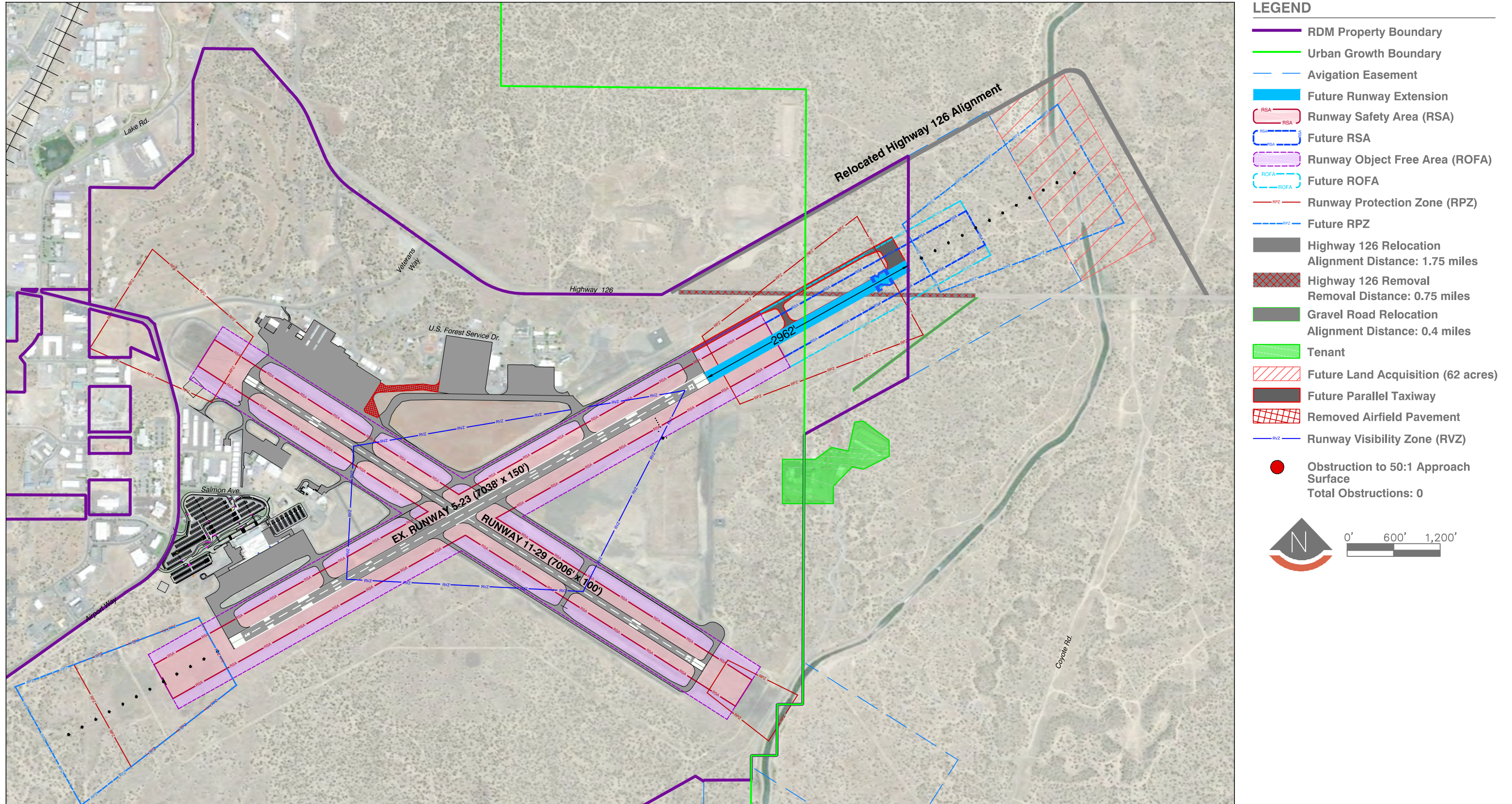


Figure 4-3
Alternative 2A - Extend Runway Northeast

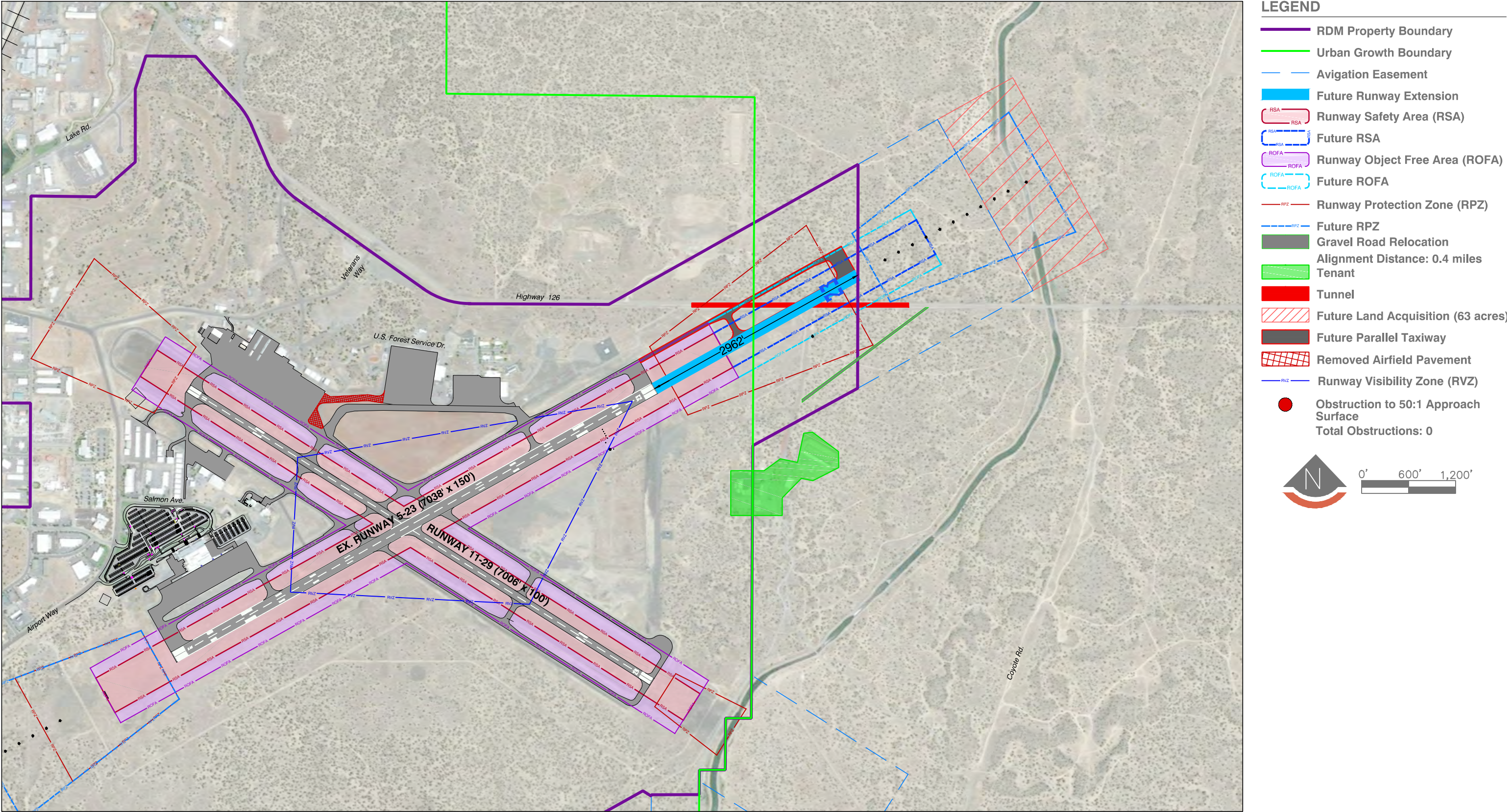


Figure 4-4
Alternative 2B - Extend Runway Northeast

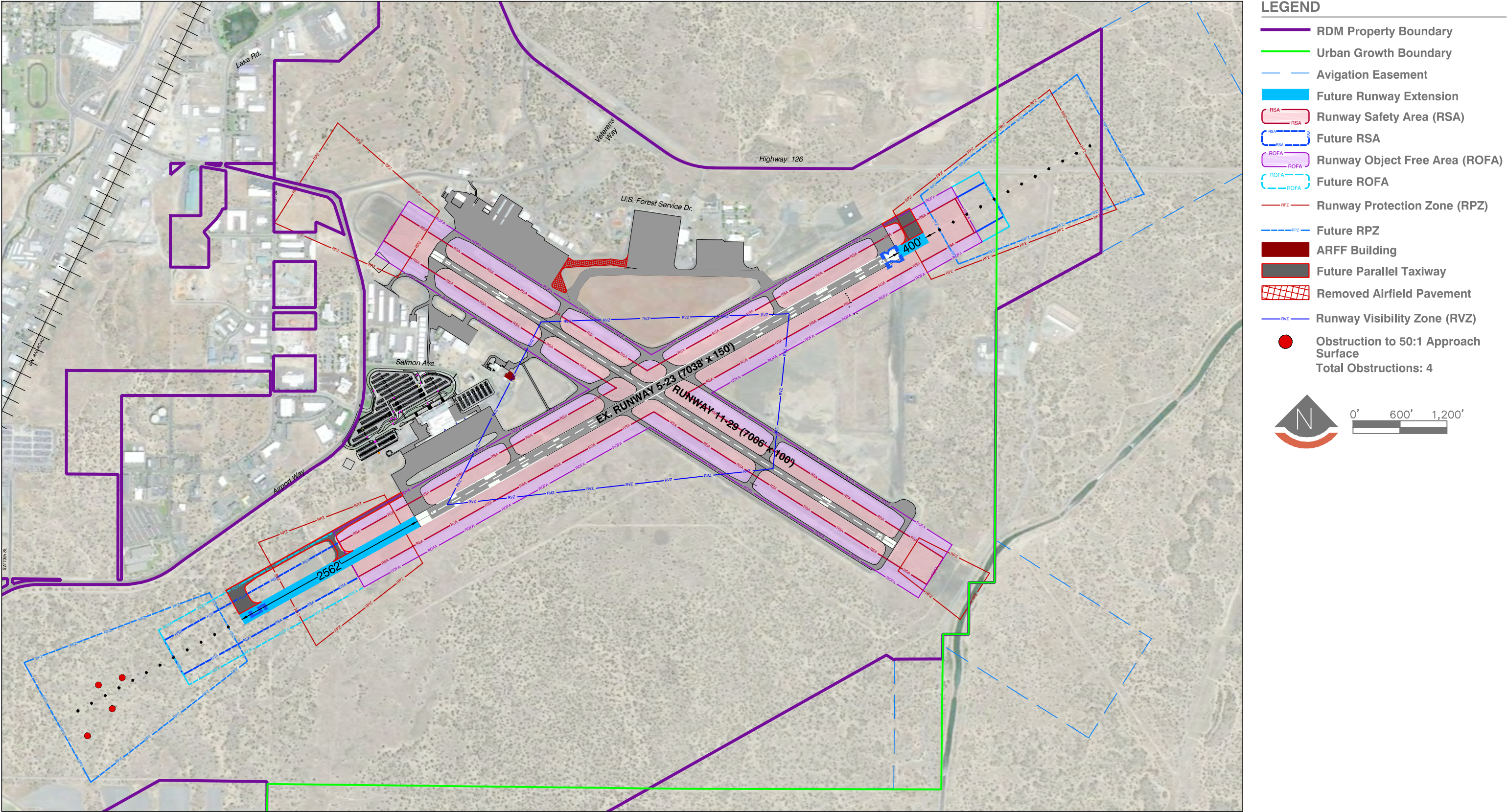


Figure 4-5
Alternative 3A - Split Runway Extension

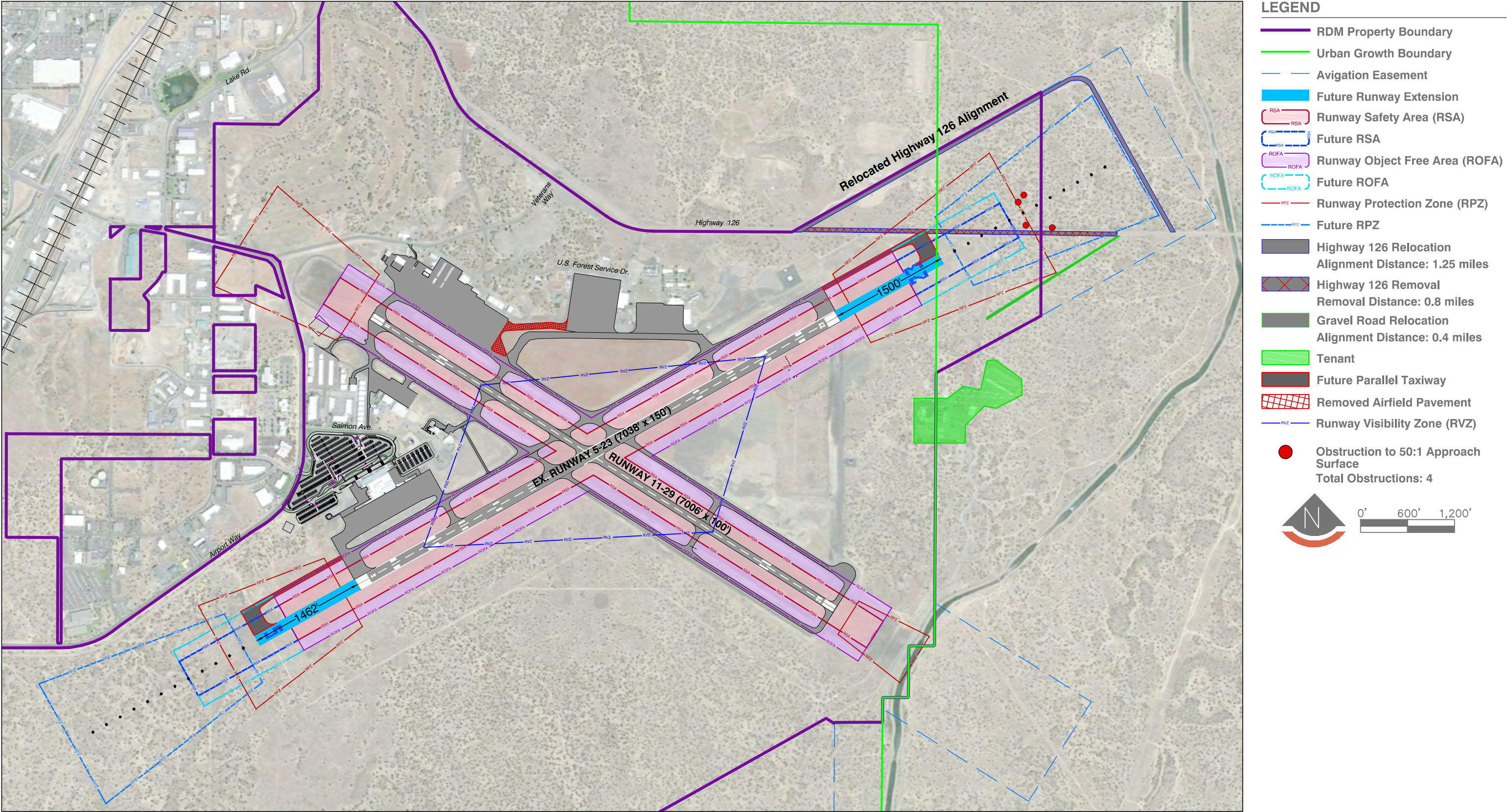


Figure 4-6
Alternative 3B - Split Runway Extension

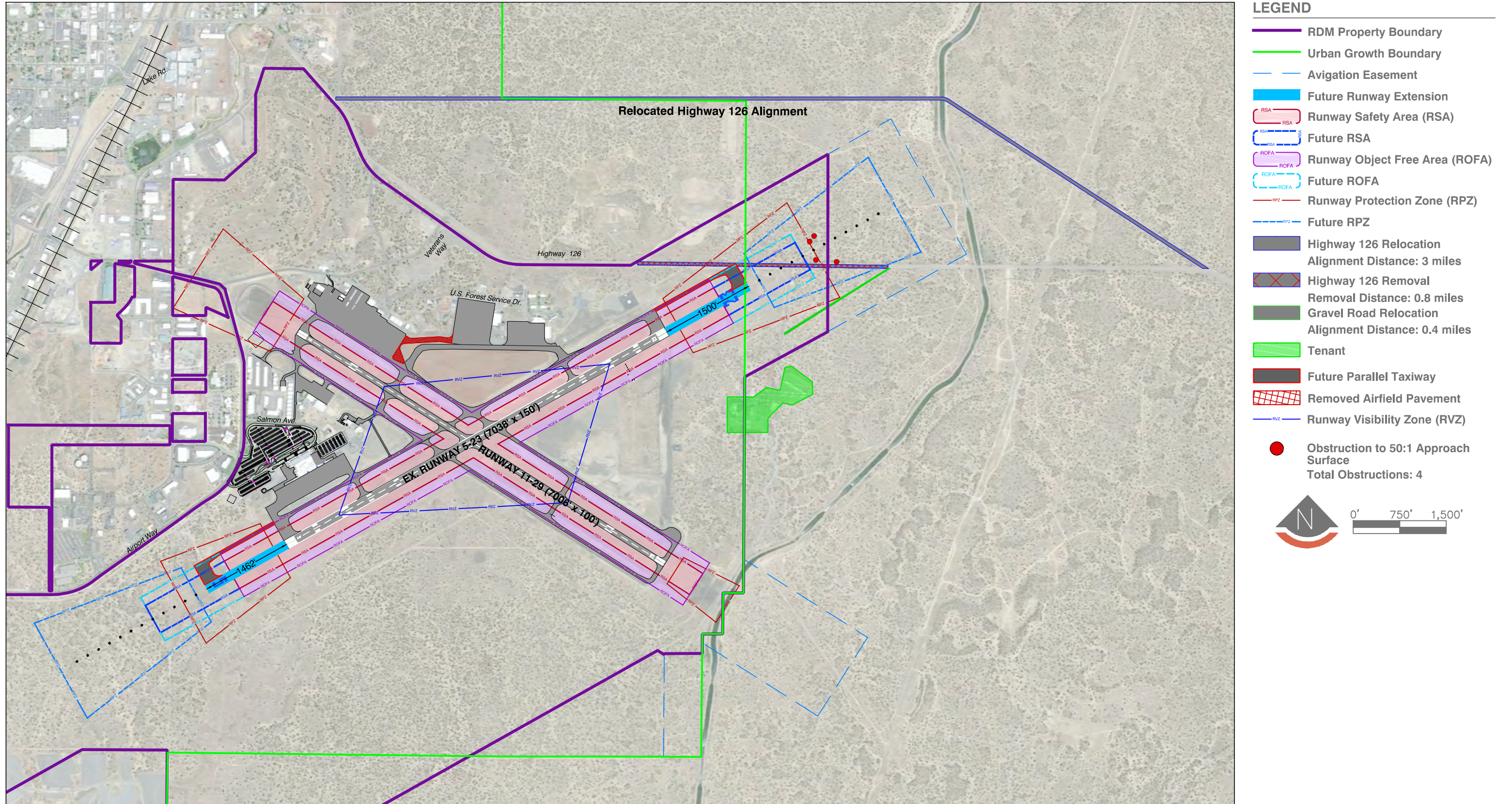


Figure 4-7
Alternative 3C - Split Runway Extension

SUMMARY EVALUATION OF RUNWAY ALTERNATIVES

Table 4-1 presents a summary and an evaluation of the various alternatives for a runway extension at RDM. Alternative 1 is the preferred alternative because the Airport owns the land on which the runway extension will be built.

Impact Category	Alternative 1	Alternative 2A	Alternative 2B	Alternative 3A	Alternative 3B	Alternative 3C
Description of Improvement	Extend Runway 5 2,962' to the southwest	Extend Runway 23 2,962' to the northeast	Extend Runway 23 2,962' to the northeast and Highway 126 tunnel under runway and taxiway	Extend Runway 5 2,562' to the southwest and extend Runway 23 400' to the northeast	Extend Runway 5 1,462' to the southwest and extend Runway 23 1,500' to the northeast	Extend Runway 5 1,462' to the southwest and extend Runway 23 1,500' to the northeast
Operational Capabilities						
Attract Larger Airplanes and Operating Weights and Range	Potential with longer published runway length for 5-23	Potential with longer published runway length for 5-23		Potential with longer published runway length for 5-23		
Critical Airspace Approach and Departure Surface Considerations	Instrument approach capabilities added to Runway 5	Instrument approach capabilities added to Runway 5		Instrument approach capabilities added to Runway 5		
Effect on All-Weather Capabilities	No Change	No Change		No Change		
NAVAIDS	Relocate with extension	Relocate with extension		Relocate with extension		
Runway Protection Zone Conflicts	Highway 126 in Runway End 23 RPZ	None	None due to Highway 126 tunnel.	Highway 126 in Runway End 23 RPZ	None	
Surface Transportation	Airport perimeter road in Runway 5 RPZ; Highway 126 in Runway 23 RPZ	None		Airport perimeter road in Runway 5 RPZ; Highway 126 in Runway 23 RPZ	None	
Effect on Night Operations	Instrument lighting proposed for Runway 5	Instrument lighting proposed for Runway 5		Instrument lighting proposed for Runway 5		
Performance Requirements						
Supporting Taxiways	Extend Taxiway F southwest 2,962' to new end of Runway 5	Extend Taxiway F northeast 2,962' to new end of Runway 23		Extend Taxiway F northeast 400' to new end of Runway 23 and 2,562' southwest to new end of Runway 5	Extend Taxiway F northeast 1,500' to new end of Runway 23 and 1,462' southwest to new end of Runway 5	
Obstructions	0 obstructions to NE 4 obstructions to SW	No obstructions		0 obstructions to NE 4 obstructions to SW	4 obstructions to NE 0 obstructions to SW	
Runway Visual Zone	Extends southwest by 1,481'; air carrier apron and ARFF bldg penetrate RVZ	Extends northeast by 1,481'; no additional inclusions		Extends southwest by 1,281' and northeast by 200'; air carrier apron and ARFF bldg penetrate RVZ	Extends southwest by 731' and northeast by 750'; no additional inclusions	
Land Use Compatibility						
Impacts to Off-Airport Land Use	Potential decreased compatibility to the southwest	Potential decreased compatibility to the northeast and relocation of business required	Potential decreased compatibility to the southwest and northeast		Potential decreased compatibility to the southwest and northeast	
Impacts to Airport Property Use	Reduction in available building area southwest of relocated approach end of Runway 5 due to RPZ and approach surface shift	No Change		Reduction in available building area southwest of relocated approach end of Runway 5 due to RPZ and approach surface shift		



Table 4-1. Summary Evaluation Matrix of Runway Alternatives						
Impact Category	Alternative 1	Alternative 2A	Alternative 2B	Alternative 3A	Alternative 3B	Alternative 3C
Description of Improvement	Extend Runway 5 2,962' to the southwest	Extend Runway 23 2,962' to the northeast	Extend Runway 23 2,962' to the northeast and Highway 126 tunnel under runway and taxiway	Extend Runway 5 2,562' to the southwest and extend Runway 23 400' to the northeast	Extend Runway 5 1,462' to the southwest and extend Runway 23 1,500' to the northeast	Extend Runway 5 1,462' to the southwest and extend Runway 23 1,500' to the northeast
Environmental Impact Potential						
Property Acquisitions / Easements	None	62 acres (Runway 23 RPZ and property around RPZ)		None		
Historic, Architectural, and Archaeological and Cultural Resources	None	The North Unit Main Canal (Historic Resource) would be located in the RPZ		None	The North Unit Main Canal (Historic Resource) would be located in the RPZ	
Section 4(F) of the Department of Transportation Act	None	The North Unit Main Canal (Section 4(f) Resource) would be located in the RPZ		None	The North Unit Main Canal (Section 4(f) Resource) would be located in the RPZ	
Material Excavation Quantities	Runway: 79,092 CY Taxiway: 10,792 CY Total: 89,884 CY	Runway: 1,693 CY Taxiway: 718 CY Total: 2,411 CY		Runway: 72,092 CY Taxiway: 9,416 CY Total: 81,508 CY	Runway: 11,893 CY Taxiway: 6,416 CY Total: 18,309 CY	Runway: 11,893 CY Taxiway: 3,416 CY Total: 15,309 CY
Impervious Surfaces (Runways and Associated Taxiways)	77,400 SY of additional pavement. (includes extension of Twy F)	77,400 SY of additional pavement. (includes extension of Twy F); 1.75 miles of relocated Highway 126	77,400 SY of additional pavement. (includes extension of Twy F)	85,300 SY of additional pavement. (includes extension of Twy F)	81,600 SY of additional pavement. (includes extension of Twy F); 1.25 miles of relocated Highway 126	
Stakeholder Feedback						
On/Off Airport Related Impacts	Low	Medium	High	Low	Medium	High
Project Risk	Low	High		Low	High	
Implementation Complexity	Low	High		Low	High	
Constructability						
Impact to Airport Operations	Low	Low		Low		
Phasing Complexity	Low	Low	High	Low	Medium	
Financial Costs/Impacts						
Project Cost	\$48,450,000	\$37,550,000	\$58,440,000	\$29,319,000	\$31,555,000	\$36,850,000
ALTERNATIVE EVALUATION						
DETERMINATION	Favorable	Favorable	Not Favorable	Neutral	Not Favorable	Not Favorable



AIRFIELD CAPACITY AND THIRD RUNWAY

As discussed in **Chapter 3 – Facility Requirements**, RDM is currently operating at 20 percent of its annual capacity, 27 percent of its Visual Flight Rules (VFR) hourly capacity and 36 percent of its Instrument Flight Rules (IFR) capacity with the existing runway configuration. Flight school operations are expected to double total operations at RDM but will not change the percentage of the mix index because of the weights of aircraft in the flight school fleet. All aircraft in the flight school fleet weigh below 12,500 pounds, and only aircraft that weigh greater than 12,500 pounds can be used in the mix index equation to determine maximum annual service volume (ASV). Total operations at RDM will approximate to 80,000, only 40 percent of its ASV of 200,000 operations. It is anticipated that the aviation activity forecasted through 2036 will not significantly change airfield capacity thus not justifying the need for additional runway capacity. However, a third parallel runway was identified in the previous April 2005 Airport Master Plan and is included on the FAA-approved current ALP (February 2005). The runway is parallel to Runway 5-23 with 3,700 feet centerline to centerline separation and is to initially be constructed 6,200 feet long and 100 feet wide with supporting taxiways and connectors. The ultimate runway was identified as 8,000 feet long and 100 feet wide.

Though it is not anticipated RDM will need a new third runway through 2036, this improvement will be preserved and carried forward into the preferred alternative. Land use controls are in place to protect the third runway from encroachment by incompatible development. Keeping the runway on the ALP preserves long-range flexibility for the Airport should operations require additional capacity, or airport development moves farther west.

4.5.2 TAXIWAY ALTERNATIVES

Airports should provide a safe and efficient taxiway system to expedite aircraft movements to and from the runways and apron areas. The purpose of taxiway improvements is to develop layouts that are operationally efficient, enhance safety, improve circulation, increase capacity and address needs identified in **Chapter 3 – Facility Requirements**. Alternatives are evaluated in this section and recommended improvements to the taxiway system are identified below.

- ✓ Taxiway A (north side): additional pavement will be added to shift the point at which Taxiway C curves and becomes Taxiway A. Taxiway centerline striping on the apron will be modified to connect to Taxiway C and require an additional turn to access Taxiway A.
- ✓ Taxiway A (south side): pavement will be added to shift the point at which Taxiway A connects to Taxiway G. This will require aircraft using the apron taxilane to taxi on Taxiway G before turning to access Taxiway A.
- ✓ Taxiway E: the existing taxiway segment between the apron and Taxiway F will be removed. It will be replaced with a new connector taxiway located about 400 feet east of the existing taxiway (measured centerline to centerline).



Taxiway H: the existing taxiway segment between the apron and Taxiway F will be removed. It will be replaced with a new connector taxiway located about 175 feet east of the existing taxiway (measured centerline to centerline).

ALTERNATIVE 1 – FULL-LENGTH PARALLEL TAXIWAY

This alternative involves addressing FAA-identified Hot Spots 1 and 2 and refines the Airport's taxiway system to resolve issues related to direct access to the runway from an aircraft apron area and non-standards pavement conditions, as shown in **Figure 4-8**, and as discussed in FAA AC 150/5300-13A, Change 1, *Airport Design*. A new parallel taxiway would be constructed in three phases on the eastside of Runway 5-23 with new taxiway connectors to the runway and Taxiway F. The first phase of construction would add 34,379 SY of additional pavement. The second phase would add 24,765 SY of additional pavement, and the third phase would add 26,067 SY of additional pavement. Pavement from Taxiways C and G between the new parallel taxiway and Taxiway F would be removed to address FAA Hot Spots 1 and 2 and mitigate the potential of a runway incursion. The existing Taxiway H and E intersections that facilitate direct access from the passenger apron to Runway 5-23 would be moved to a location that mitigates the potential for aircraft to accidentally cross Taxiway F and unintentionally enter the runway environment. An additional Taxiway connection to Taxiway F would be constructed to facilitate aircraft movement to and from the apron area. To resolve the non-standard pavement conditions, pavement would be added to both sides of the Taxiway A intersections to form a 90-degree turn and eliminate the wide-pavement areas.

Separately, in-fill pavement would be added to the existing aircraft apron area to increase the size of the apron and provide additional uses to include aircraft parking, ground service equipment staging, and storage or other as-needed storage or staging.

The phased approach to project construction allows the Airport to add additional taxiway pavement as needed and minimizes impact on airport operations during construction. The runways will need to be closed temporarily when connector taxiways are added, and when Phase 2 crosses Runway 11-29. Construction can be scheduled to minimize overall disruption.

This alternative is estimated at a total project cost of \$20,400,00 and includes engineering, environmental compliance, and construction management services.

ALTERNATIVE 2 – PARALLEL TAXIWAY WITH OFFSET

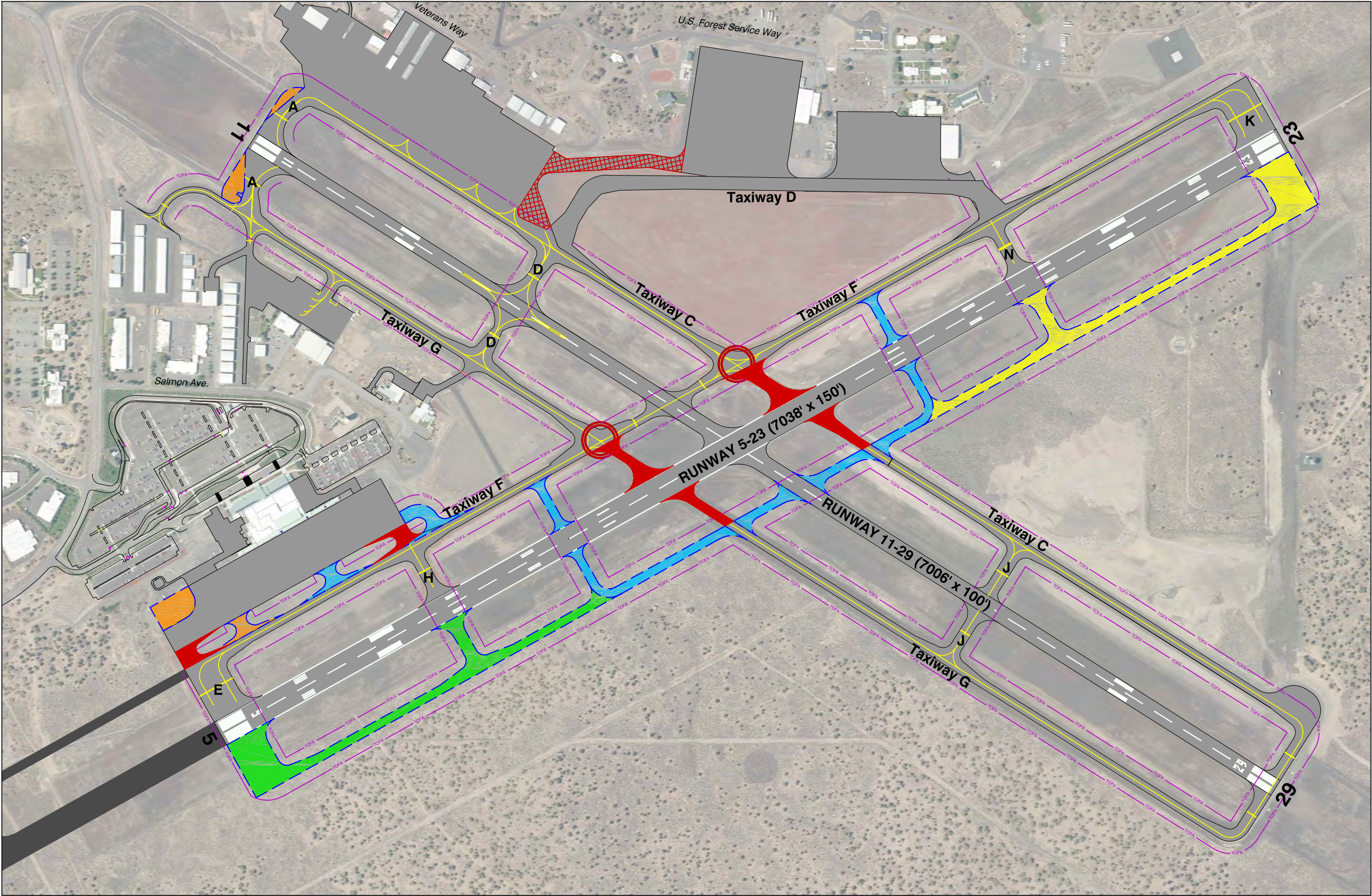
This alternative, as shown in **Figure 4-9**, is a derivative of Alternative 1 and similarly addresses FAA identified Hot Spots 1 and 2 and resolves all pavement conditions identified in FAA AC 150/5300-13A, Change 1, *Airport Design*. The only difference between Alternatives 1 and 2 relate to designing the new parallel taxiway on the eastside of Runway 5-23 and eliminating the taxiway connectors between Taxiway C and G. New taxiway connectors would be constructed to prevent the creation of hot spots similar to the



existing FAA identified Hot Spots 1 and 2 on the opposite side of the airfield. Other conditions remain the same.

This alternative is estimated at a total project cost of \$10,913,000 and includes engineering, environmental compliance, and construction management services.

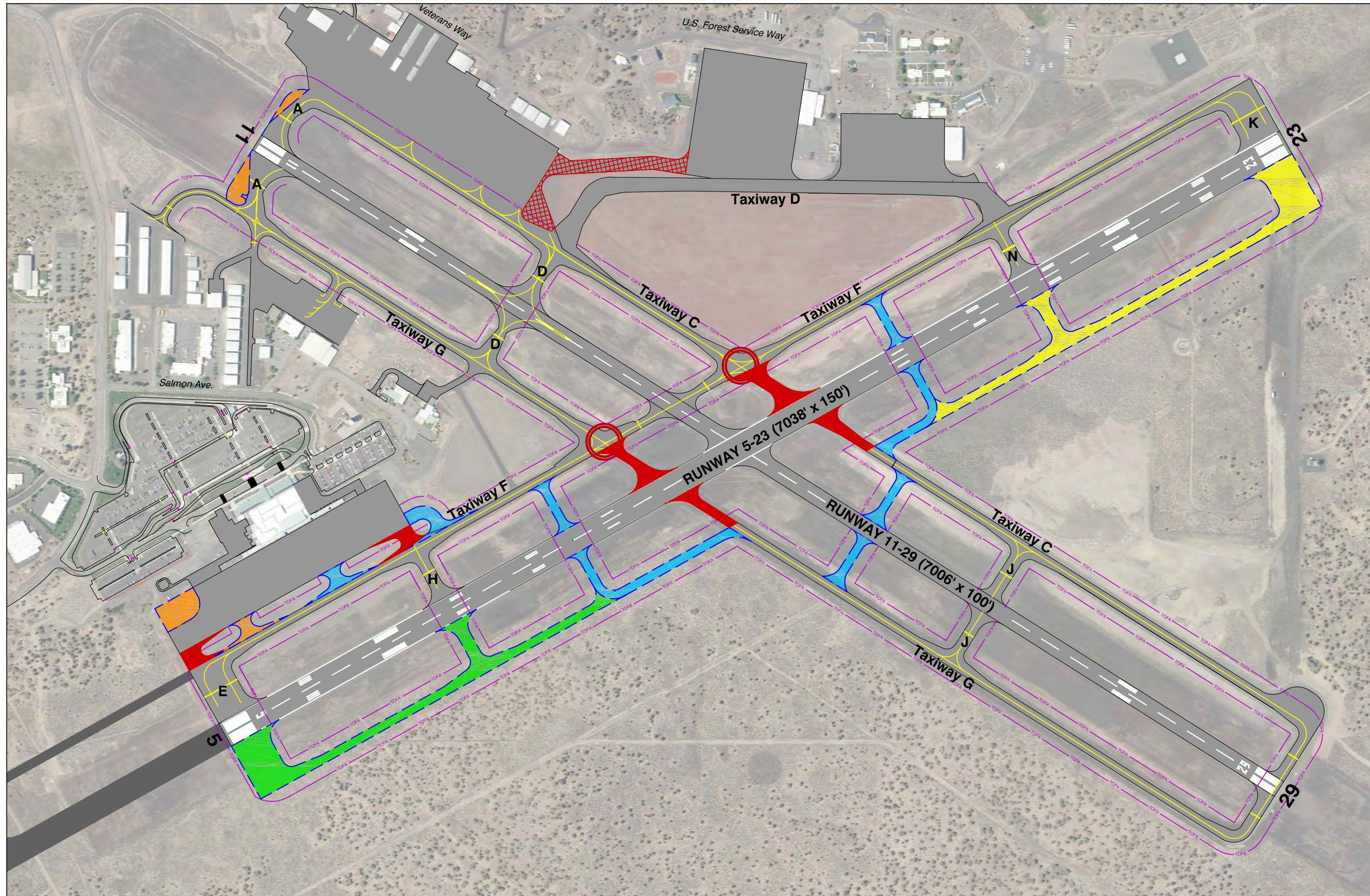




LEGEND

- TOFA — Taxiway/Taxilane Object Free Area (TOFA)
 - Existing Pavement
 - Runway Extension - Alternative 1
 - Airfield Pavement to be Removed
 - Future Taxiway Pavement (Phase 1)
 - Future Taxiway Pavement (Phase 2)
 - Future Taxiway Pavement (Phase 3)
 - Removed Airfield Pavement
 - Fiscal Year 2018 project
 - Existing Hotspot
- 0' 300' 600'

Figure 4-8
Alternative 1 - Full Length Parallel Taxiway



LEGEND

- TOFA Taxiway/Taxilane Object Free Area (TOFA)
- Existing Pavement
- Runway Extension - Alternative 1
- Airfield Pavement to be Removed
- Future Taxiway Pavement (Phase 1)
- Future Taxiway Pavement (Phase 2)
- Future Taxiway Pavement (Phase 3)
- Removed Airfield Pavement
- Fiscal Year 2018 project
- Existing Hotspot

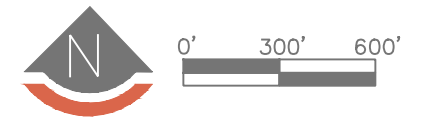


Figure 4-9
Alternative 2 - Parallel Taxiway with Offset

SUMMARY EVALUATION OF TAXIWAY ALTERNATIVES

Table 4-2 presents a summary and an evaluation of the various alternatives for taxiway improvements at RDM. Alternative 1 is the preferred alternative due to the taxiway connectors not being offset, resulting in a full length parallel taxiway.

Table 4-2. Summary Evaluation Matrix of Taxiway Alternatives		
Impact Category	Alternative 1	Alternative 2
Description of Improvement	Parallel taxiway on east side of RWY 5-23.	Parallel taxiway on east side of RWY 5-23.
Operational Capabilities		
Airfield Operability & Access	New east and west access to RWY 5-23	New east and west access to RWY 5-23
Presents Solution for FAA Identified Hot Spots 1 & 2	Yes	Yes
Airline and GA Aircraft Separation	Yes	Yes
Performance Requirements		
Reduces Aircraft Taxi Times	TBD	TBD
Increases Potential for Development	Yes	Yes
Expansion Capabilities	Project can be completed in multiple phases	Project can be completed in multiple phases
AC 150/5300-13A Deficiencies	Resolved	Resolved
Complies with Current Design Criteria	Yes	Yes
Land Use Compatibility		
Impacts to Airport Property Use	New airside or landside development area east of RWY 5-23	New airside or landside development area east of RWY 5-23
Aviation Compatible Use	Yes	Yes
Environmental Impact Potential		
Property Acquisitions / Easements	None	None
Impervious Surfaces	Additional Pavement: Phase 1: +/- 34,379 SY Phase 2: +/- 24,765 SY Phase 3: +/- 26,067 SY	Additional Pavement: Phase 1: +/- 34,379 SY Phase 2: +/- 24,765 SY Phase 3: +/- 26,067 SY
Constructability		
Impact to Airport Operations	Low	Low
Phasing Complexity	Low	Low
Financial Costs/Impacts		
Project Cost	\$20,400,000	\$10,913,000
ALTERNATIVE EVALUATION		
DETERMINATION	Favorable	Favorable



4.5.3 AIRPORT VEHICLE PARKING ALTERNATIVES

Chapter 3 – Facilities Requirements identified the need for additional vehicle parking. The airport reached the terminal parking lot capacity of 1,083 vehicles multiple times in 2016 and had to utilize overflow parking lots. An additional 1,100 parking stalls will be needed to meet demand through 2036. This section analyzes landside alternatives through options focused on adding hourly and premium vehicle parking, long-term vehicle parking, remote vehicle employee vehicle parking, vendor vehicle parking, and rental car facilities.

It is noted that the Airport has begun to see service by transportation network companies (TNCs) like Lyft and Uber. Service by TNCs could theoretically reduce future parking demand if passengers opt to take TNCs to and from the Airport rather than using their own vehicles. It is recommended that the Airport monitor how TNCs impact parking demand and adjust planning assumptions accordingly. Since each community is different and TNCs are a relatively new entrant to the RDM market, it is unknown how much impact they will have on parking demand.

A passenger vehicle parking garage was not considered as part of the alternatives analysis due to the abundance of available vacant land, operational impacts during construction, costs associated with long-term operations and maintenance, and impacts to the scenic views to and from the passenger terminal building.

ALTERNATIVE 1 – SOUTHWEST DEVELOPMENT

This alternative adds an estimated 4,000 parking stalls, as shown in **Figure 4-10**, and involves converting the existing hourly terminal parking lot into a combination of hourly and premium long-term parking. The estimate for the number of parking stalls is based on the average space for stalls and circulation.

Additional hourly and premium long-term parking would be developed directly adjacent to the existing hourly terminal parking. This vehicle parking lot would require the relocation of existing tenants and building demolition. The existing employee vehicle parking lot to the west of the passenger terminal would be converted to hourly or premium long-term parking. A new employee vehicle parking lot would be developed off Salmon Avenue, between the south GA apron and snow removal equipment building. Additional long-term vehicle parking would be developed west of SE Airport Way, and a remote vehicle parking lot would be developed north of the Deschutes County Fair Grounds Expo Center, along the west side of SE Airport Way. Rental car facilities would be developed just north of the additional long-term vehicle parking lot.



For the Airport to provide service to these new areas, the Airport would need to implement a bus operation as the distance to the new passenger parking lot from the passenger terminal ranges from 1.2 to 1.5 miles. This would increase costs due to the need for procurement of a bus fleet, and the on-going costs for fuel, maintenance, and drivers.

The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas and would have minimal impact to airport operations. Potential exists for the discovery of archaeological resources in the project area, and it is recommended that a field survey be conducted prior to any construction.

This alternative is estimated at a total project cost of \$21,400,000 and includes engineering, environmental compliance, and construction management services.

ALTERNATIVE 2A – SE AIRPORT WAY DEVELOPMENT

This alternative adds an estimated 3,100 parking stalls, as shown in **Figure 4-11**, and involves converting the existing hourly terminal parking lot into a combination of hourly and premium long-term parking. The estimate for the number of parking stalls is based on the average space for stalls and circulation.

The existing employee vehicle parking lot to the west of the passenger terminal would be converted to hourly or premium long-term parking. A new employee vehicle parking lot would be developed off Salmon Avenue, between the south GA apron and snow removal equipment building. Additional remote and long-term vehicle parking would be developed closer to the central passenger terminal area east of SE Airport Way and outside of critical Runway 5-23 design surfaces. Rental car facilities would be developed just north of the additional long-term vehicle parking lot adjacent to the central passenger terminal area.

For the Airport to provide service to these new areas, the Airport would need to implement a bus operation as the distance to the new passenger parking lot ranges from half a mile to one mile. This would increase costs due to the procurement of a bus fleet, fuel, maintenance, and drivers.

The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact to airport operations. A potential exists, however, for the discovery of archaeological resources in the area of this alternative, and it is recommended a survey be conducted prior to any construction.

This alternative is estimated at a total project cost of \$13,692,000 and includes engineering, environmental compliance, and construction management services. It does not include increased operational costs or vehicle costs associated with bus service.



ALTERNATIVE 2B – SE AIRPORT WAY DEVELOPMENT

This alternative adds an estimated 1,600 parking stalls, as shown in **Figure 4-12**, and is derived from Alternative 2A. Alternative 2B involves converting the existing hourly terminal parking lot into a combination of hourly and premium long-term parking. The estimate for the number of parking stalls is based on the average space for stalls and circulation.

The existing employee vehicle parking lot to the west of the passenger terminal would be converted to hourly or premium long-term parking. A new employee vehicle parking lot would be developed off Salmon Avenue, between the south GA apron and snow removal equipment building.

Additional long-term vehicle parking would be developed in multiple phases, with the first phase on property west of SE Airport Way on a vacant parcel within an industrial complex. The second phase would be on property east of SE Airport Way close to the terminal area. Additional remote vehicle parking and rental car facilities would be developed closer to the central passenger terminal area west of SE Airport Way and outside of critical Runway 5-23 design surfaces. These facilities would be adjacent to the second phase for long-term vehicle parking.

For the Airport to provide service to these new areas, a similar type of bus operation as Alternative 2A would need to be implemented by the Airport as the distance to the new passenger parking lot from the passenger terminal ranges from half a mile to one mile.

The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact to airport operations. A potential exists, however, for the discovery of archaeological resources in the area of this alternative, and it is recommended a survey be conducted prior to any construction.

This alternative is estimated at a total project cost of \$10,678,000 and includes engineering, environmental compliance, and construction management services. It does not include increased operational costs or vehicle costs associated with bus service.



ALTERNATIVE 2C – SE AIRPORT WAY DEVELOPMENT

This alternative adds an estimated 1,700 parking stalls, as shown in **Figure 4-13**, and is derived from Alternatives 2A and 2B. Alternative 2C involves converting the existing hourly terminal parking lot into a combination of hourly and premium long-term parking. The estimate for the number of parking stalls is based on the average space for stalls and circulation.

The existing employee vehicle parking lot to the west of the passenger terminal would be converted to hourly or premium long-term parking. A new employee vehicle parking lot would be developed off Salmon Avenue, between the south GA apron and snow removal equipment building. Additional long-term vehicle parking would be developed in multiple phases with the first phase on property east of SE Airport Way. The second phase would require the relocation of existing tenants and building demolition; however, this parcel of land is close to the terminal area. Tenants would be relocated to a vacant parcel within an industrial complex. Additional remote vehicle parking and rental car facilities would be developed closer to the central passenger terminal area west of SE Airport Way and outside of critical Runway 5-23 design surfaces. These facilities would be adjacent to the initial phase for long-term vehicle parking.

For the Airport to provide service to these new areas, the Airport would need to implement a bus operation as the distance to the new passenger parking lot from the terminal building ranges from one half to one mile. This would increase costs due to the need for procurement of a bus fleet, and the on-going costs for fuel, maintenance, and drivers.

The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact to airport operations. A potential exists, however, for the discovery of archaeological resources in the area of this alternative, and it is recommended a survey be conducted prior to any construction.

This alternative is estimated at a total project cost of \$16,222,000 and includes engineering, environmental compliance, and construction management services. It does not include increased operational costs or vehicle costs associated with bus service.



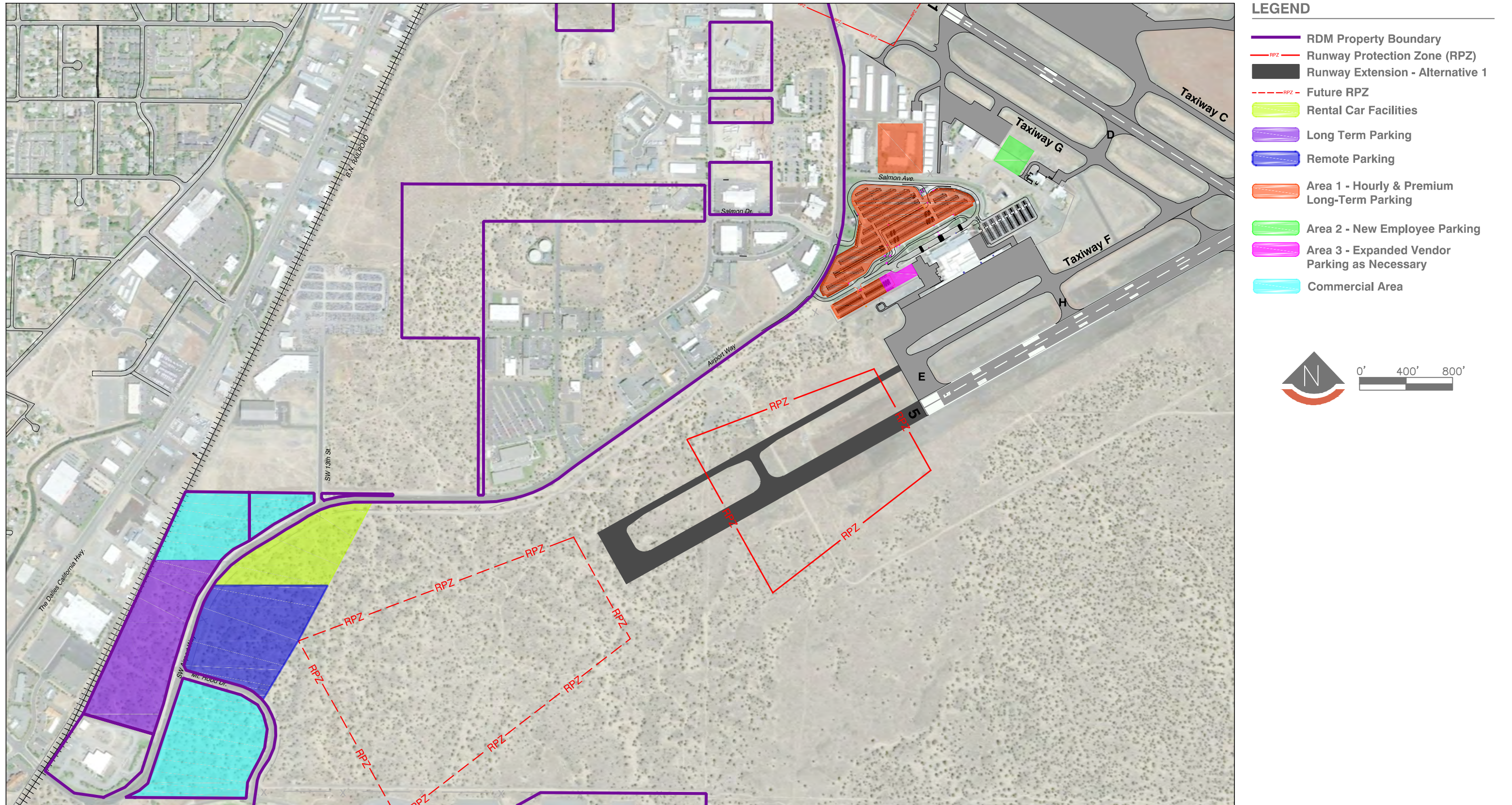


Figure 4-10
Alternative 1 - Southwest Development

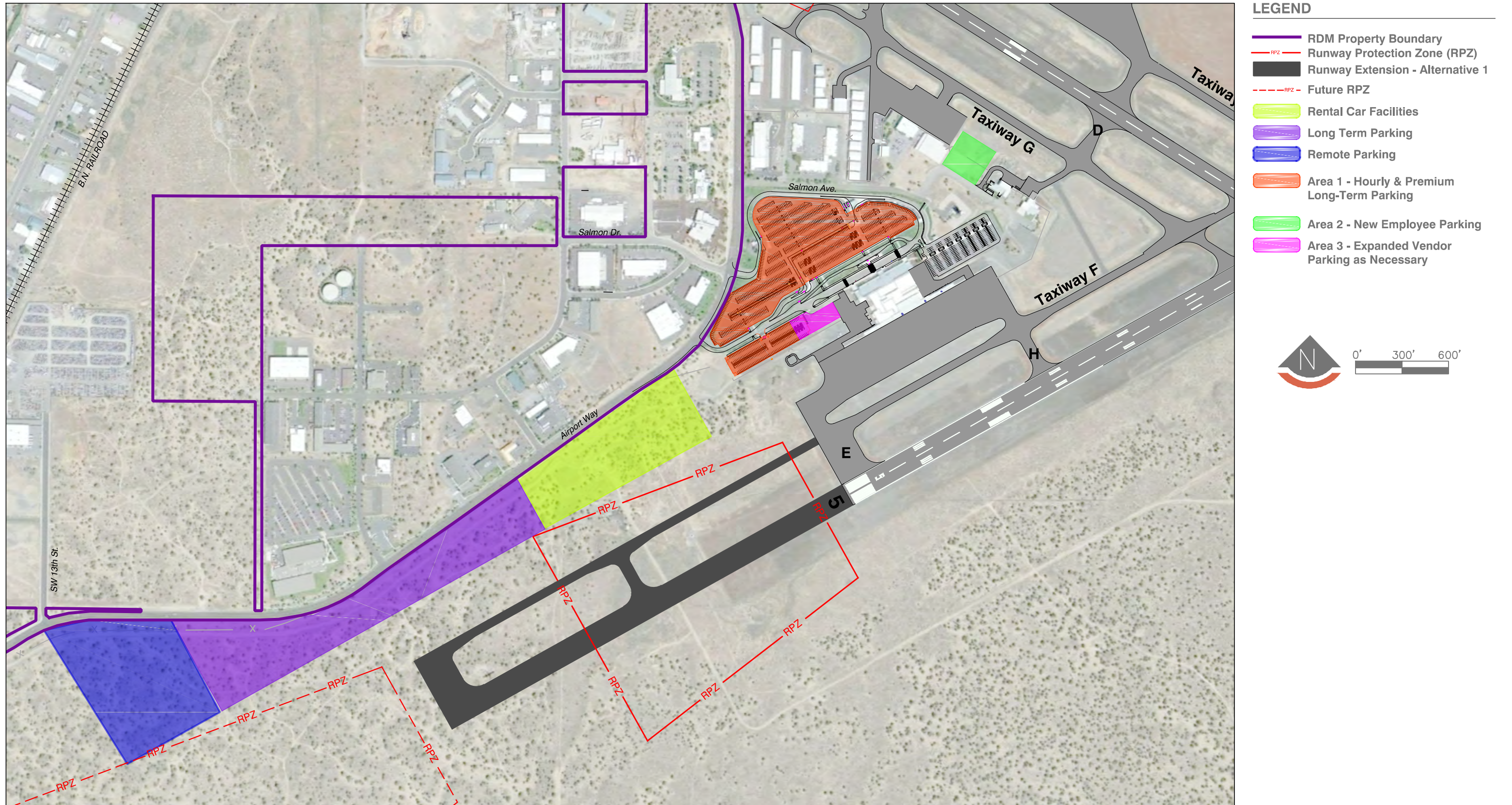


Figure 4-11
Alternative 2A - SE Airport Way Development



LEGEND

- RDM Property Boundary
- Runway Protection Zone (RPZ)
- Runway Extension - Alternative 1
- Future RPZ
- Rental Car Facilities
- Long Term Parking Phase 1
- Long Term Parking Phase 2
- Remote Parking
- Area 1 - Hourly & Premium Long-Term Parking
- Area 2 - New Employee Parking
- Area 3 - Expanded Vendor Parking as Necessary

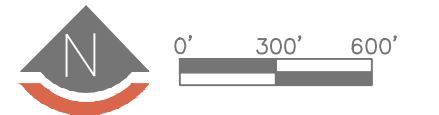
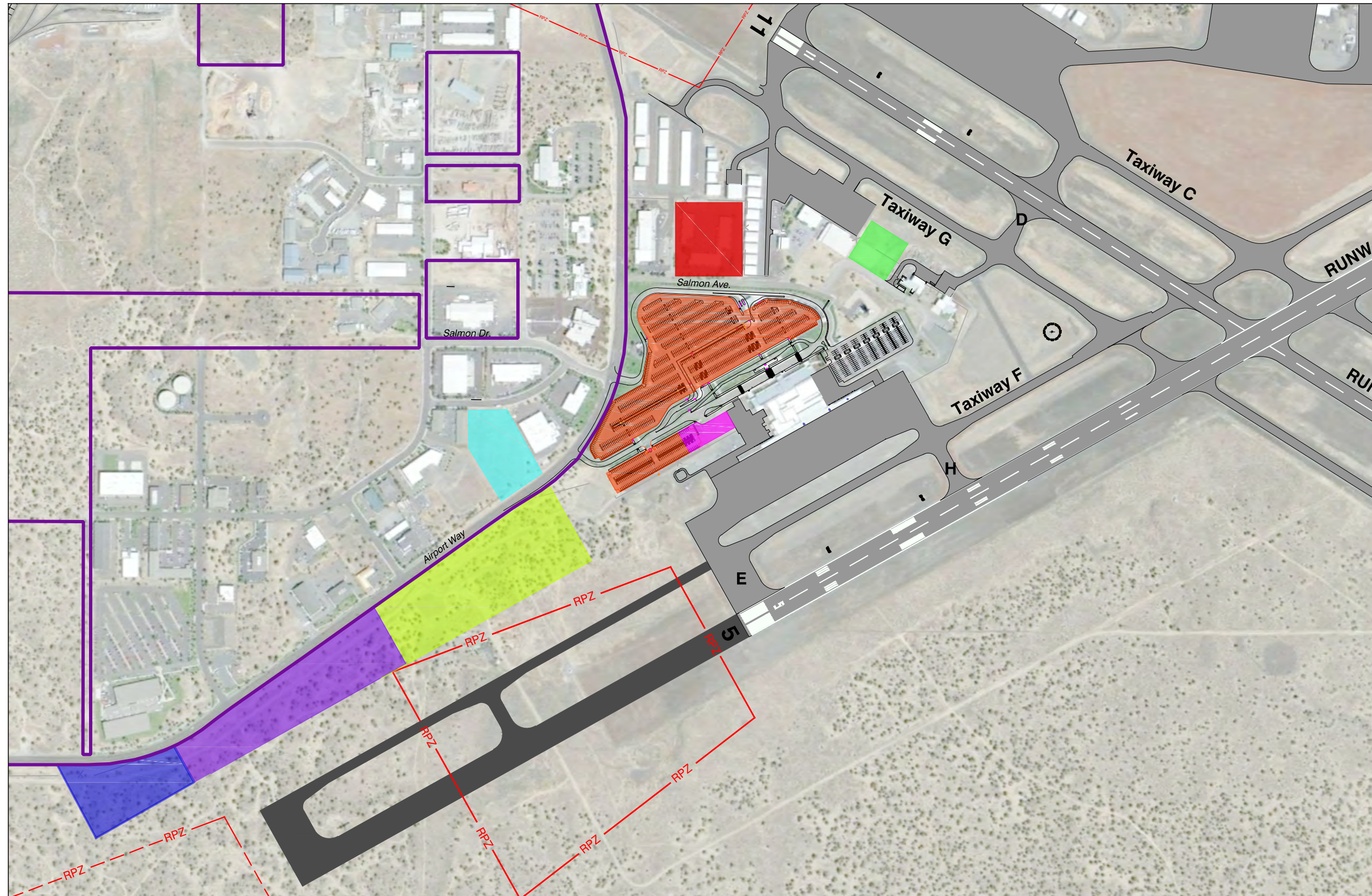


Figure 4-12
Alternative 2B - SE Airport Way Development



LEGEND

- RDM Property Boundary
- Runway Protection Zone (RPZ)
- Runway Extension - Alternative 1
- Future RPZ
- Rental Car Facilities
- Long Term Parking Phase 1
- Long Term Parking Phase 2
- Remote Parking
- Area 1 - Hourly & Premium Long-Term Parking
- Area 2 - New Employee Parking
- Area 3 - Expanded Vendor Parking as Necessary
- Relocated Tenants

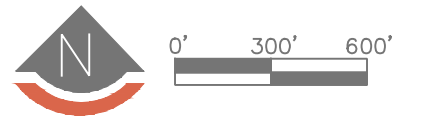


Figure 4-13
Alternative 2C - SW Airport Way Development

SUMMARY EVALUATION OF VEHICLE PARKING ALTERNATIVES

Table 4-3 presents a summary and an evaluation of the various alternatives for vehicle parking at RDM. Alternative 1 is the preferred alternative because of the increase in the amount of parking stalls (estimated increase of 4,000) and the minimal impact to airport operations.

Table 4-3. Vehicle Parking Alternatives Summary Evaluation Matrix				
Impact Category	Alternative 1	Alternative 2A	Alternative 2B	Alternative 2C
Description of Improvement	Reorganization of existing vehicle parking and additional long term/remote vehicle parking lots	Reorganization of existing vehicle parking and additional long term/remote vehicle parking lots		
Operational Capabilities				
Operability & Access to Terminal	Increases existing parking stalls by 314%.	Increases existing parking stalls by 287%.	Increases existing parking stalls by 153%.	Increases existing parking stalls by 161%.
Surface Transportation	Passengers are transported via bus to/from the terminal.	Passengers are transported via bus to/from the terminal.		
Transportation Cost	Increased cost for procurement of bus fleet, fuel and continued maintenance	Increased cost for procurement of bus fleet, fuel and continued maintenance		
Performance Requirements				
Addition or Subtraction of Vehicle Parking Stalls	Estimated 4,052 additional stalls	Estimated 3,109 additional stalls	Estimated 1,667 additional stalls	Estimated 1,744 additional stalls
Estimated Distance from Terminal to Vehicle Parking Lot	6,500' to 8,000'	2,000' to 5,000'	1,500' to 4,000'	1,000' to 4,000'
Conforms to FAA Standards	No Parking in RPZ.	Future parking in RPZ and no height conflicts with critical surfaces.		
Land Use Compatibility				
Impacts to Airport Property Use	Undeveloped property repurposed into vehicle parking.	None		Business relocation to repurpose land into vehicle parking.
Property Acquisition	None	None	Yes	
Business Relocation	Yes	None		Yes
Impacts to Off- Airport Land Use	None	None	Vacant property repurposed into vehicle parking.	Vacant property repurposed for Commercial/Industrial use.
Environmental Impact Potential				
Property Acquisitions / Easements	None	None	Yes	
Historic, Architectural, and Archaeological and Cultural Resources	Potential exists for discovery of archaeological resources	Potential exists for discovery of archaeological resources		
Threatened and Endangered Species	Requires Contact of USFWS - East Wolf Mgmt. Zone.	Requires Contact of USFWS - East Wolf Mgmt. Zone.		
Stakeholder Feedback				
Supporting Services	Required	Required		
Compatible w/Existing Development	Above Average	Excellent	Above Average	Above Average
Protection of Scenic View (Terminal)	No Impact	No Impact		
Constructability				
Impact to Airport Operations	Minimal	Construction near SE Airport Way and Central Terminal Area		
Building Demolition	Yes	No		Yes
Phasing Complexity	Low	Medium		
Financial Costs/Impacts				
Project Cost	\$21,400,000	\$13,692,000	\$10,678,000	\$16,222,000
OVERALL EVALUATION				
DETERMINATION	Favorable	Favorable	Not Favorable	Not Favorable



4.5.4 GENERAL AVIATION DEVELOPMENT ALTERNATIVES

As discussed in **Chapter 4 – Facility Requirements**, the existing GA facilities are constrained and lack easily developable areas with airfield access. Demand forecasts project additional based aircraft, corporate aviation related activities, and a potential flight school. This section analyzes GA development alternatives focused on accommodating anticipated demand with a maximum build potential.

ALTERNATIVE 1 – CENTRAL DEVELOPMENT AREA

This alternative, as shown in **Figure 4-14**, focuses on the development of a vacant 37.6-acre parcel of land southeast of the proposed taxiway parallel to Runway 5-23. This parcel has been identified for future aviation use and can be developed to accommodate many GA activities. This site does not penetrate the existing RVZ and has direct access to Runway 5-23.

The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact to airport operations. Earthwork is a significant factor due to the significant grades and known presence of rock in the area that requires excavation and embankment quantities of 9,200 CY and 151,000 CY, respectively.

This alternative is estimated at a total project cost of \$19,491,000 and includes engineering, environmental compliance, and construction management services.

ALTERNATIVE 2 – NORTH DEVELOPMENT AREA

This alternative, as shown in **Figure 4-15**, focuses on the redevelopment of existing GA facilities on the northwest side of the Airport while maximizing the development of vacant land north and south of SE Veterans Way for a total of 60 acres.

Future aviation development would occur north of existing GA facilities and south of Highway 126. The development would require relocating segments of SE Airport Way, SW Sisters Avenue, and SE Sisters Avenue and provide new access to existing buildings, leasehold areas, and new facilities. The future aviation development would be the potential site for a new flight school, or fixed-base operator (FBO). A new single engine air tanker (SEAT) Base would be located adjacent to existing USFS buildings. New commercial development would surround proposed aviation development and border, but not impact, Highway 126. It is recommended that all Airport property on the north side of the Airport, that is outside of the RPZ for Runway End 11, the USFS lease and GA development areas, be rezoned for airport compatible general commercial zoning.

This alternative is estimated at a total project cost of \$72,000,000 and includes engineering, environmental compliance, and construction management services. Total project cost reflects the full buildout of this alternative.



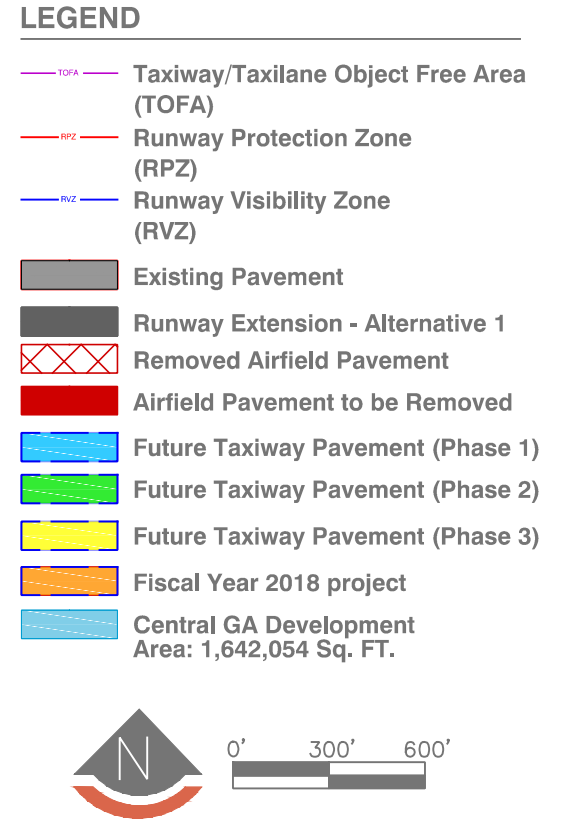
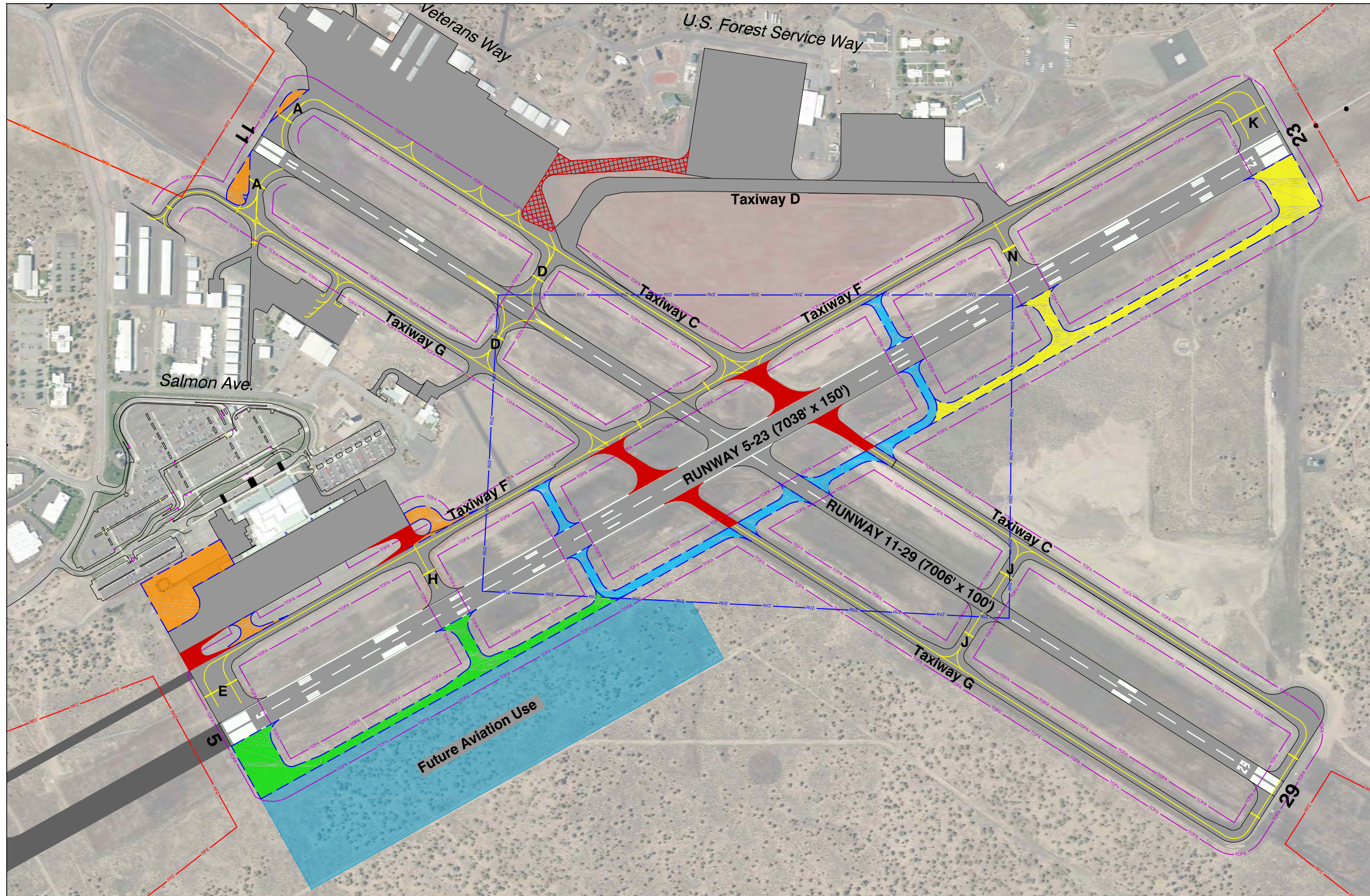


Figure 4-14
Alternative 1 - Centralized Development Area

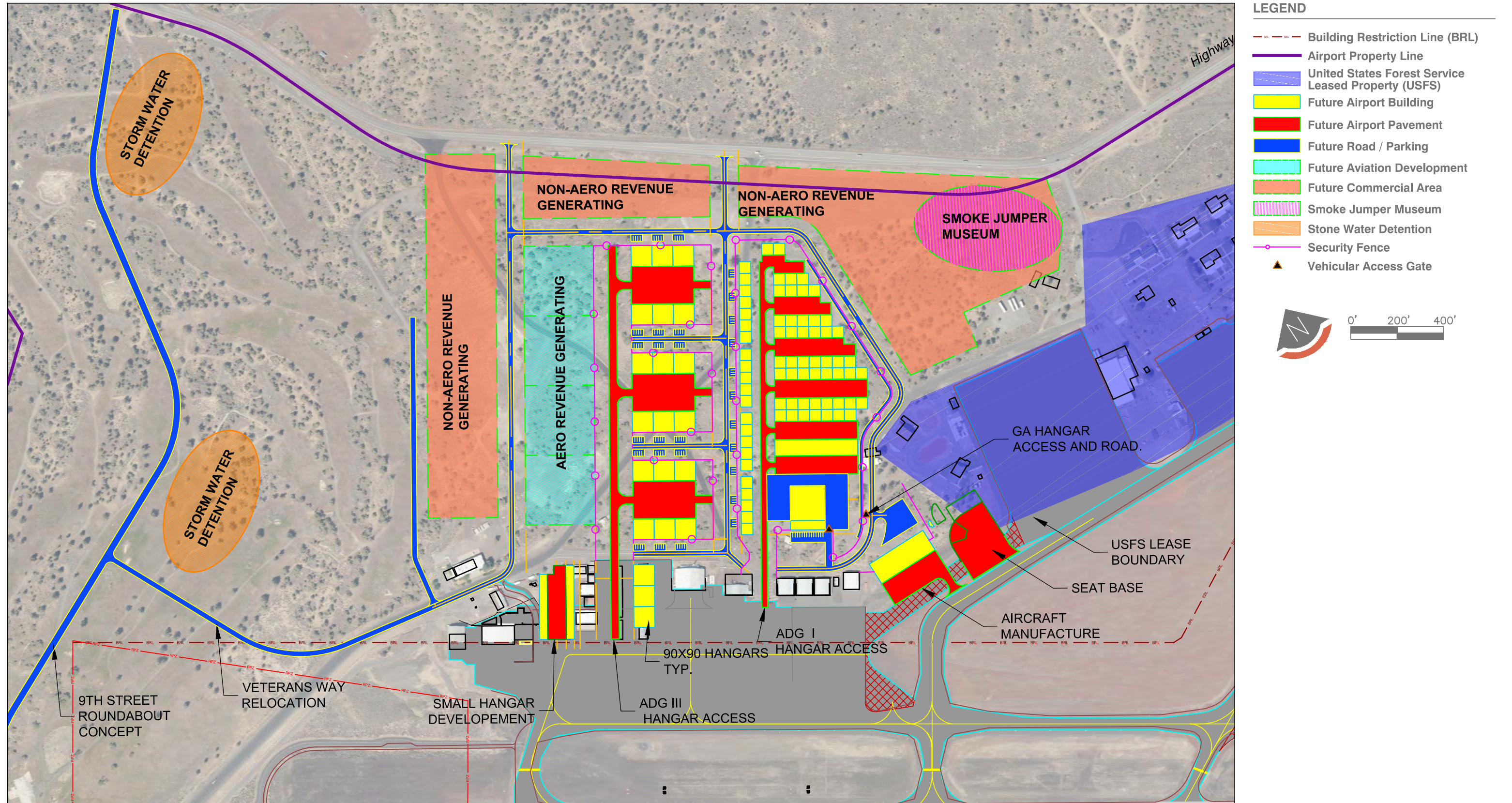


Figure 4-15
Alternative 2 - North Development Area

SUMMARY EVALUATION OF GA DEVELOPMENT ALTERNATIVES

Table 4-4 presents a summary and an evaluation of the various alternatives for GA development at RDM. Alternative 2 is the preferred alternative because development of the north area will have minimal impacts to airport operations and the airfield and will help meet demand for future based aircraft.

Table 4-4. General Aviation Development Alternatives Summary Evaluation		
Impact Category	Alternative 1	Alternative 2
Description of Improvement	Expand GA development east of RWY 5-23.	Expand north GA area for future based aircraft.
Operational Capabilities		
Operability & Access	Accommodates anticipated demand. New roadways required.	Accommodates anticipated demand. Roadway relocations required.
Airfield Impacts	Low	Low
Airline and GA Aircraft Separation	Yes	Yes
Hangar and Building Facility Additions	Greenfield site - potential multiple uses.	New flight school, FBO and hangar facilities for corporate and general aviation users
Performance Requirements		
Expansion Capabilities	Estimated 1,642,054 Sq. FT. of new development	Estimated 2,574,000 Sq. FT. of new development
Increases Potential for Development	Yes	Yes
Land Use Compatibility		
Impacts to Airport Property Use	Undeveloped land repurposed into aviation use.	Undeveloped land repurposed into aviation use.
Impact to Other Facilities	None	Demolition of older hangar facilities
Environmental Impact Potential		
Impervious Surfaces	Unknown	Estimated 46,350 SY of additional airfield pavement and 34,350 SY of additional roadway pavement
Property Acquisitions / Easements	None	Relocation of Veterans Way and 10th Street
Historic, Architectural, and Archaeological and Cultural Resources	None	Removal of two of four historic structures on airport property (Warehouse #1 and #2, circa 1940)
Section 4(F) of the Department of Transportation Act	None	Potential removal of an identified Section 4(f) resource
Tenant Relocation Required	No	Yes
Threatened and Endangered Species	Requires Contact of USFWS - East Wolf Mgmt. Zone.	Requires Contact of USFWS - East Wolf Mgmt. Zone.
Constructability		
Impact to Airport Operations	Low	Low
Grading/Soil Conditions	Complex	Complex
Facilities Demolition	None	Yes
Phasing Complexity	Low	Medium
Financial Costs/Impacts		
Project Cost	\$19,491,000	\$72,000,000
OVERALL EVALUATION		
DETERMINATION	Favorable	Favorable



4.5.5 AVIATION SUPPORT FACILITIES ALTERNATIVES

This section develops and evaluates alternatives for fuel farm expansion and the identification of fuel truck routes that minimize taxiway crossings. Aviation support facilities such as fuel farms are necessary to serve existing users but also encourage growth in aviation-related activities. Another important factor is the identification of a dedicated on-airport fuel truck haul route to expedite the delivery of fuel and provide for the highest level of safety by minimizing airfield crossings.

FUEL FARM

During the busiest times of the year, the Airport requires multiple Jet A fuel deliveries per day to keep up with demand. The lack of storage capacity is operationally inefficient and puts the Airport at risk of not being able to meet demand should the supply chain be disrupted by a fuel shortage or natural disaster. Analysis considers an expanded fuel farm location that would increase Jet A fuel storage capacity. For planning purposes, all fuel farm alternatives include five 20,000-gallon Jet A tanks. This order of magnitude increase in fuel storage would allow the Airport to have approximately fifteen days of fuel capacity during the very busiest times of year, which meets the needs projected in the demand forecasts, and is similar to the storage capacity of other airports with a similar amount of jet and turbo-prop operations. There is potential for the development of two fuel farm locations to expedite delivery and minimize the crossing of Runway 11-29, with one site to potentially serve the north GA users, and a second to support airline operations. All fuel farm alternatives can be expanded as demand dictates.

All alternatives are estimated at a total project cost of \$5,200,000 that includes site work, concrete pad, containment, five 20,000 United States Gallon (USG) tanks, permitting, paved vehicle access, and other associated costs.

Each of the alternatives involve the construction of a fuel farm. The proposed fuel farm can accommodate five 20,000 USG Jet A fuel tanks to increase Jet A fuel capacity by 100,000 USG over the Airport's existing capacity of 44,000 USG. The existing airfield perimeter fence will need to be reconfigured to account for two new access gates that allow the ingress and egress of fuel trucks to access the secure airside of the Airport, but with access limited to only the fuel farm. The fuel farm can be expanded to accommodate additional Jet A tanks or other types of fuel.

ALTERNATIVE 1 – SE AIRPORT WAY

This alternative, as shown in **Figure 4-16**, involves the construction of a fuel farm off Airport Way, south of the existing parking lots. This proposed location of a new fuel farm does not penetrate the existing or any future RVZ for Runway 5-23.

The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas and would have minimal impact to airport operations.



ALTERNATIVE 2 – NORTH DEVELOPMENT AREA: VETERANS AVENUE

This alternative, as shown in **Figure 4-17**, involves the construction of a fuel farm off Veterans Avenue, on the north GA apron. This proposed location of a new fuel farm does not penetrate the existing or any future RVZ for Runway 5-23.

Construction of this alternative requires the demolition of an existing building that has been identified as a Section 4(f) historic resource (Warehouse #2, circa 1940). The method of construction is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact to airport operations. A potential exists, however, for the discovery of archaeological resources in the area of this alternative, and it is recommended a survey be conducted prior to any construction.

ALTERNATIVE 3 – NORTH DEVELOPMENT AREA: SISTERS AVENUE

This alternative, as shown in **Figure 4-18**, involves the construction of a fuel farm off Sisters Avenue, on the north GA apron. This proposed location of a new fuel farm does not penetrate the existing or any future RVZ for Runway 5-23.

The complexity of constructing this alternative is straightforward relative to project phasing, contractor mobilization, and staging areas, and would have minimal impact to airport operations. A potential exists, however, for the discovery of archaeological resources in the area of this alternative, and it is recommended a survey be conducted prior to any construction.



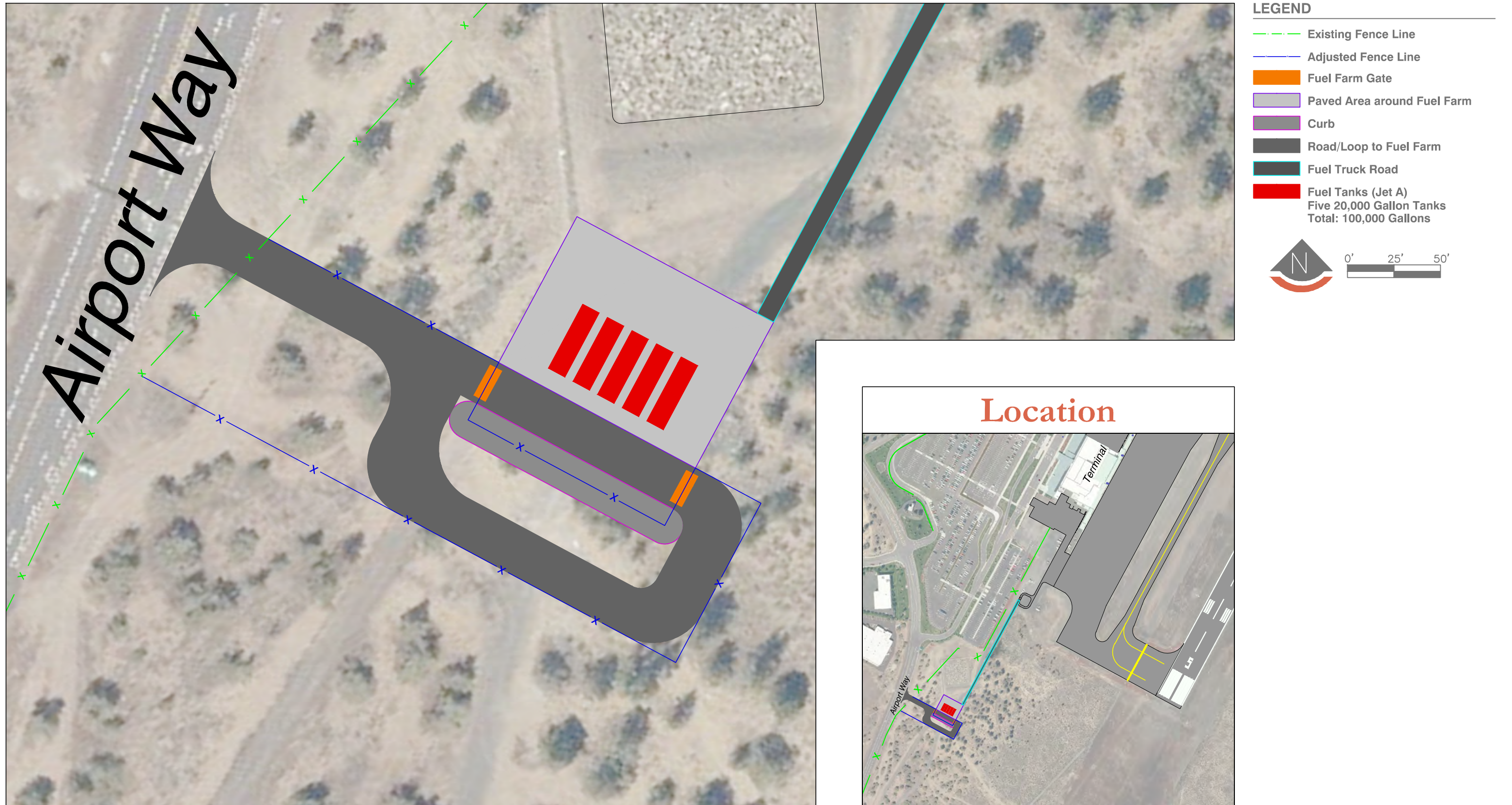


Figure 4-16
Alternative 1 - SE Airport Way

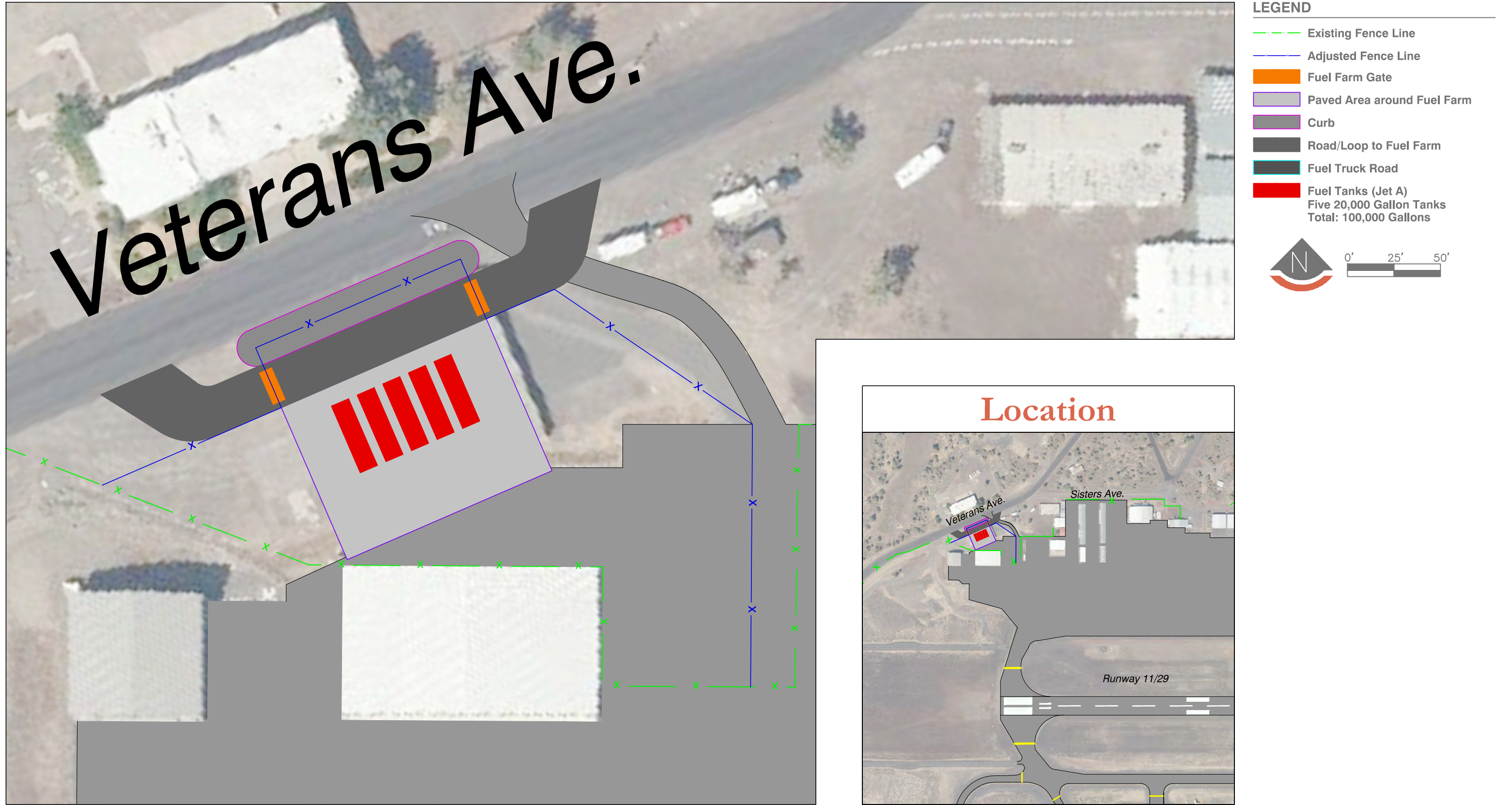


Figure 4-17
Alternative 2 - North Development Area: Veterans Ave.

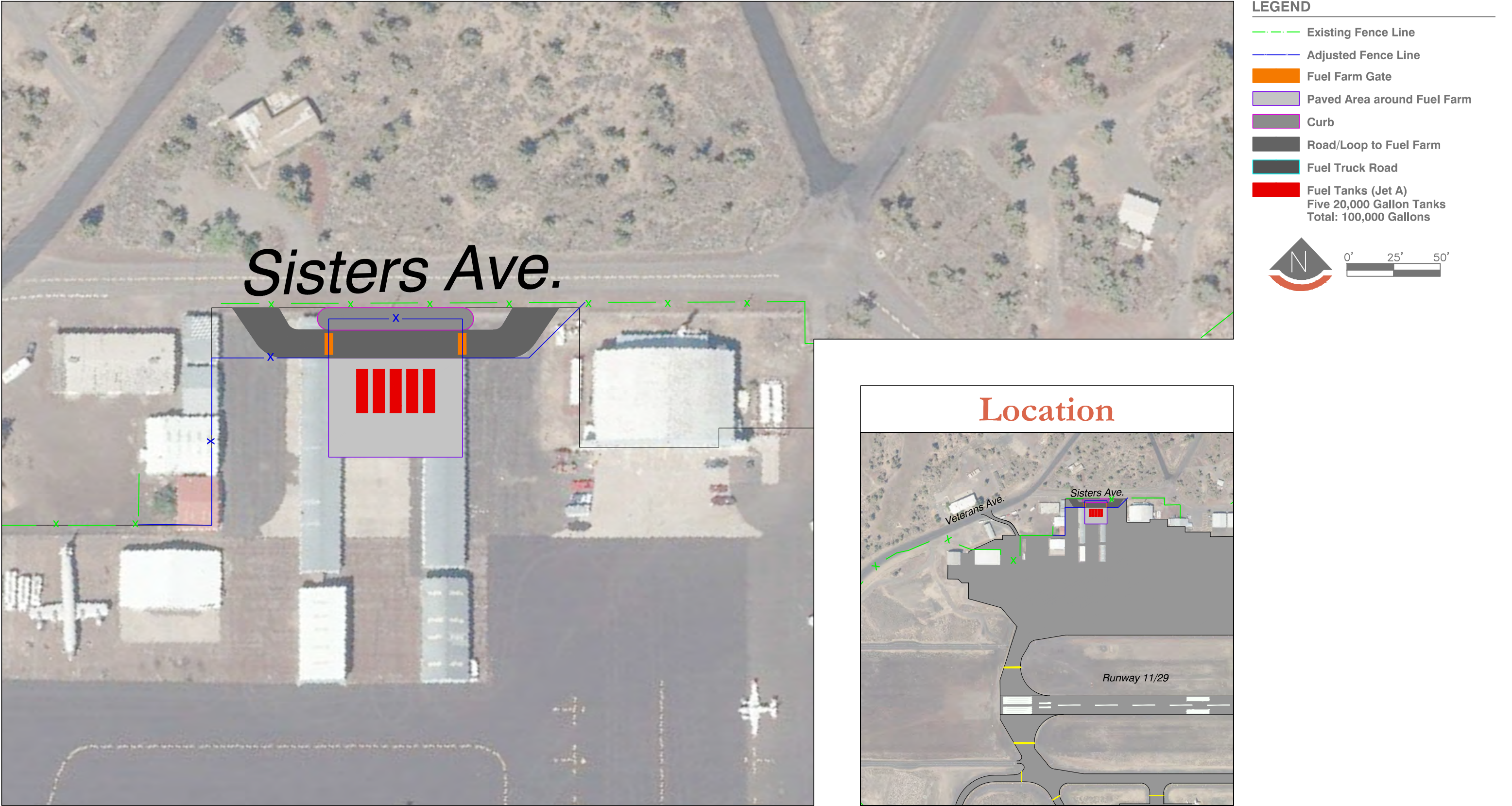


Figure 4-18
Alternative 3 - North Development Area: Sisters Ave.

SUMMARY EVALUATION OF FUEL FARM EXPANSION ALTERNATIVES

Table 4-5 presents a summary and an evaluation of the various alternatives for the expansion of the fuel farm at RDM. Alternative 1 is the preferred alternative because of the low impact to the airfield and airport operations. The location of the fuel farm is beneficial for commercial operations because fuel trucks will have a short commute time between the fuel farm and commercial apron, and the addition of Jet A fuel tanks near the commercial apron will negate the need for a fuel truck haul route.

Constructability			
Impact Category	Alternative 1	Alternative 2	Alternative 3
Description of Improvement	Construction of five 20,000 USG Jet A fuel tanks (100,000 USG)	Construction of five 20,000 USG Jet A fuel tanks (100,000 USG)	Construction of five 20,000 USG Jet A fuel tanks (100,000 USG)
Operational Capabilities			
Airfield Operability & Access	Serves Jet A users only. No 100 LL or mogas tanks. Tanker entrance off of Airport Way.	Serves Jet A users only. No 100 LL or mogas tanks. Tanker entrance off of Veterans Ave.	Serves Jet A users only. No 100 LL or mogas tanks. Tanker entrance off of Sisters Ave.
Airfield Impacts	None	None	None
Performance Requirements			
Level of Service	15 day fuel reserve	15 day fuel reserve	15 day fuel reserve
Expansion Capabilities	Additional tanks can be added in the future.	Additional tanks can be added in the future.	Additional tanks can be added in the future.
Land Use Compatibility			
Impact to Other Facilities	None	Demolition of existing building	Demolition of older hangar buildings.
Impacts to Airport Property Use	None	None	None
Environmental Impact Potential			
Permits/Code Requirements	Federal, State, City permits and Code Requirements	Federal, State, City permits and Code Requirements	Federal, State, City permits and Code Requirements
Historic, Architectural, and Archaeological and Cultural Resources	None	Removal of one of four historic structures on airport property (Warehouse #2, circa 1940). Potential exists for discovery of archaeological resources.	Potential exists for discovery of archaeological resources.
Section 4(F) of the Department of Transportation Act	None	Potential removal of an identified Section 4(f) resource	None
Tenant Relocation	No	Yes	Yes
Property Acquisitions / Easements	No	No	No
Constructability			
Impact to Airport Operations	Low	Low	Low
Facilities Demolition	No	Yes	Yes
Phasing Complexity	Low	Low	Low
Financial Costs/Impacts			
Project Cost	\$5,200,000	\$5,200,000	\$5,200,000
OVERALL EVALUATION			
DETERMINATION	Favorable	Favorable	Favorable



ON-AIRPORT FUEL TRUCK HAUL ROUTES

Fuel trucks currently travel from the north GA apron to the commercial terminal apron to refuel aircraft because Jet A fuel is only stored at the north GA apron. Travel between both aprons requires fuel trucks to travel on taxiways that are in the movement area. Fuel truck haul route alternatives are designed to allow fuel trucks to deliver fuel from the north GA apron to the commercial apron and to stop fuel trucks from traveling on taxiways or runways.

Fuel truck haul route alternatives can be ignored if Jet A fuel tanks are built on both sides of Runway 11-29. If Jet A tanks are built south of Runway 11-29, in proximity to the commercial apron, fuel trucks will be able to deliver fuel to the commercial apron without having to travel on taxiways or runways.

ALTERNATIVE 1 – INNER ROUTE

This alternative, as shown in **Figure 4-19**, involves the construction of a road for fuel trucks to deliver fuel to aircraft on the commercial apron without crossing or traveling on a taxiway or runway. The proposed road starts at the north GA apron and connects with the service road that exists around Runway 11 to avoid the TOFA. It then continues off the service road outside of the RPZ and crosses three taxiway connectors as the road avoids the TOFA. The road stays parallel with Runway 11-29 until it crosses in front of the segmented circle at the intersection of Runways 11-29 and 5-23, and then it turns running parallel with Runway 5-23, continuing straight to the commercial apron, and staying outside of the TOFA.

This alternative is estimated at a total project cost of \$514,200 and includes engineering, environmental compliance, and construction management services.

ALTERNATIVE 2 – CENTRAL ROUTE

This alternative, as shown in **Figure 4-20**, involves the construction of a road for fuel trucks to deliver fuel to aircraft on the commercial apron without crossing or traveling on a taxiway or runway. The road begins at the north GA apron and connects with the existing service road around Runway End 11 to avoid the TOFA. It then continues off the service road while in the RPZ and continues along the Airport's perimeter to the south GA apron and parallels Runway 11-29 to the area of the segmented circle and follows the same route to the commercial apron that is shown for Alternative 1.

This alternative is estimated at a total project cost of \$162,000 and includes engineering, environmental compliance, and construction management services.

ALTERNATIVE 3 – OUTER ROUTE

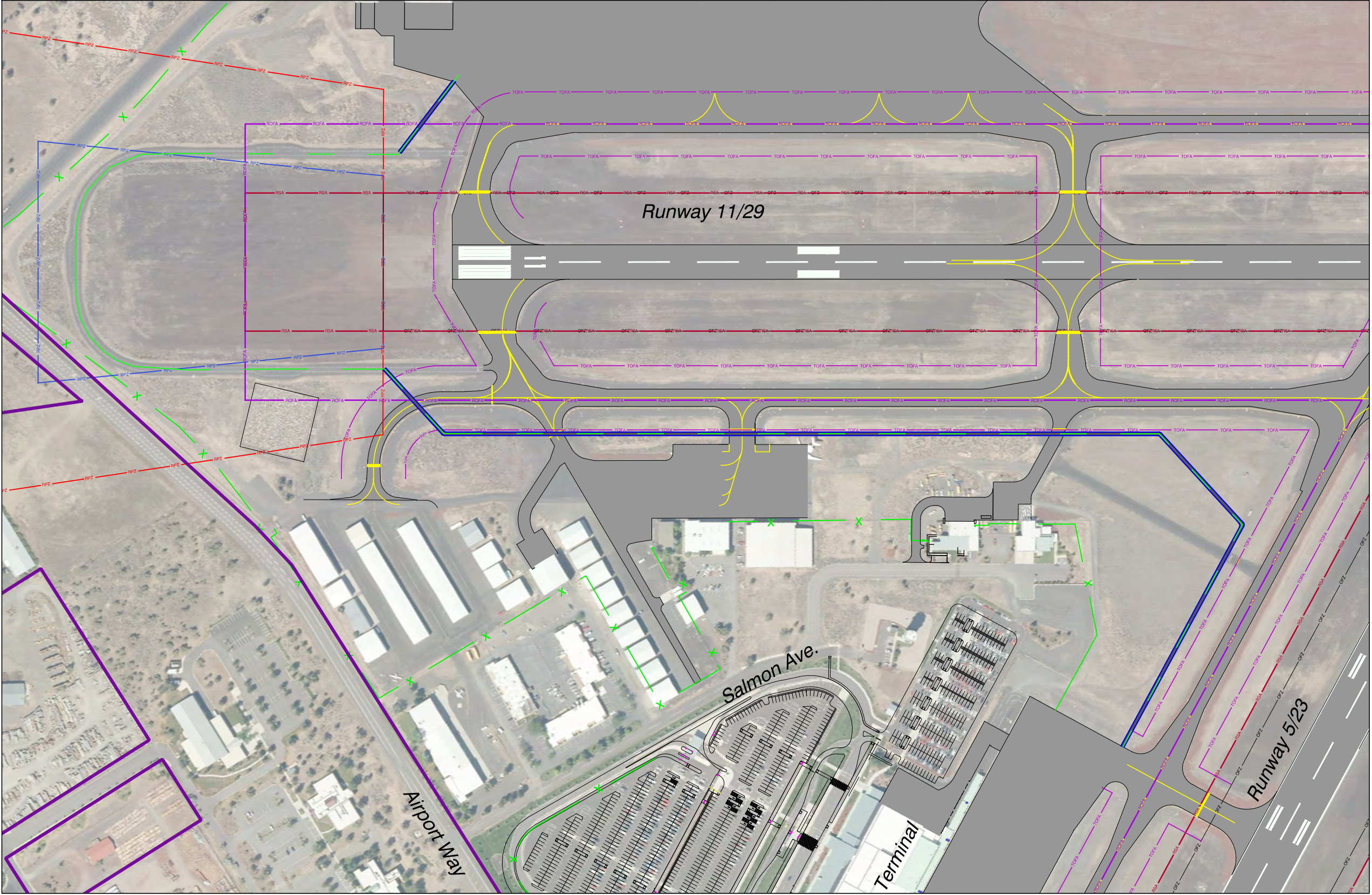
This alternative, as shown in **Figure 4-21**, involves the construction of a road for fuel trucks to deliver fuel to aircraft on the commercial apron without crossing or traveling on a taxiway or runway. The proposed



road follows the same route as Alternative 2 until it reaches the ARFF. It then follows the existing perimeter fence to the commercial apron.

This alternative is estimated at a total project cost of \$183,000 and includes engineering, environmental compliance, and construction management services.



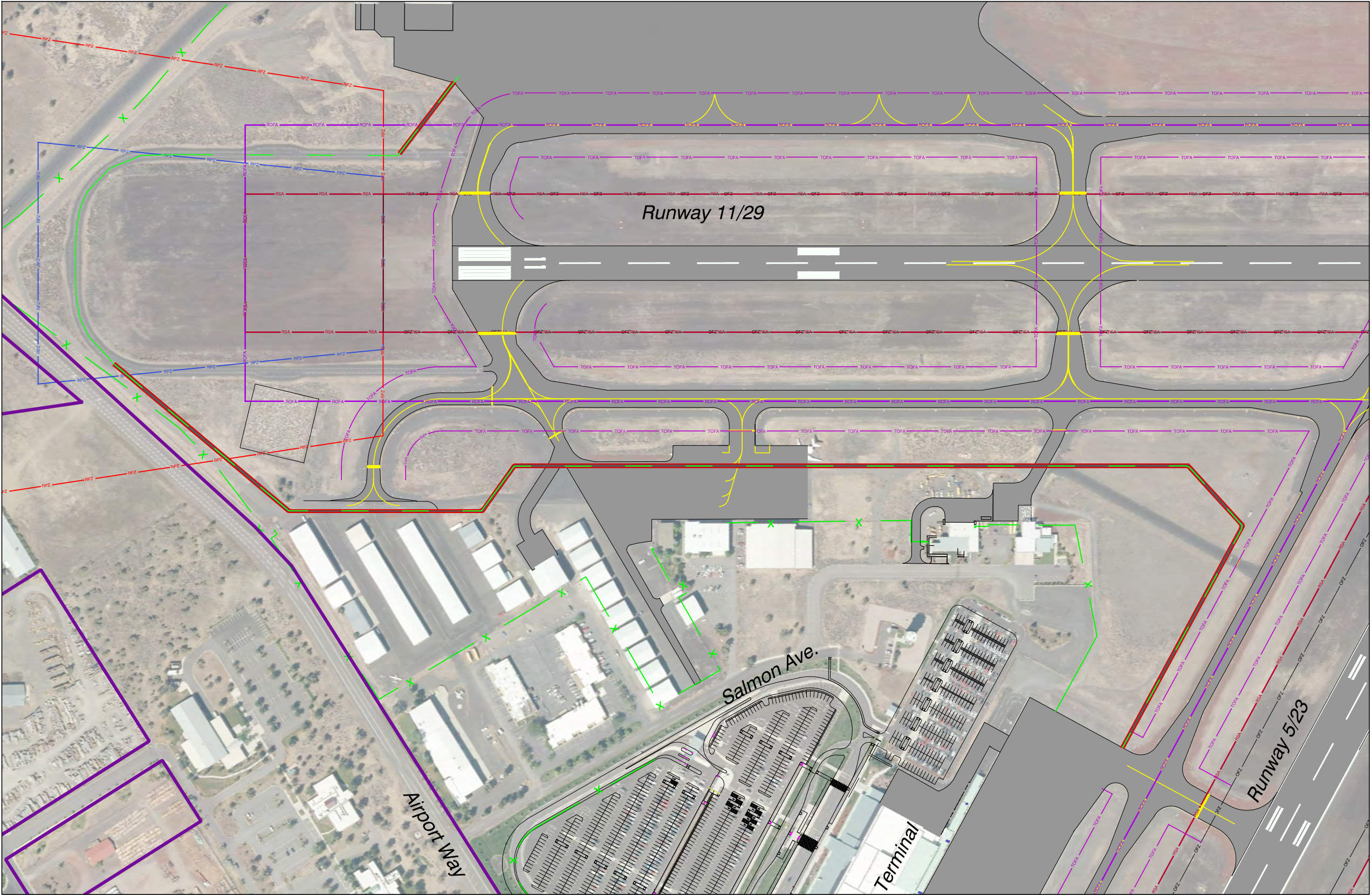


LEGEND

- Airport Property Line
- Runway Protection Zone (RPZ)
- Departure RPZ
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Taxiway/Taxilane Object Free Area (TOFA)
- Fuel Truck Route
- Fuel Truck Road Alternative 1

 0' 150' 300'

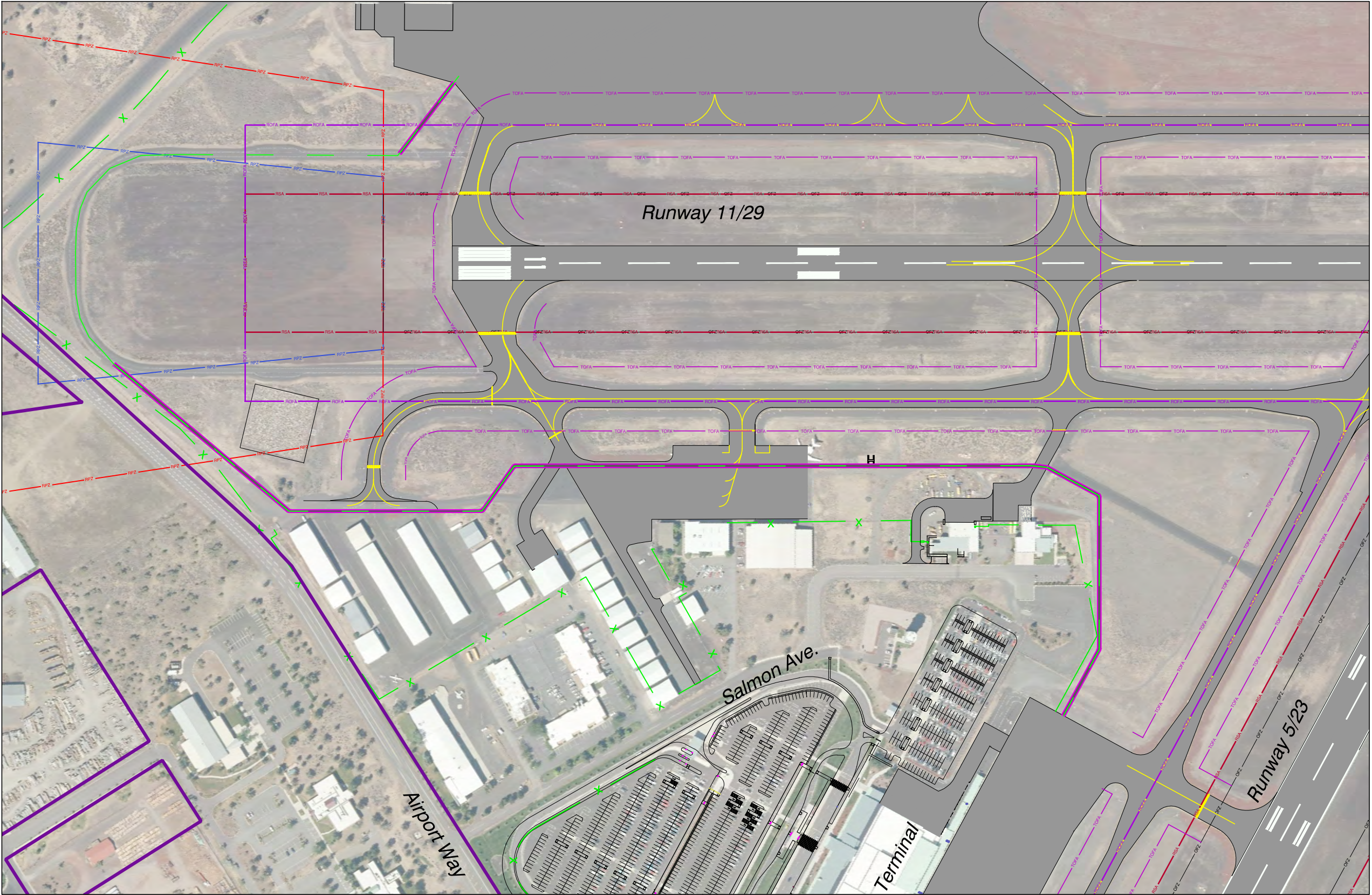
Figure 4-19
Alternative 1 - Inner Route



LEGEND

- Airport Property Line
- Runway Protection Zone (RPZ)
- Departure RPZ
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Taxiway/Taxilane Object Free Area (TOFA)
- Fuel Truck Route
- Fuel Truck Road Alternative 2

Figure 4-20
Alternative 2 - Central Route



LEGEND

- Airport Property Line
- Runway Protection Zone (RPZ)
- Departure RPZ
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Taxiway/Taxilane Object Free Area (TOFA)
- Fuel Truck Route
- Fuel Truck Road Alternative 3

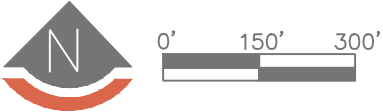


Figure 4-21
Alternative 3 - Outer Route

SUMMARY EVALUATION OF FUEL TRUCK HAUL ROUTE ALTERNATIVES

Table 4-6 presents a summary and an evaluation of the various alternatives for the construction of a fuel truck haul route at RDM. Alternative 1 is the preferred alternative because of the minimal impact to airport operations and facilities.

Table 4-6. Fuel Truck Haul Routes Alternatives Summary Evaluation Matrix			
Impact Category	Alternative 1	Alternative 2	Alternative 3
Description of Improvement	Construction of a two way on-airport fuel truck haul route to eliminate the crossing of active runways/taxiways.	Construction of a two way on-airport fuel truck haul route to eliminate the crossing of active runways/taxiways.	Construction of a two way on-airport fuel truck haul route to eliminate the crossing of active runways/taxiways.
Operational Capabilities			
Airfield Operability & Access	Connects North GA, Central GA and Airline Operations.	Connects North GA, Central GA and Airline Operations.	Connects North GA, Central GA and Airline Operations.
Airfield Operational Impacts	Minimal	Minimal	Minimal
Performance Requirements			
Route Alignment	Eliminates taxiway and runway crossings. Penetrations to the TOFA and ROFA. Crosses four taxilane connectors.	Eliminates taxiway and runway crossings. Penetrations to the TOFA and ROFA. Crosses four taxilane connectors.	Eliminates taxiway and runway crossings. Penetrations to the TOFA and ROFA. Crosses four taxilane connectors.
Land Use Compatibility			
Impacts to Airport Property Use	None	None	None
Impact to Other Facilities	None	Crosses South GA Apron	Crosses South GA Apron
Environmental Impact Potential			
Property Acquisitions / Easements	None	None	None
Tenant Relocation Required	None	None	None
Constructability			
Impact to Airport Operations	Minimal	Minimal	Minimal
Facilities Demolition	None	None	None
Phasing Complexity	Low	Low	Low
Financial Costs/Impacts			
Project Cost	\$514,200	\$162,000	\$183,000
OVERALL EVALUATION			
DETERMINATION	Favorable	Neutral	Neutral



4.5.6 PASSENGER TERMINAL ALTERNATIVES

As discussed in **Chapter 3 – Facility Requirements**, the existing passenger terminal was originally designed for smaller commuter aircraft with 35 to 50 seats. As airlines retired these aircraft to focus on more fuel-efficient aircraft with 65 to 90 seats, existing facilities have struggled to meet the existing passenger demand. The forecasted growth in passengers requires additional space in almost every functional terminal component. The following areas are specifically addressed in this chapter:

- ✓ Passenger boarding and holdrooms
- ✓ Outbound and inbound baggage operations
- ✓ TSA security screening
- ✓ Rental car counters and offices
- ✓ Ticket counters, queuing, and airline ticketing offices
- ✓ Administration space
- ✓ Mechanical support spaces

It is anticipated that airlines will operate even larger aircraft at the Airport within the 20-year forecast horizon to include variants of the Airbus A320 or Boeing 737, ADG-III aircraft. This section develops and evaluates alternatives for the expansion of the current passenger terminal to serve the anticipated demand in passengers and larger aircraft.

ALTERNATIVES 1 & 2 – WEST & EAST EXPANSIONS

PASSENGER BOARD BRIDGES AND HOLDROOMS

With the projected increase in passengers, and the airlines' planned transition from regional aircraft to larger and more efficient jets, the terminal will need physical improvements to accommodate these changes. The use of passenger boarding bridges (PBBs) provides a more efficient and comfortable way to board the larger aircraft. Smaller regional jets, like the CRJ 200, can be accessed from the current boarding floor with bridges, but larger jets can only be served from the second floor waiting area. The holdrooms and associated support spaces (e.g., restrooms, concession, etc.) will need expansion to meet the larger passenger capacity of the aircraft.

By 2026 it is anticipated that five passenger boarding bridges will be needed, and by 2036, an additional three bridges will be needed. To handle this expansion, the first and second floor holdrooms will need to increase in size.



There is only one recommended boarding bridge layout for 2026. The second floor will be slightly expanded over the existing ground floor concourse to accommodate two boarding bridges. These PBBs will service larger ADG-III aircraft such as the A320 or a 737. The lower level gates 3, 5, and 6 will be reconfigured to house PBBs that will service small regional aircraft. Gates 2, 4, and 7 will remain as ground floor boarding.

Two alternatives exist for the 2036 expansion. The first, identified in **Figure 4-22**, is to expand the terminal's second floor towards the west over an expanded baggage make-up area and the existing first floor passenger holdroom. In this alternative, five additional PBBs will be installed for aircraft boarding from the second floor. Gate 3 will remain as a first level accessed PPB.

A second alternative, identified in **Figure 4-23**, is to expand the terminal's second floor towards the east over an expanded first floor holdroom and incoming baggage. Four additional PBBs will be added to provide aircraft boarding from the second floor. Gates 5 and 6 will remain as first floor accessed PPBs.

The expansion of the gate and holdroom areas for both options is projected to be approximately 35,000 square feet (sf).

OUTBOUND AND INBOUND BAGGAGE OPERATIONS

By 2019, it is expected that the outbound baggage system will be at capacity due to the increased passenger enplanements. In addition to the increase in enplanements, the first floor holdroom expansion to the west will occupy a portion of the existing outbound baggage system. The outbound baggage system will require an expansion of approximately 3,500sf.

Inbound baggage operations will also need expansion. The existing baggage claim has two baggage carousels. It is anticipated that two additional carousels will be needed to meet the increased passenger load. This expansion will move towards the east. The expansion of the inbound baggage area is projected to be an additional 7,800sf.

TRANSPORTATION SECURITY ADMINISTRATION SECURITY SCREENING

The current Transportation Security Administration (TSA) screening area at the Airport consists of two screening lanes and will be at maximum capacity in five to six years. The expected need, by 2036, is for four lanes to provide uncongested screening. The increased area needed for this expansion will be accomplished by appropriating the area currently occupied by the rental car counters and offices. Future screening options may also provide a separate screening lane for security badged personnel.

The additional space required for the expanded TSA screening area will be 4,500sf.



RENTAL CAR COUNTERS AND OFFICES

To accommodate the expansion of TSA screening, the rental car counters and offices will require relocation. Rental car operations will expand to the northeast corner of the terminal. This area will be directly connected to baggage claim and sized to meet the future needs of the Rent-A-Car (RAC) operations.

TICKET AGENT POSITIONS, QUEUING, AND AIRLINE TICKET OFFICES

There are currently 20 agent positions at the ticketing counters with an anticipated need to add an additional four positions by 2026 and an additional nine positions by 2036, for a total of 33 positions. Additional queuing space will also be required for the 13 new positions. A westward expansion will allow for these future needs. To support the expanded ticketing operation, additional Airline Ticket Offices (ATOs) will be necessary.

The additional space required for the expanding ticketing operations and ATO offices is projected to be 10,800sf.

ADMINISTRATION SPACE

As the terminal expands, additional administrative space will be required to accommodate the growing staff. It is anticipated that a future administrative space would be provided on the second floor above the planned RAC expansion.

MECHANICAL, ELECTRICAL, IT, AND OTHER SUPPORT SPACE

To support the expansion of the terminal, additional space will be needed for mechanical, electrical, IT, and support space.

ALTERNATIVE 3 – NEW CONCOURSE EXPANSION

Development of Alternative 3 is based on comments about Alternative 1 from airport management and the general public from the open house meeting on October 18, 2017. Alternative 3 provides details on each phase of the terminal expansion.

To facilitate future passenger capacity and the ability to handle large jet aircraft, renovations to the existing terminal would proceed in three phases: 1) renovating the existing ground floor holdroom (identified in **Figure 4-24**); 2) expanding the terminal west and adding a new concourse adjacent to the existing second floor holdroom (identified in **Figure 4-25**); and 3) expanding the remaining areas of the terminal (identified in **Figure 4-26**).



PASSENGER BOARD BRIDGES AND HOLDROOMS

Phase one will include reconfiguring the boarding corridor into extra passenger holdroom space to increase seating capacity. An expansion of the passenger holdroom will extend east past the exit lane. The ground floor of the passenger holdroom expansion will be 5 feet higher than the existing holdroom to facilitate PBBs. The extra 5 feet allows PBBs to reach the larger aircraft on the apron. Three PBBs are anticipated in the holdroom expansion. The exit lane will receive renovations to handle an increase in passengers. No renovations will occur on the second floor.

TERMINAL EXPANSION AND NEW CONCOURSE

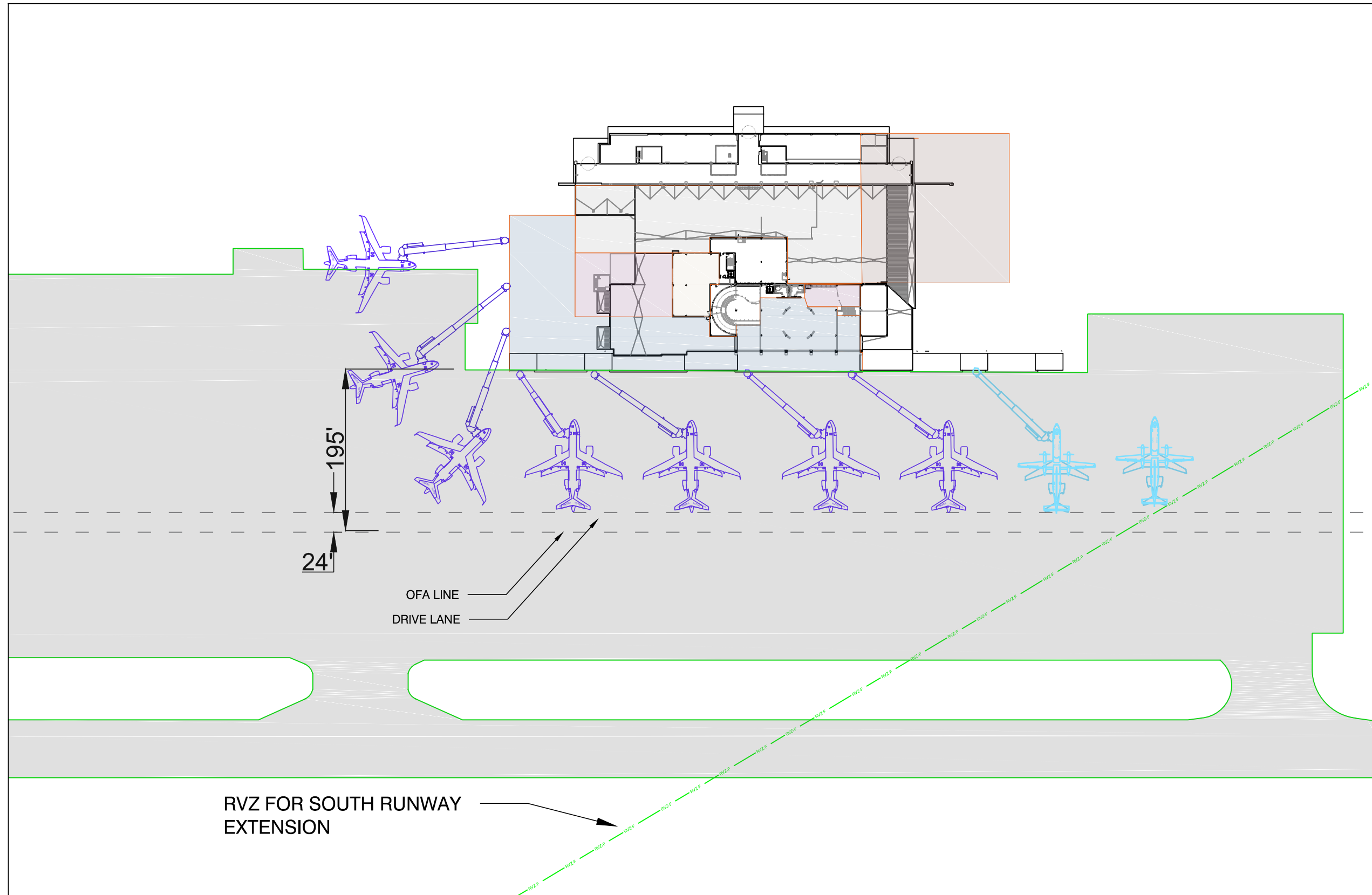
Phase two will expand the terminal west and add a new concourse adjacent to the existing second floor holdroom. In the interest of fiscal responsibility, avoiding construction-related congestion, and alleviating space needs in the terminal, a new building will be built adjacent to and connected to the west side of the terminal. The new building will house the ticket hall and larger baggage handling area on the ground floor. The second floor of the new building will contain a new concourse that is adjacent to the existing second floor holdroom. Access to the concourse will be possible with escalators and elevators that will be in the ground floor holdroom. The new concourse will have four PBBs. Once the new ticket hall is operational, a portion of the existing ticket hall and ticket offices will be repurposed as the new security checkpoint to accommodate passenger capacity needs. Mechanical facilities will be relocated to the new building. Renovations will occur to the existing second floor holdroom to connect to the new concourse.

TERMINAL EXPANSION OF REMAINING AREAS

In Phase three, RAC operations will relocate to the existing airport administration area, baggage claim will expand into the area previously occupied by RAC operations, and the existing TSA security checkpoint will be reconfigured into a new exit lane. Completion of phase three of Alternative 3 will provide space for the expansion of program areas in order of emerging need in the future. There will be two possible configurations for aircraft boarding, the first being seven PBBs and three ground boarding positions, and the second being eight PBBs and one ground boarding position. **Figure 4-26** shows the first configuration for boarding. This configuration, when upgrading to an eighth PBB, will remove two of the three ground boarding positions and allow for the additional PBB to facilitate boarding from the ground floor holdroom or from the second floor holdroom.

This alternative is estimated at a total project cost of 110,698,900 and includes engineering, environmental compliance, and construction management services. Total project cost includes the cost of the northeast terminal apron reconstruction alternative.





LEGEND

- Runway Visibility Zone (RVZ)
- Existing Pavement
- Boarding Bridge / Aircraft Associated with 1st Floor Level
- Boarding Bridge / Aircraft Associated with 2nd Floor Level



Figure 4-22

Alternative 1 - Forecast 2036 West Aircraft Boarding Expansion

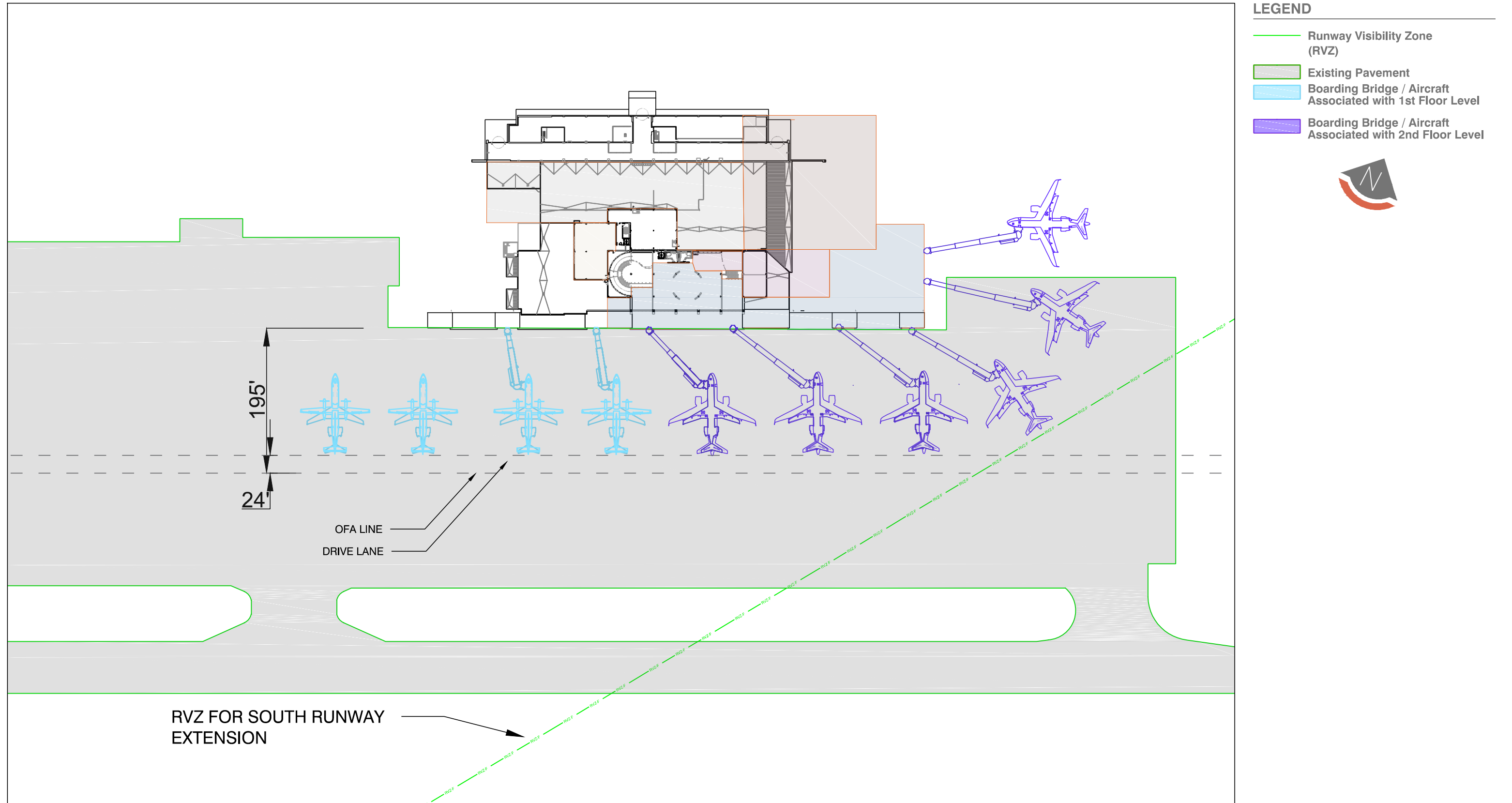


Figure 4-23
Alternative 2 - Forecast 2036 East Aircraft Boarding Expansion

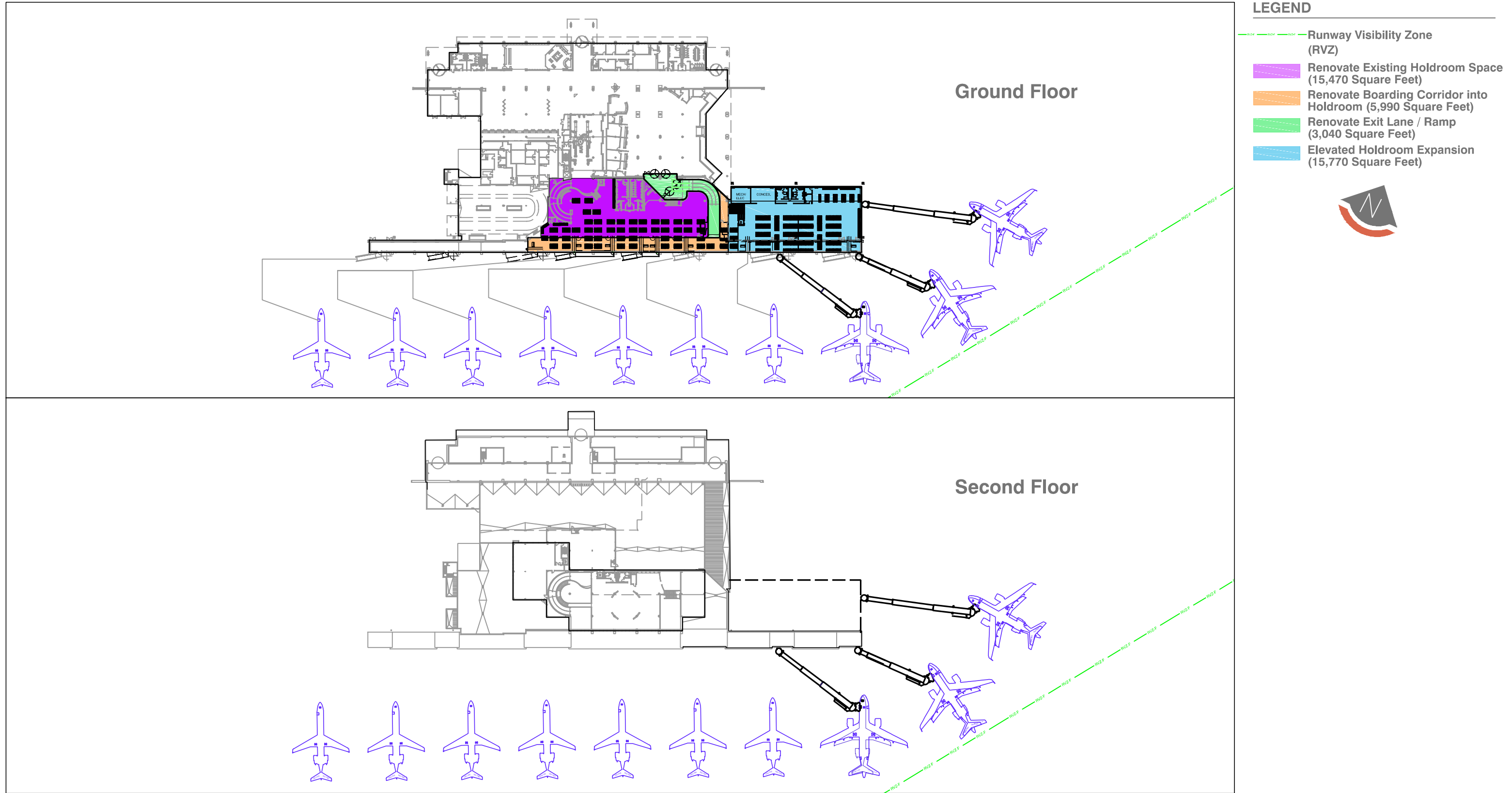


Figure 4-24
Alternative 3 - Forecast 2036 New Concourse Expansion - Phase 1

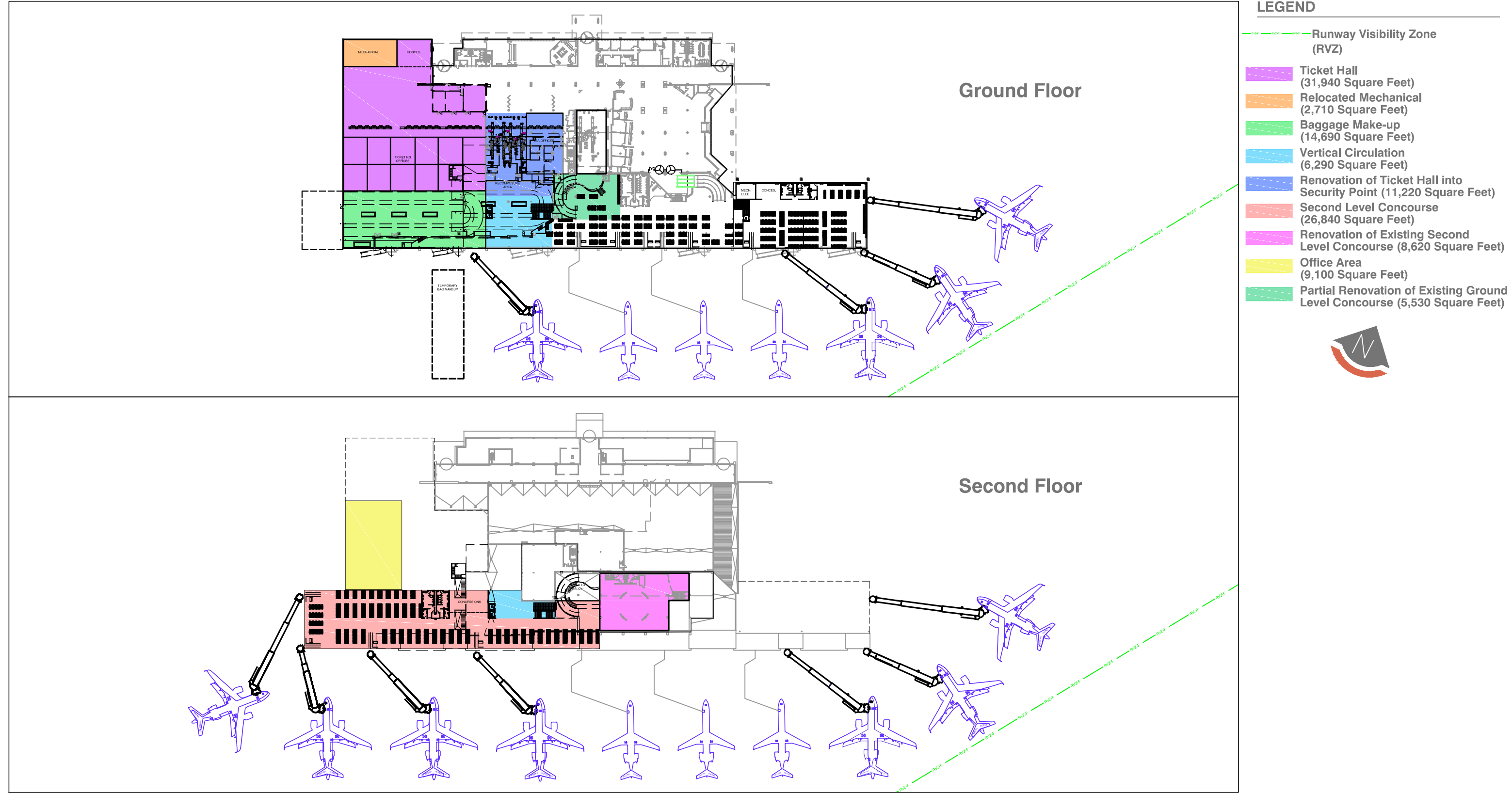


Figure 4-25
Alternative 3 - Forecast 2036 New Concourse Expansion - Phase 2

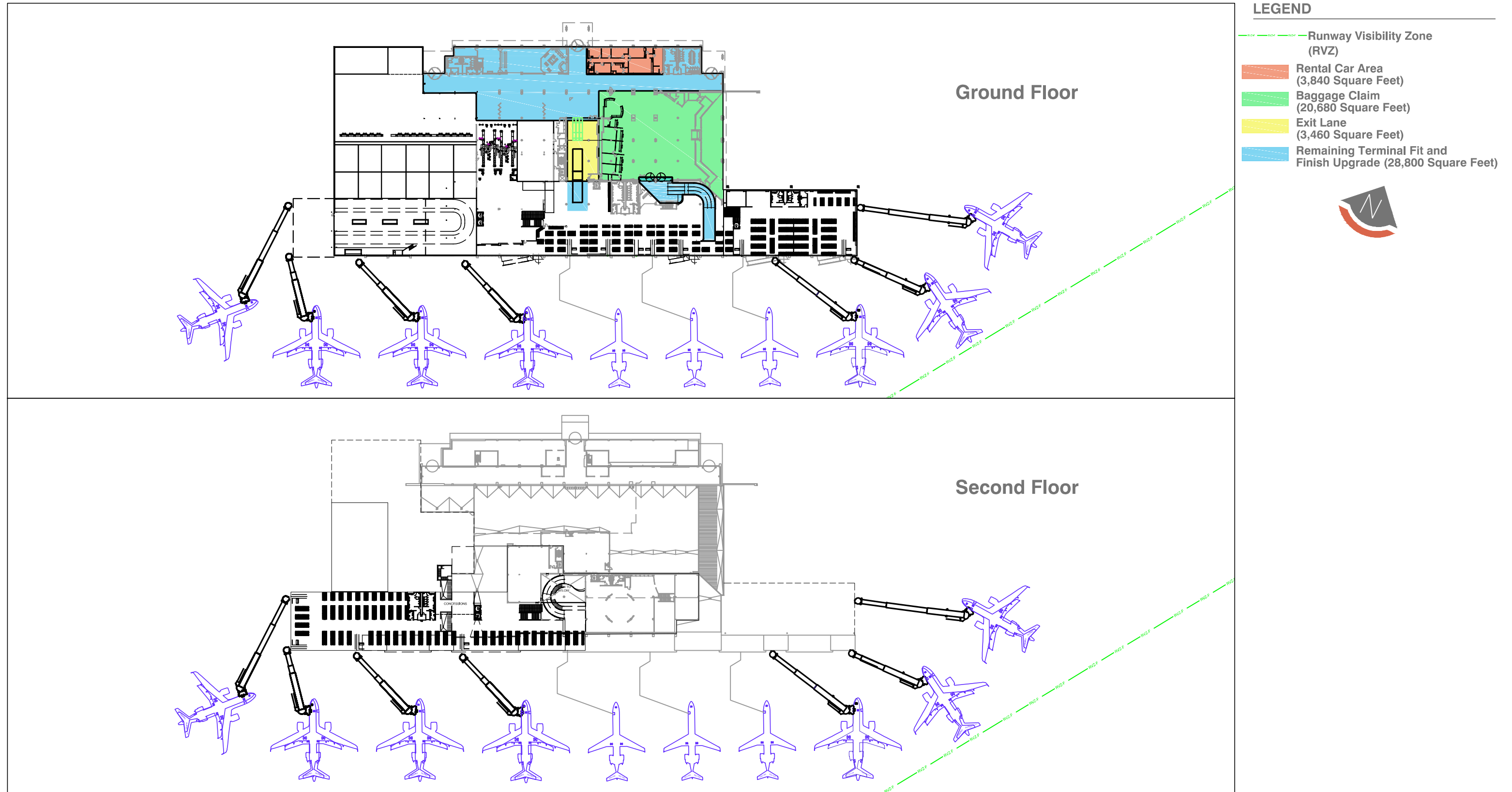


Figure 4-26
Alternative 3 - Forecast 2036 New Concourse Expansion - Phase 3

SUMMARY EVALUATION OF PASSENGER TERMINAL ALTERNATIVES

Table 4-7 presents a summary and an evaluation of the various alternatives for improvements to the passenger terminal at RDM. Alternative 3 is the preferred alternative because expanding the existing terminal to the west provides greater flexibility for future growth.

Table 4-7. Passenger Terminal Alternatives Summary Evaluation Matrix			
Impact Category	Alternative 1	Alternative 2	Alternative 3
Description of Improvement	Expansion of existing terminal facilities to the west	Expansion of existing terminal facilities to the east	Expansion of existing terminal facilities and new concourse
Operational Capabilities			
Operability & Access	Reconfiguration of internal building space and temporary placement of facilities	Reconfiguration of internal building space and temporary placement of facilities	Reconfiguration of internal building space and temporary placement of facilities
Operational Impacts	Runway 5 expansion to the SE increases extent of the RVZ but does not include aircraft parking positions	Runway 5 expansion to the SE increases extent of the RVZ to include aircraft parking	Runway 5 expansion to the SE increases extent of the RVZ to include aircraft parking
Performance Requirements			
Accommodates Anticipated Passenger Demand	Yes	Yes	Yes
Accommodates Anticipated ADG-III Aircraft (A320 / B737)	Yes	Yes	Yes
Land Use Compatibility			
Impacts to Airport Property Use	Yes	Yes	Yes
Impact to Other Facilities	Yes	Yes	Yes
Environmental Impact Potential			
Property Acquisitions / Easements	None	None	None
Tenant Relocation Required	Yes	Yes	Yes
Constructability			
Impact to Airport Operations	Minimal	Minimal	Minimal
Facilities Demolition	Yes	Yes	Yes
Phasing Complexity	Low	Low	Low
Financial Costs/Impacts			
Project Cost	In Progress	In Progress	\$110,698,900
OVERALL EVALUATION			
DETERMINATION	Favorable	Not Favorable	Favorable



4.5.7 NON-AERONAUTICAL DEVELOPMENT ALTERNATIVES

The economic benefits generated from an airport's commercial, industrial, and aviation-related tenants provide substantial tax revenues and employment opportunities for the surrounding communities. Thus, it is in the Airport's best interest to develop future commercial/industrial uses, in addition to aviation-related activities, where feasible. Development around the Airport will diversify revenue streams and promote compatible development. Multiple subareas on and around the Airport were analyzed to examine their development potential to include the:

- ✓ Fairgrounds Industrial Subarea
- ✓ Airport Way Subarea
- ✓ West Business Park
- ✓ North Business Park
- ✓ North Apron
- ✓ South Apron
- ✓ North Development Parcel
- ✓ USFS Campus
- ✓ Terminal

Non-aeronautical alternatives were developed for the Fairgrounds Industrial and Airport Way Subareas in addition to the West and North Business Parks. The remaining potential development areas were excluded from non-aeronautical concept planning due to their planned aviation use or other exclusive uses (e.g., USFS use of its campus and potential emergency response training facility in the North Development Parcel).

Non-aeronautical landside alternatives were developed to illustrate the following potential uses:

- ✓ Accommodation and food services
- ✓ Industrial (which includes speculative light industrial buildings, construction firms, manufacturing, and wholesalers and warehousing)
- ✓ Gas station/ convenience store
- ✓ Office/flex (only in the North Business Park)

Conceptual building footprints were developed for the City-owned parcels within the Fairgrounds Industrial Subarea, Airport Way Subarea, West Business Park, and North Business Park. Additional buildings are likely to be constructed on privately held land as well, though those have not been illustrated within the development alternatives prepared for this Master Plan.



Table 4-8 summarizes the approximate size of the resulting non-aviation building floor areas that could be accommodated on City-owned land within each of the four subareas and further described in the subsequent alternatives.

Table 4-8. Summary of Non-Aviation Building Areas by Subarea (Square Feet)				
Use	Subarea			
	Fairgrounds Industrial	Airport Way	West Business Park	North Business Park
Accommodations	0	130,000	0	0
Food/restaurant	0	11,000	0	0
Gas station/ convenience store ¹	0	4,500	0	0
Industrial buildings ²	70,000	299,500	123,000	0
Office/flex ³	0	0	0	289,000
Notes:				
¹ Gas station/convenience store is not a permitted use in the M-1 Light Industrial zone so a zone change or code amendment would be necessary to accommodate this use.				
² Industrial buildings include light industrial buildings, construction firms, manufacturing uses, wholesalers, and warehouse use.				
³ The illustrated portion of the North Business Park is zoned C-5 Tourist Commercial, which does not permit industrial uses. Office uses have been illustrated in this area as they are permitted in the zone.				

As a subsequent effort to the Master Plan update, the City may wish to consider amending the zoning near the Airport to accommodate a wider range of airport-compatible uses, including commercial, industrial, and institutional uses. Currently, nearby zones include Airport, Light Industrial (M-1), Tourist Commercial (C-5), Open Space Park Reserve (OSPR), Park, and Public Facility (PF), each of which has its own set of permitted uses and development standards. Some communities have been able to capitalize on their public airports by applying zoning designations that allow for a wide range of uses so long as they do not affect aviation operations. Permitting a variety of uses and imposing regulations to limit impacts on aviation may be a way for the City to stimulate economic development while maintaining and enhancing the viability of the Airport. To implement this option, the City may need to amend the Comprehensive Plan and Comprehensive Plan Map, Development Code, and Zone Map.

FAIRGROUNDS INDUSTRIAL SUBAREA

The Fairgrounds Industrial Subarea is zoned Light Industrial (M1) and the majority is privately owned. The southernmost lot in this subarea is an 8-acre City-owned lot. The concept plan illustrates the potential for 70,000sf of industrial buildings on the City parcel. While not pictured on the diagrams, the privately owned land has the potential for up to 200,000sf of additional industrial buildings and 15,000-20,000sf of supporting commercial uses (e.g., restaurants).

AIRPORT WAY SUBAREA

The Airport Way Subarea is zoned Light Industrial (M1) and the land is owned by the City. The southern 9 acres are currently developed with Peterson Caterpillar's facility. The concept plan illustrates nearly



300,000sf of industrial buildings, plus 15,500sf of supporting commercial (gas station and restaurants) and a five-story, 130,000sf hotel (hotels may require additional soundproofing measures due to proximity to the railroad and runway). Of this, a hotel, 4,000sf of restaurant, and 195,000sf of industrial buildings are depicted west of Airport Way. If the land west of Airport Way is needed for rental car facilities and airport parking as envisioned in some aviation alternatives, then some or all these non-aviation uses would not be possible at this location. East of Airport Way, the concept plan illustrates 7,000sf of restaurant, 4,500sf of gas station/convenience store, and 104,500sf of industrial buildings. Due to the large parcel size east of Airport Way, an internal circulation network with private roadways has also been illustrated.

WEST BUSINESS PARK

The West Business Park area contains multiple zoning designations, including Light Industrial (M1), Public Facility, and Park. The concept plan illustrates 123,000sf of industrial buildings on City-owned land within the M1 zone. Potential building locations were selected to avoid the future westward extension of Salmon Drive and the future realignment of the Airport Way-Veterans Way intersection. While not pictured on the diagrams, the privately owned land has the potential for up to 375,000sf of additional industrial buildings.

NORTH BUSINESS PARK

The North Business Park area contains multiple zoning designations, including Light Industrial (M1), Tourist Commercial (C5), and Open Space Park Reserve (OSPR). As the southern portion of this subarea is anticipated to be used for aviation purposes, only the northern portion by Highway 126 is available for non-aeronautical development. This northern portion is zoned C5 and industrial uses are not allowed, so the concept plan illustrates 289,000sf of office buildings. The C5 zone would also permit food services and accommodations, which have not been illustrated but may be considered if such uses are not developed along Airport Way south of the Airport.

SITE, TRANSPORTATION, AND UTILITY CONSTRUCTION COST ESTIMATES

Based on the illustrated non-aeronautical development, this section describes order-of-magnitude site preparation costs as well as transportation and utility costs that can be anticipated to serve the developments.



In general, the site preparation costs include site clearing and grading, stormwater management, installation of utilities, and construction of new roadways. Site development costs have been estimated on a square-foot basis and assume typical construction methods and design for commercial and industrial developments.

The overall public utility systems within the non-aeronautical development areas appear to have capacity to accommodate the proposed uses, so a need for upgrades to existing utilities are not expected to be necessary. Some of the study areas require public utility extensions to serve new development.

FAIRGROUNDS INDUSTRIAL SUBAREA

Site preparation for the Fairgrounds Industrial Subarea is expected to include extension of SW Elkhorn Avenue to connect to the southern terminus of SW Badger Way, which will include 8" sewer and 12" water public utility extensions within the new roadway.

Site preparation construction costs are expected to total over \$4 million, as outlined below:

- ✓ On-site earthwork, parking, and private roadways - \$1,232,900
- ✓ On-site private utilities - \$818,900
- ✓ Public roadways - \$960,000
- ✓ Public utilities - \$1,160,000
- ✓ Total site development costs: \$4,171,800

AIRPORT WAY SUBAREA

Site preparation for the Airport Way Subarea is expected to include extension of 12" public water lines along Mt Hood Drive and within the southern on-site private roadway, as well as extension of 8" public sewer lines within the southern private roadway.

Site preparation construction costs are expected to total nearly \$13 million, as outlined below:

- ✓ On-site earthwork, parking, and private roadways - \$6,536,800
- ✓ On-site private utilities - \$5,528,200
- ✓ Public roadways - \$0
- ✓ Public utilities - \$855,000
- ✓ Total site development costs: \$12,920,000



WEST BUSINESS PARK

Site preparation for the West Business Park Subarea is expected to include extension of SE Salmon Drive to the western edge of the subarea, which will include 12" water and 8" sewer public utility extensions within the new roadway. The proposed realignment of the intersection of SE Airport Way and SE Veterans Way is not included in the non-aeronautical site development roadway costs listed below.

Site preparation construction costs are expected to total over \$8 million, as outlined below:

- ✓ On-site earthwork, parking, and private roadways - \$3,277,700
- ✓ On-site private utilities - \$2,651,600
- ✓ Public roadways - \$850,000
- ✓ Public utilities - \$1,232,500
- ✓ Total site development costs: \$8,011,800

NORTH BUSINESS PARK

Site preparation for the North Business Park Subarea is expected to include upgrades of the existing SE 10th Street and SE Veterans Way to meet city standard road sections, which will include 12" water and 8" sewer public utility extensions within 10th Street. SE Veterans Way includes public utilities that do not need upgrades or extensions. The proposed realignment of the intersection of SE Airport Way and SE Veterans Way is not included in the non-aeronautical site development roadway costs listed below.

Site preparation construction costs are expected to total over \$8 million, as outlined below:

- ✓ On-site earthwork, parking, and private roadways - \$3,045,400
- ✓ On-site private utilities - \$2,396,200
- ✓ Public roadways - \$470,000
- ✓ Public utilities - \$451,300
- ✓ Total site development costs: \$6,392,900



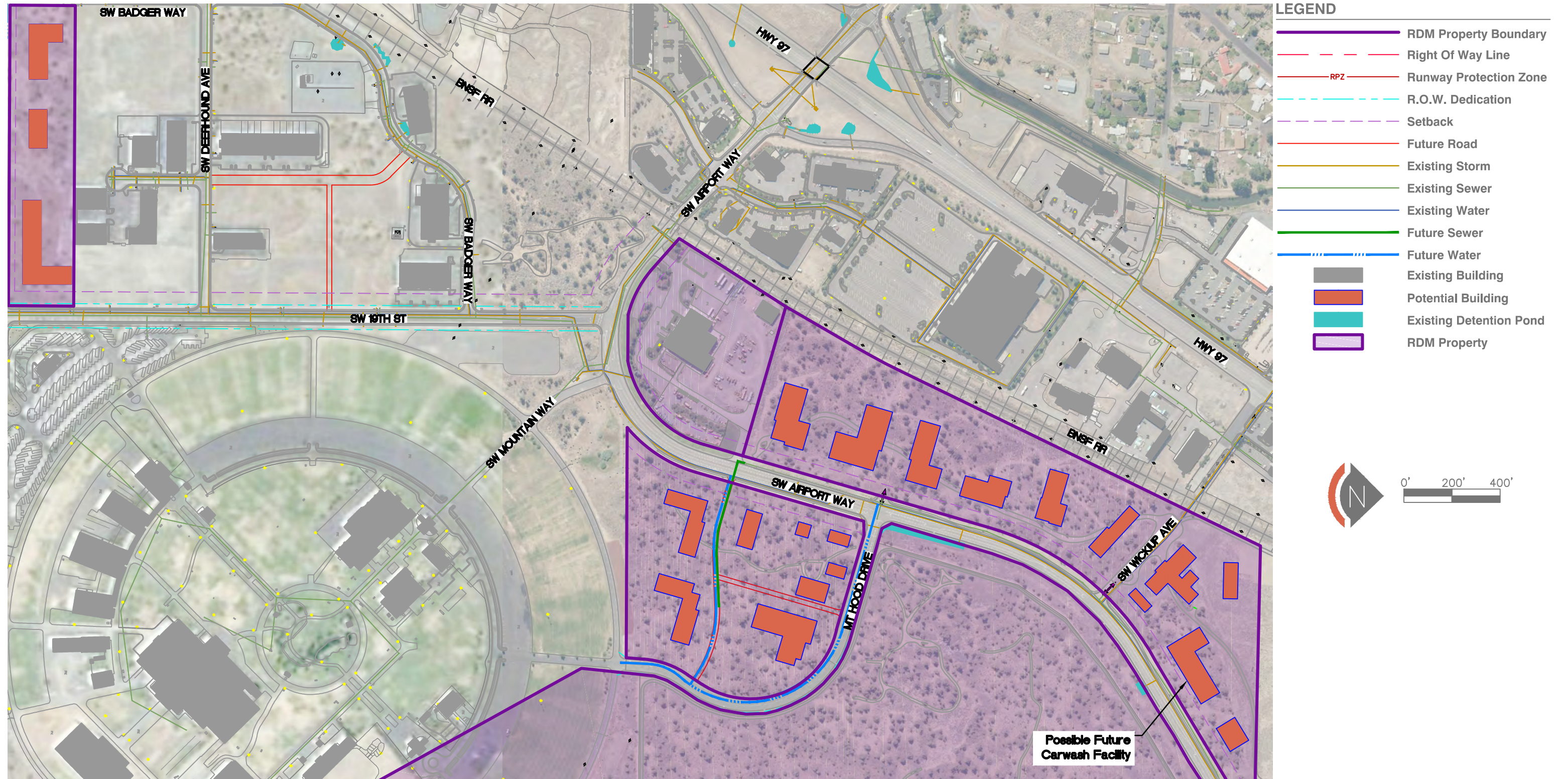


Figure 4-27
Alternatives - Fairgrounds Industrial & Airport Way Subareas

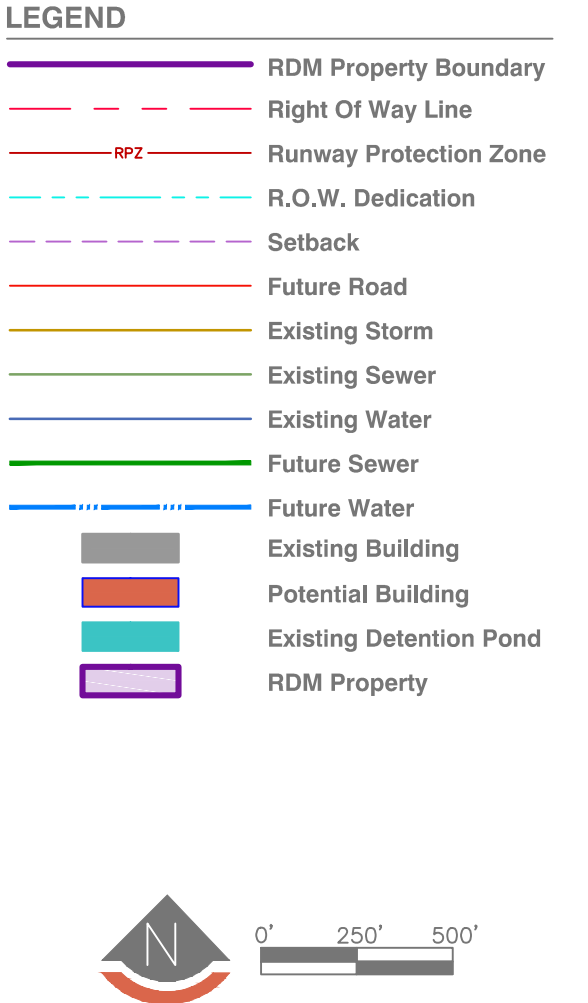
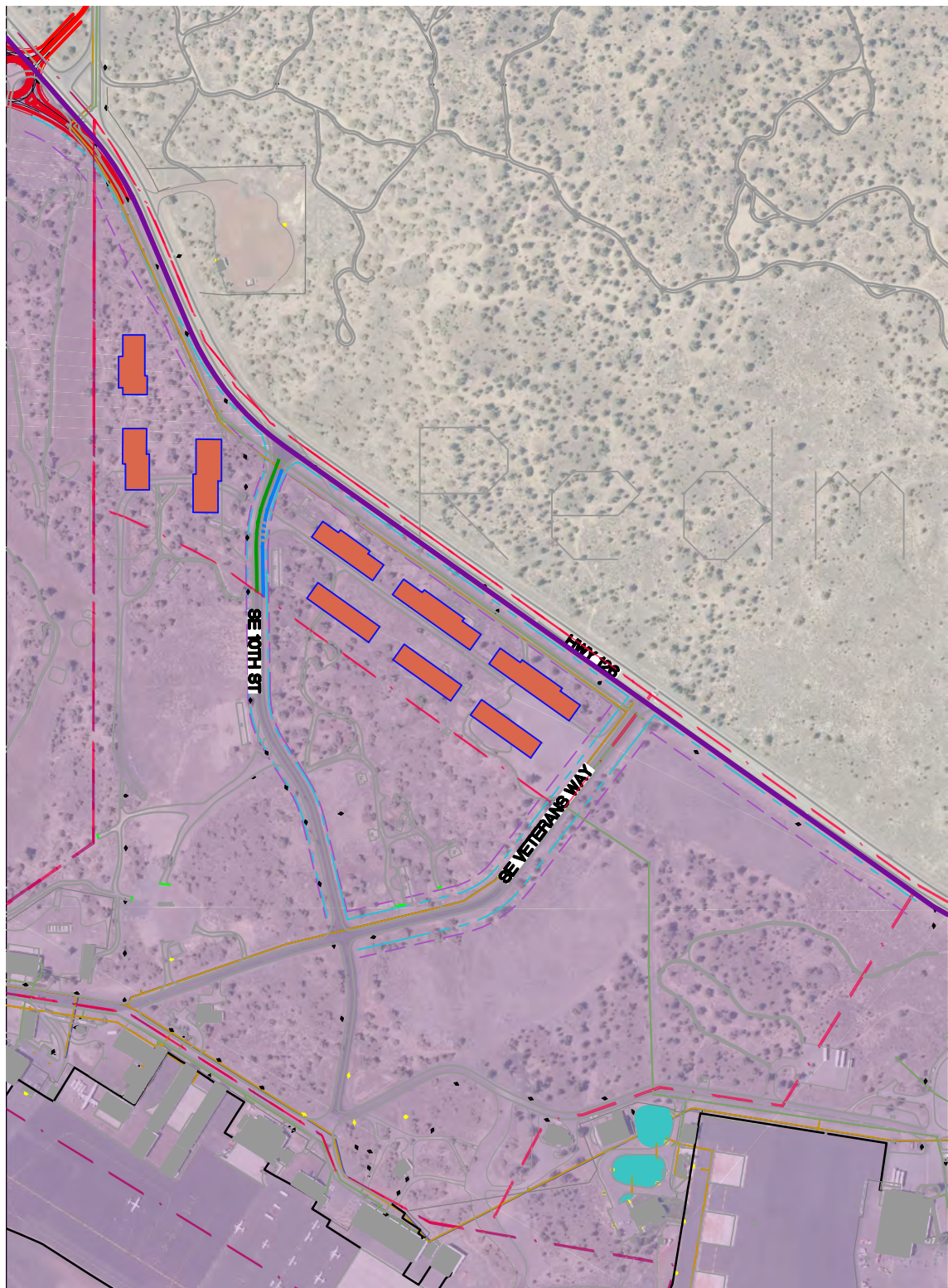
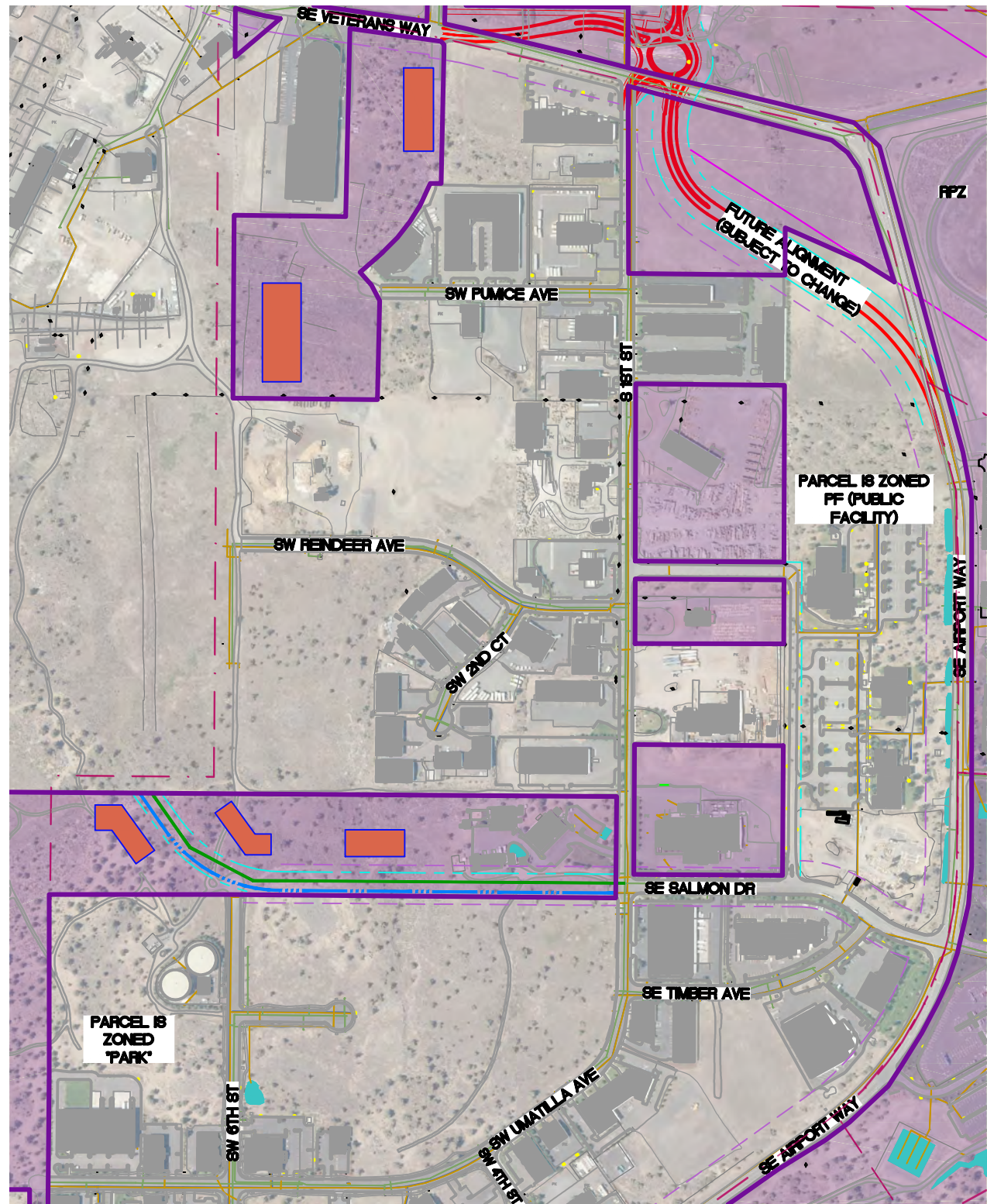


Figure 4-28
Alternatives - West & North Business Park Subareas

4.5.8 AIRCRAFT RESCUE & FIRE FIGHTING BUILDING ALTERNATIVES

The FAR Part 139 establishes certification requirements for airports serving scheduled air carrier operations. As an FAR Part 139 certified airport, RDM must provide Aircraft Rescue and Firefighting (ARFF) services in support of scheduled air carrier service. Part 139 requires that ARFF services must be able to meet a three-minute response time where an ARFF vehicle must reach the midpoint of the farthest runway serving air carrier aircraft from its assigned post or reach any other specified point of comparable distance on the movement area that is available to air carriers and begin application of an extinguishing agent. The existing ARFF building will lie within the future RVZ if Runway 5-23 extends to the southwest; in this scenario, the ARFF site would need to be relocated. The relocated site must remain clear of all FAR Part 77 surfaces, existing, and future RVZ and not impact FAA Air Traffic Control Tower (ATCT) line of site. Three possible locations were identified for the ARFF building, as described below.

ARFF RELOCATION SITE 1

This alternative, as shown in **Figure 4-29**, involves demolishing the existing ARFF facility and the construction of a new ARFF facility on a portion of the former footprint of the existing site, while shifting the future building a sufficient distance to remain clear of FAR Part 77 and the RVZ. The new ARFF location remains clear of all FAR Part 77 surfaces, does not impact the existing or future RVZ, and does not impact the existing ATCT line of site.

This alternative is estimated at a total project cost of \$3,250,000 and does not include demolition, engineering, environmental compliance, or construction management services.

ARFF RELOCATION SITE 2

This alternative, as shown in **Figure 4-30**, involves the construction of a relocated ARFF building on a vacant parcel of land, northeast of the ATCT, adjacent to the existing Snow Removal Equipment (SRE) building. The new ARFF location remains clear of all FAR Part 77 surfaces, does not impact the existing or future RVZ, and does not impact the existing ATCT line of site.

This alternative is estimated at a total project cost of \$2,877,280 and does not include engineering, environmental compliance, or construction management services.

ARFF RELOCATION SITE 3

This alternative, as shown in **Figure 4-31**, involves converting the existing SRE building into the ARFF building. The new ARFF location remains clear of all FAR Part 77 surfaces, does not impact the existing or future RVZ, and does not impact the existing ATCT line of site.

This alternative is estimated at a total project cost of \$2,877,280 and does not include engineering, environmental compliance, or construction management services.



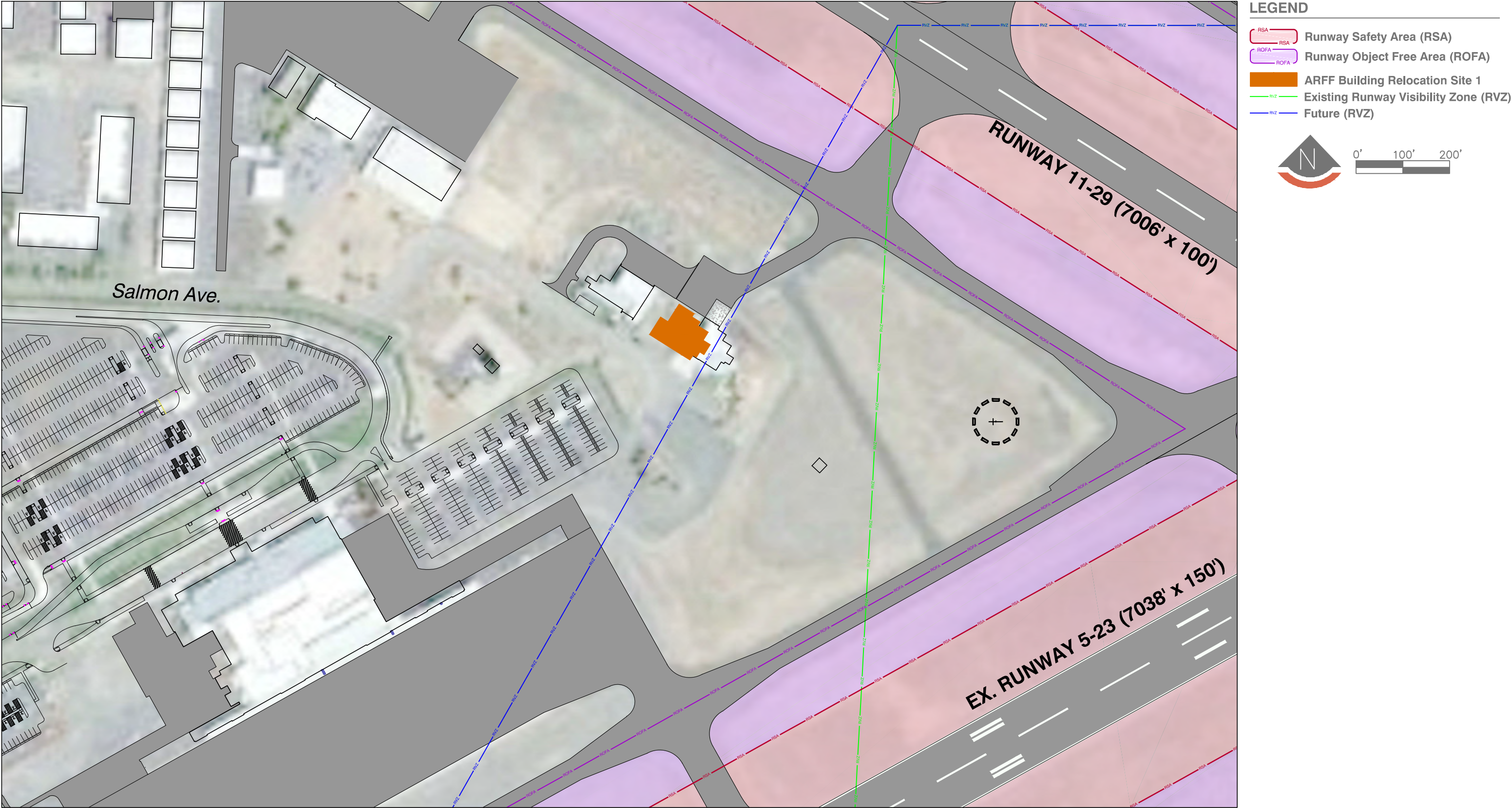


Figure 4-29
Alternative 1A - ARFF Relocation Site 1

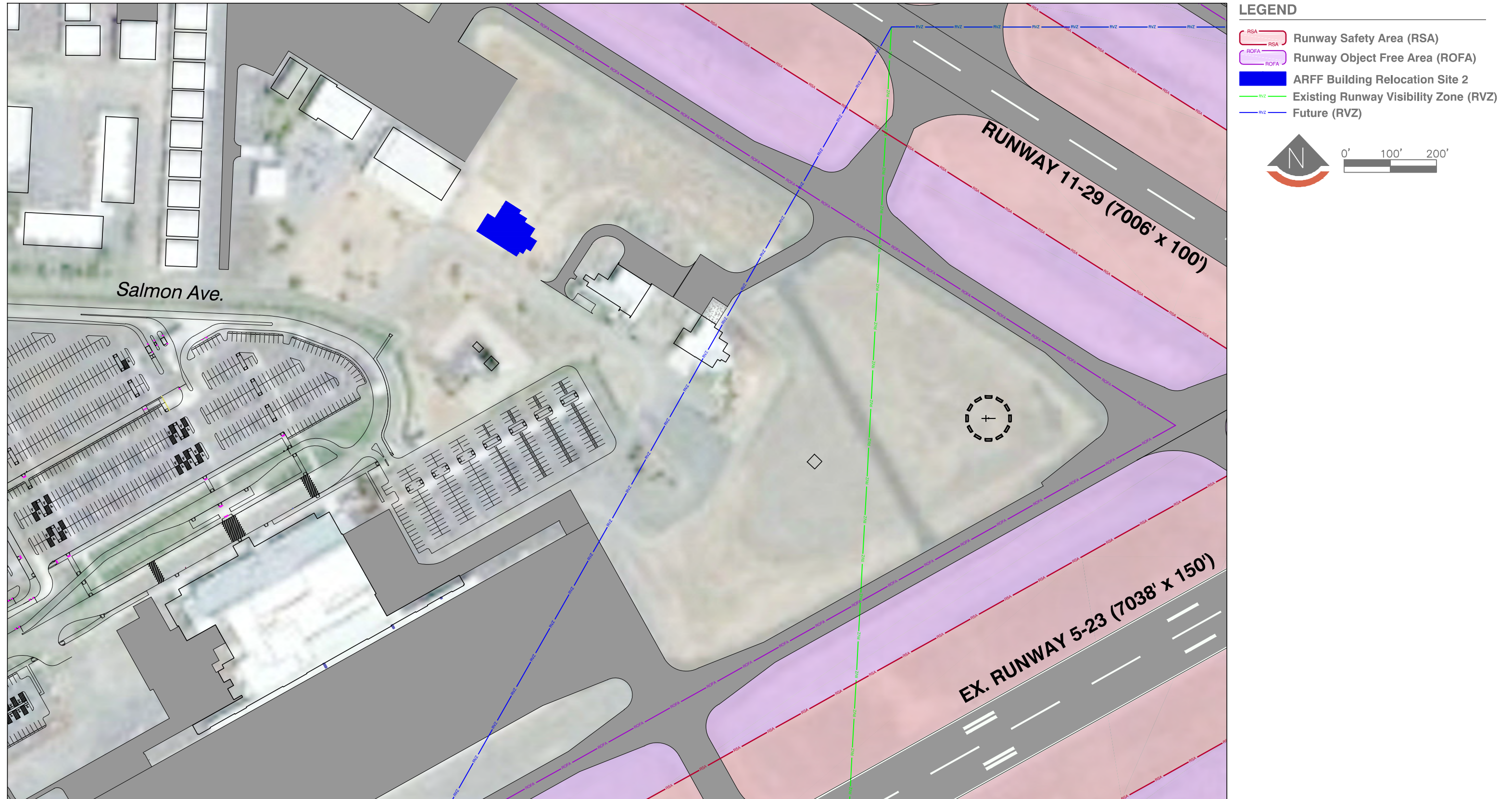


Figure 4-30
Alternative 1B - ARFF Relocation Site 2

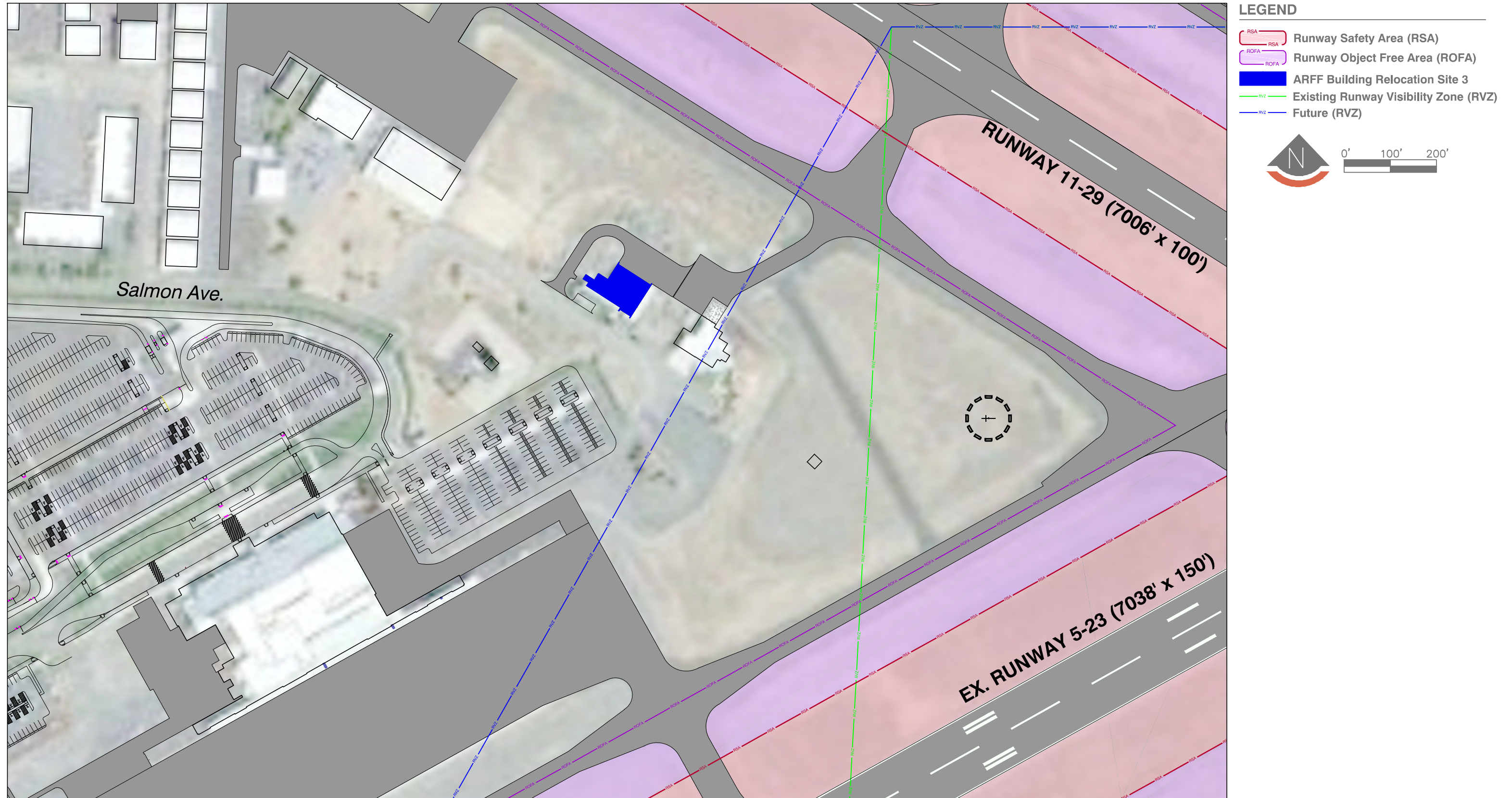


Figure 4-31
Alternative 1C - ARFF Relocation Site 3

SUMMARY EVALUATION OF ARFF BUILDING ALTERNATIVES

Table 4-9 presents a summary and an evaluation of the various alternatives for the relocation of the ARFF building. Alternative 1 is the preferred alternative because the ARFF building will continue to be in range to meet required response times for emergencies and the alternative uses a portion of the existing ARFF building footprint for the relocation.

Table 4-9. ARFF Relocation Alternatives Summary Evaluation Matrix			
Impact Category	Alternative 1	Alternative 2	Alternative 3
Description of Improvement	Relocate ARFF to portion of existing ARFF footprint.	Relocate ARFF next to SRE building.	Relocate ARFF to existing SRE building.
Operational Capabilities			
Operability & Access	ARFF will remain in response time distance for emergencies	ARFF will remain in response time distance for emergencies	ARFF will remain in response time distance for emergencies
Airfield Impacts	Low	Low	Low
Performance Requirements			
Expansion Capabilities	Yes	Yes	Yes
Land Use Compatibility			
Impacts to Airport Property Use	ARFF will be out of RVZ	ARFF will be out of RVZ	ARFF will be out of RVZ
Impact to Other Facilities	None	None	SRE building converted into ARFF
Environmental Impact Potential			
Property Acquisitions / Easements	None	None	None
Historic, Architectural, and Archaeological and Cultural Resources	None	None	None
Section 4(F) of the Department of Transportation Act	None	None	None
Tenant Relocation Required	Yes	Yes	Yes
Threatened and Endangered Species	Requires Contact of USFWS - East Wolf Mgmt. Zone.	Requires Contact of USFWS - East Wolf Mgmt. Zone.	Requires Contact of USFWS - East Wolf Mgmt. Zone.
Constructability			
Impact to Airport Operations	Low	Low	Low
Grading/Soil Conditions	Complex	Complex	Complex
Facilities Demolition	Yes	Yes	Yes
Phasing Complexity	Low	Low	Low
Financial Costs/Impacts			
Project Cost	\$3,250,000	\$2,877,280	\$2,877,280
OVERALL EVALUATION			
DETERMINATION	Favorable	Favorable	Favorable



4.5.9 NORTHEAST PASSENGER TERMINAL APRON RECONSTRUCTION ALTERNATIVE

As part of the terminal expansion project, the northeast passenger terminal apron needs to be reconstructed with concrete to accommodate a parked regional jet Embraer ERJ-175 to have adequate support for the weight of the aircraft and tail height clearance of the FAR Part 77 transitional surface, and to remain clear of the future RVZ. The section of apron that would be reconstructed is located on the northeast side of the existing apron. The concrete area would be 135' in width and 30' in length for a total area of 4,126sf of Portland Cement Concrete Pavement (PCCP). The apron reconstruction would potentially require the relocation of two light poles, relocation of the vehicle service road, and relocation of ground support equipment storage on the apron.

ALTERNATIVE 1 – NORTHEAST APRON RECONSTRUCTION

This alternative, as shown in **Figure 4-32**, involves the reconstruction of 4,126sf of pavement to PCCP to accommodate the weight of an ERJ-175. This alternative is estimated at a total project cost of \$1,998,900 and does not include any relocation of light poles, service roads, demolition of existing facilities, engineering, environmental compliance, or construction management services.



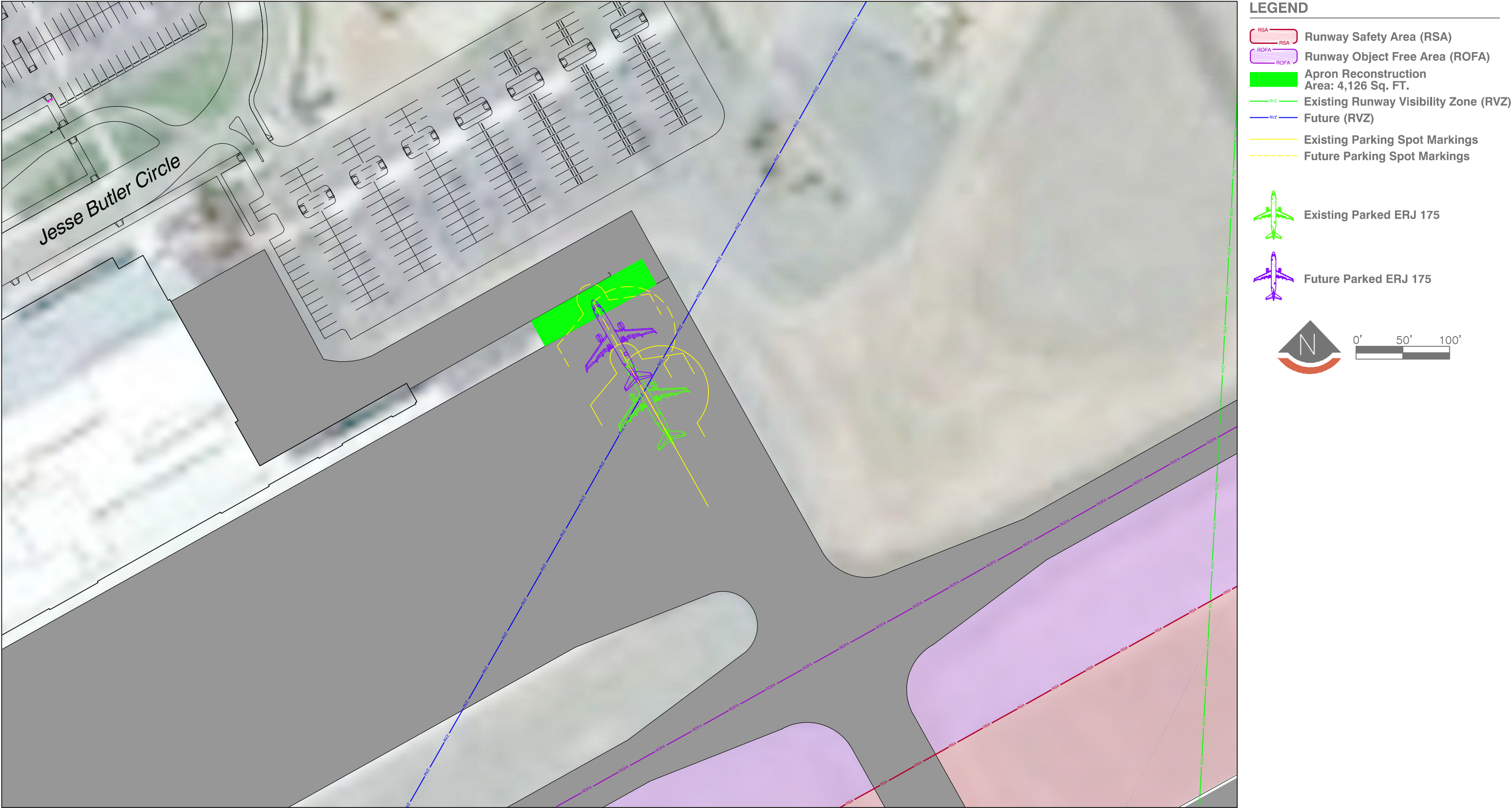


Figure 4-32
Alternative 1 - Northeast Apron Reconstruction

4.6 ALTERNATIVES SUMMARY

The preferred Airport development alternative outlines the necessary development and facility improvements that will not only meet the forecasted demand presented in **Chapter 2 – Forecast**, but also ultimately supports competitiveness and financial viability for the Airport. It is recommended that the Airport acquire available property north of Highway 126 for future aeronautical and non-aeronautical uses, in addition to ensuring compatible uses. The following improvement alternatives are recommended.

AIRSIDE FACILITIES

- ✓ Extend Runway End 5 to the southwest by 2,962 feet for a total length of 10,000 feet for Runway 5-23
- ✓ Upgrade the approach to Runway 5 to support LPV approach capabilities
- ✓ Demolish existing taxiway connectors E and H that provide direct access to Runway 5-23 from the passenger terminal apron and reconstruct taxiway connectors E and H in a position that conforms to current FAA AC 150/5300-13A, Change 1, *Airport Design* standards
- ✓ Construct a new taxiway connector from Taxiway F to the passenger terminal apron on the northeast side
- ✓ Construct the first phase of a new parallel taxiway on the east side of Runway 5-23, and eliminate two segments of Taxiways F and C, to address FAA identified Hot Spots 1 and 2
- ✓ Construct the second phase of a new parallel taxiway on the east side of Runway 5-23 to facilitate aircraft movements and support a future central GA development area
- ✓ Construct the third phase of a new parallel taxiway on the east side of Runway 5-23 to facilitate aircraft movements
- ✓ Construct improvements to the north and south ends of taxiway connector A to conform to current FAA AC 150/5300-13A, Change 1, *Airport Design* standards
- ✓ Reconstruct the passenger terminal apron to allow the tail of a parked ERJ-175 to remain under the FAR Part 77 surfaces and have the weight of the aircraft properly supported
- ✓ Coordinate with the FAA, Oregon Department of Transportation – Highway Division, County of Deschutes, and the local Irrigation District for the relocation of a segment of Highway 126 outside of Runway 23's RPZ to comply with requirements in FAA AC 150/5300-13A, Change 1, *Airport Design* and the 2012 RPZ Memo



GENERAL AVIATION DEVELOPMENT

- ✓ Expand existing GA facilities on the north side
- ✓ Develop new GA facilities east of the Runway 5 End that would support future aviation uses upon buildout of the north side GA facilities

VEHICLE PARKING

- ✓ Develop property near the Deschutes County Fair Grounds Expo Center for the expansion of rental car facilities, new long-term parking, and remote parking
- ✓ Expand employee parking to include the vacant parcel within the central terminal area
- ✓ Expand existing vendor parking to consume a portion of the existing employee parking lot

SUPPORT FACILITIES

- ✓ Relocate the SRE building to the northside GA development area
- ✓ Construct a new fuel farm south of the existing passenger terminal
- ✓ Relocate the ARFF building outside of the future RVZ

PASSENGER TERMINAL BUILDING

- ✓ Expand the passenger terminal building to the west to accommodate future passenger demand and larger ADG-III aircraft

NON-AERONAUTICAL PROPERTY DEVELOPMENT

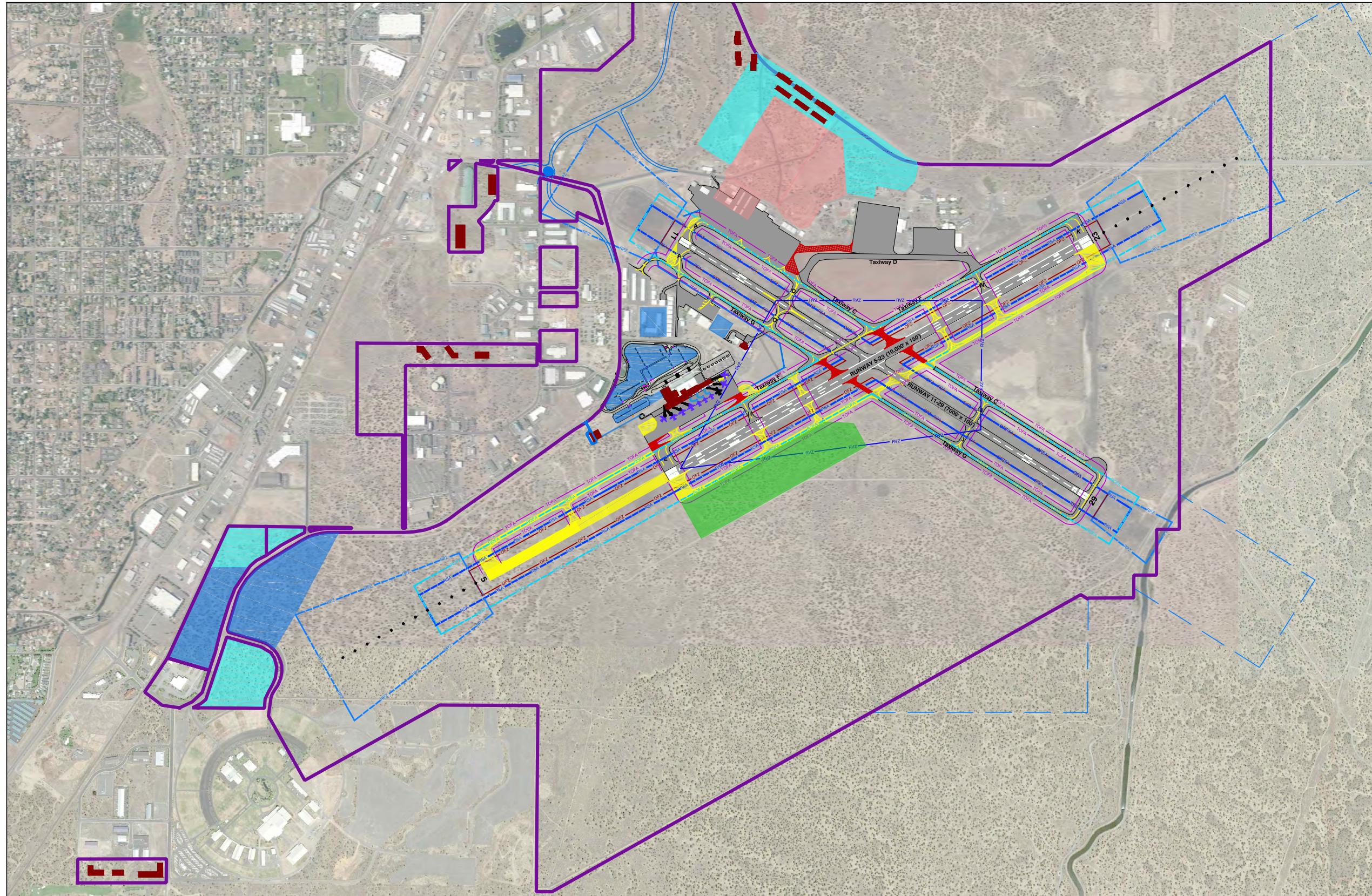
- ✓ Develop non-aeronautical property in the Fairgrounds Industrial, Airport Way, West Business Park, and North Business Park Subareas
- ✓ Explore amending the zoning near the Airport to accommodate a wider range of airport-compatible uses, including commercial, industrial, and institutional uses

4.6.1 PREFERRED DEVELOPMENT CONCEPT

Capital costs will be calculated and added to the improvement projects identified in the implementation plan. The preparation of an updated ALP will begin to show how the Airport will look at the end of the implementation plan.

The preferred airport layout is shown in **Figure 4-33**.





LEGEND

- Airport Property
- Easement
- Runway Object Free Area (OFA)
- Runway Obstacle Free Zone (OFZ)
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Visibility Zone (RVZ)
- Taxiway/Taxilane Object Free Area (TOFA)
- Existing Pavement
- Removed Airfield Pavement
- Airfield Pavement to be Removed
- Future Commercial Area
- Future Pavement
- Future Auto Parking/Road
- Future General Aviation
- Future Building/Building Expansion
- Aviation Reserve

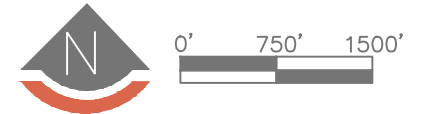


Figure 4-33
Preferred Alternatives

5.0 FINANCIAL FEASIBILITY

This chapter describes the 20-year Capital Improvement Plan (CIP) for Redmond Municipal Airport (RDM or the Airport). The CIP is a strategic year-by-year project development schedule for the continued development, upgrade, and expansion of facilities and equipment. The CIP is developed in accordance with federal and state aviation grant programs and is structured to fit the Airport's financial capabilities. The Federal Aviation Administration (FAA) and the Oregon Department of Aviation (ODA) reviewed and accepted the Airport's current five-year CIP, which RDM updates annually. Annual updates include improvement projects identified in this Master Plan through the 20-year planning horizon.

The CIP is not intended to be rigid or inflexible. It does not require the Airport to build anything and does not require the FAA or ODA to fund identified projects. Projects that receive FAA funding will need to show that they meet FAA design standards, are justified based on FAA criteria described in this chapter, and undergo an environmental review pursuant to the requirements of the National Environmental Policy Act (NEPA), as amended.

5.1 APPROACH TO CAPITAL PLANNING

5.1.1 Project Phasing

The CIP identifies individual projects, costs, and funding participation phased within the short term (1-5 years), mid-term (6-10 years), and long-term (11-20 years) planning periods. The CIP projects are prioritized based on need identified in **Chapter 2, Aviation Activity Forecasts**, and **Chapter 3, Facility Requirements**. These considerations influenced project priority:

- ✓ Ability to enhance efficiency and meet FAA design standards.
- ✓ Ability to repair and upgrade facilities reaching the end of useful life.
- ✓ Ability to meet user demand and desired level of service.
- ✓ Ability to support long-term airport strategic goals related to scheduled commercial air service, general aviation, the U.S. Forest Service, and emergency response.

Several projects identified in this CIP can be phased over years. This approach helps distribute capital costs more evenly and allows the Airport to implement improvements as demand materializes. Project phasing supports accelerating or delaying project implementation in response to economic conditions and changing airport user needs.



5.1.2 Project Costs

Professional engineers and architects have developed cost estimates for each project contained in the CIP. All project costs use 2018 dollars. For projects not occurring in 2018, the estimators adjusted for inflation at a rate of three percent. Except where explicitly noted, project costs have fifteen percent contingency added to the construction cost to account for unknowns. Costs for environmental assessment, design, and construction management are included as appropriate.

5.1.3 Funding Participation and Commitment

The CIP identifies funding classified into one of three categories for each project:

- ✓ FAA Airport Improvement Program (AIP)
- ✓ Passenger Facility Charges (PFCs)
- ✓ Local funds (Airport revenues, bonds, customer facility charge [CFC], and ODA grants)

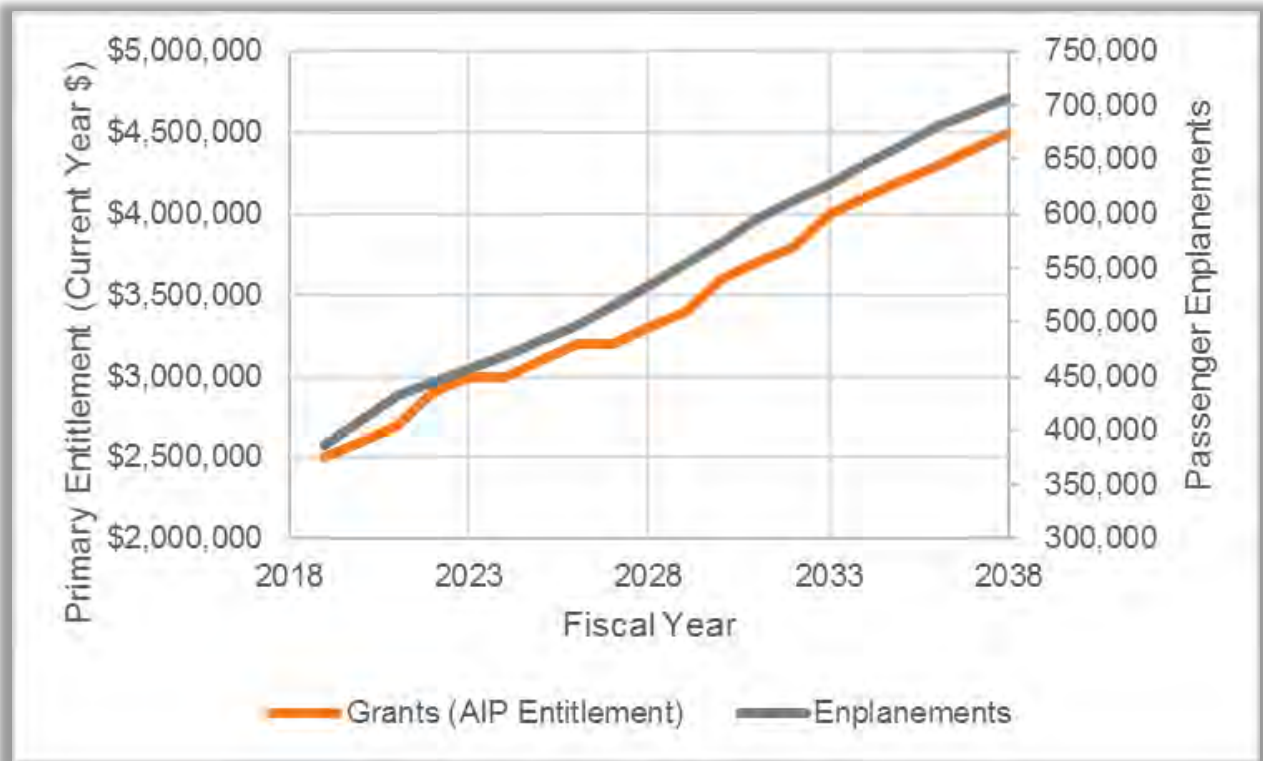
FAA AIP funds are classified as entitlement and discretionary. The FAA grants funding to airport improvements through the Aviation Trust Fund (ATF), which is financed by aviation system user fees and taxes (e.g., airline passenger tax, aircraft parts taxes, fuel taxes, and aircraft registration fees). The AIP provides the mechanism to reinvest the ATF at FAA-eligible airports. FAA Order 5100.38D *Airport Improvement Program Handbook* (AIP Handbook) describes AIP funding eligibility. The AIP program requires the Airport to contribute a local match of 6.67 percent for AIP grants received, which is lower than the typical 10 percent requirement. This is due to the fact that the Airport receives a high federal share based the large amount of federal lands located in Deschutes County. More information can be found in FAA Order 5100.38D Appendix AA. The FAA distributes AIP entitlement funding annually, and the Airport can save the entitlement funds for up to three years, which helps pay for more expensive projects.

The FAA National Plan of Integrated Airport Systems (NPIAS) defines RDM as a primary airport, meaning it is a commercial service airport with more than 10,000 annual passenger enplanements. The NPIAS identifies airports eligible for AIP funding and estimates the amount of AIP funds needed to fund projects that will update airports to current FAA standards and increase capacity as needed. Primary airports are eligible for annual primary entitlement funding under the AIP. The total amount of primary entitlement funding depends on the number of enplaning passengers (passenger entitlements), and the volume of landed cargo (cargo entitlement). The AIP Handbook defines how the FAA calculates primary entitlement.



In fiscal year (FY) 2018, the primary entitlements (PE) for RDM totaled \$2,240,000. The FAA calculates entitlement based on the last calendar year of data prior to the FAA fiscal year that starts in October. FY2018 started in October 2017, and FY2018 entitlement is based on enplanement levels in calendar year 2016. The FAA projects future entitlement funds using the passenger enplanement forecast for two years prior and rounded to the nearest hundred thousand. RDM sees less than 1/10 of a percent of national cargo volume, so cargo entitlements are not included in future entitlement projections. **Figure 5-1** shows the entitlement and passenger enplanement projections.

Figure 5-1: AIP Entitlement Funding Projection



Entitlement funds equal to current year dollars, not adjusted for inflation to 2018 values. Entitlement calculated using formula in AIP Handbook, Table 4-1, for when more than \$3.2 billion is available in national AIP funding.

*Enplanement forecast described in **Chapter 3***



Projects eligible for AIP funding may receive discretionary funding if the total cost exceeds what can be covered by entitlement funds. Discretionary funds are not guaranteed and the project in question competes with others from across the NPIAS for funding.

The demand for FAA AIP funds exceeds the availability. The FAA uses a national priority rating system to allocate AIP grant funds for specific airport projects. This formula system, which is occasionally adjusted to reflect national priorities, considers the airport type and project role. The following are the FAA AIP funding categories and point system:

- ✓ Safety/Security = 10 points
- ✓ Statutory Emphasis Programs = 9 points
- ✓ Planning / Reconstruction / Environment = 8 points
- ✓ Capacity = 7 points
- ✓ Standards = 6 points
- ✓ Other = 4 points

PFCs are a fee attached to airline tickets to pay for facilities that passengers on commercial airlines use. This fee can be used for airport improvement projects; however, the Airport is required to consult with the airlines on which projects the fee will be used for. As of February 2018, the Airport collects \$4.50 per enplaning passenger, and the proceeds are used for the debt service on the bonds that paid for the existing passenger terminal building. PFCs are allocated to the existing terminal debt service through the City of Redmond (the City) Fiscal Year 2038/2039.

Local funds include, but are not limited to, Airport revenues from leases, fuel surcharges, landing fees, and automobile parking. Local funds may include bonds issued on the full faith and credit of the City, grants from ODA, and CFCs from rental cars. The Airport does not receive funding from the City general fund for capital or operating expenses. The Airport uses local funds to provide the 6.67 percent match on AIP-eligible projects, and to pay for projects that are not eligible for AIP funding. FAA policy states that CFC funds can only be used for projects related to the rental cars.

The CIP identifies expected funding sources for each project based on cost and eligibility. The Airport updates its five-year CIP with the State and the Airport annually and will update funding sources appropriately as the time nears to implement projects. Before projects included on the CIP can be implemented, they may require environmental assessment and property acquisition. The CIP allocates time and money for the Airport to complete these actions. The cost estimates include contingency for unknown expenses such as legal fees, design challenges, and changing regulation.



5.1.4 Airport Funds

The City reviewed the Airport's financial data to ascertain the availability of local funds to support the CIP. The City performed a financial analysis during the development of the CIP to identify if the expected local capital requirements could be met. The City's model considered revenue growth based on additional landings and passengers and the ability of the Airport to take on debt to finance more expensive capital projects.

Airport revenue consists of grants and fees collected from users of the air carrier terminal. Such fees include: PFCs, landing fees, rental car commissions, and parking fees. Federal and state grants for approved capital improvement projects make up a sizable portion of airport funding. The airport also receives revenue from non-aviation related land leases.

The source of funds for operational and capital improvement projects at the Airport is the Airport Fund. The Airport Fund is divided into two sub-funds: Capital Projects and Operational Projects. The Capital Projects sub-fund is used to construct major capital projects. Operational projects are further divided into three programs: the Terminal program, the Airfield program, and the General Operations program:

- ✓ The Terminal program funds Airport Terminal operations and is collected through Airline tenants paying rent, maintenance, and overhead fees.
- ✓ The Airfield program funds Airport Airfield operations and maintenance. Costs for the Airfield program are recovered through landing and fuel flowage fees.
- ✓ The General Operations program funds maintenance, improvement, and leasing of industrial properties, private hangars, and vehicle parking lots for passengers and rental car agencies.

Airport funds vary from year to year depending on how busy the Airport is. Large capital projects, typically paid for by AIP grants, are the primary cause of large variations of the past five years. For example, the Airport received \$3 million in grants during FY2014, and more than \$12 million in grants for FY2015.

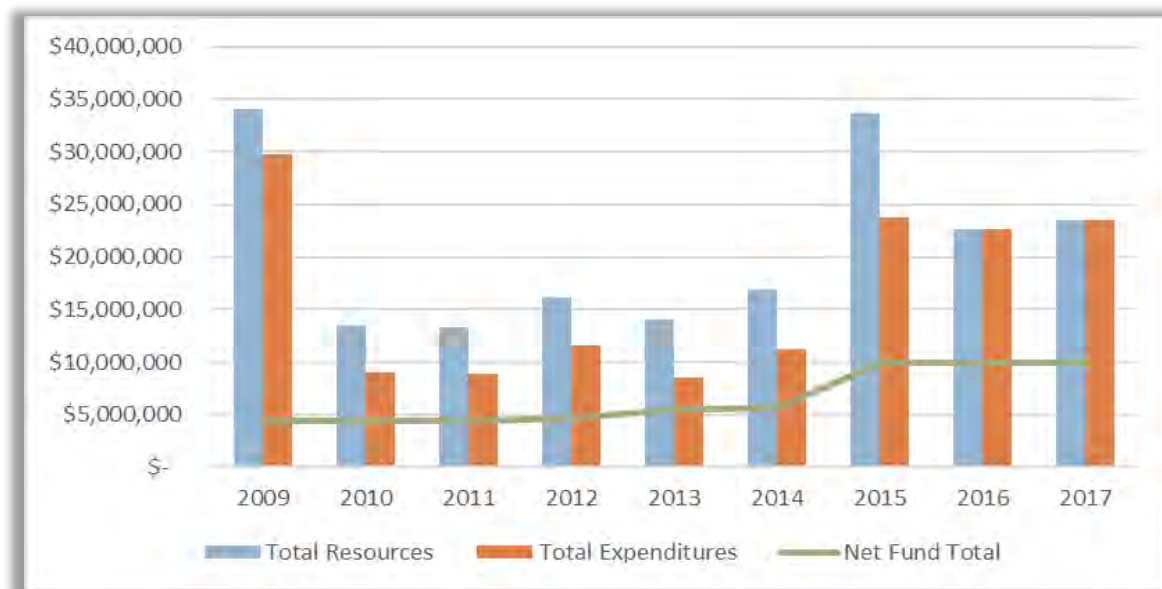
Table 5-1 shows the resource and expenditure by sub-fund.



Table 5-1. Total Resources and Expenditures by Sub-Fund

	2013	2014	2015	2016	2017
Total Resources	\$14,106,302	\$16,846,264	\$33,649,483	\$22,616,499	\$23,477,443
Total Beginning Fund Balances	\$4,620,801	\$ 5,562,536	\$ 5,617,592	\$ 8,039,651	\$ 6,755,917
Total Current Resources	\$9,485,501	\$11,283,728	\$28,031,891	\$14,576,848	\$16,721,526
Total Expenditures	\$8,543,766	\$11,228,672	\$23,739,026	\$22,616,499	\$23,477,443
Operations	\$7,307,316	\$ 7,375,838	\$ 9,929,537	\$11,157,582	\$13,308,184
Debt Service Reserve	\$0	\$0	\$0	\$ 2,515,917	\$2,715,259
Customer Facility Charge	\$0	\$0	\$0	\$0	\$739,000
Capital Projects	\$1,236,450	\$ 3,852,834	\$13,809,489	\$ 8,943,000	\$6,715,000
Net Fund Total	\$5,562,536	\$5,617,592	\$9,910,457	\$9,910,456	\$9,910,456
Total Resources is the sum of Total Beginning Fund Balances and Total Current Resources. Total Expenditure is the sum of Operations, Debt Service Reserve, Customer Facility Charge, and Capital Projects. Net Fund Total is the difference between Total Resources and Total Expenditure. Source: City of Redmond: The Airport Fund					

Figure 5-2 provides information on expenditures by sub-funds and total resources from FY2009 to 2017. FY2009 to FY2015 are income statements, and FY2016 and FY2017 are budgets. The budgets are balanced: expenses equal projected revenues. The Total Resources category is the sum of current resources and the fund balance from the beginning of the previous year. The Airport has had surplus net funds with enough resources to cover expenditures. Additional details of the annual revenue and expenditure can be found in the City's annual budget.

Figure 5-2: Airport Fund Resources and Expenditures

5.2 CAPITAL IMPROVEMENT PLAN

The Airport completed its latest CIP in January 2018, which covers projects for FY2019 to FY2023, and reviewed it with the FAA Seattle Airports District Office (ADO). The FAA prefers that the next three years of capital projects remain consistent to assist in the allocation of funds across the NPIAS. Thus, near-term projects have a relatively firm timeline compared to mid- and long-term projects which have more flexible timelines. The Master Plan CIP focuses on projects that occur beyond FY2023; however, there are some recommendations for reordering projects in FY2022 and FY2023 based on conversations that occurred during Master Plan CIP development. **Table 5-2** includes a summary of the costs and funding sources.

Table 5-2. Summary of Capital Improvement Plan					
Period (Years)	Years	Project Costs	Entitlement	Discretionary	Local
Near-term (1-5)	2019-2023	\$39,558,000	\$13,633,403	\$8,653,020	\$17,271,577
Mid-term (6-10)	2024-2028	\$28,148,001	\$11,861,480	\$2,143,327	\$14,143,194
Long-term (11-20)	2029-2038	\$203,001,667	\$42,705,187	\$64,244,174	\$96,052,306
CIP	2019-2038	\$270,707,668	\$68,200,070	\$75,040,521	\$127,467,077
PFC funds are not shown as a source of up-front capital improvement funds. PFCs are expected to be used for terminal building debt service throughout the 20-year CIP.					
This list includes only projects that are considered candidates for AIP funding.					

The CIP summary shown above does not include projects not eligible for AIP funding and does not include PFCs or CFCs as funding sources. Funding from the Airport and the State are part of the local funding category, and availability of State funding should be assessed closer to the time to implement the project. AIP discretionary funding can be variable, and the project may need to be advanced or delayed depending on funding availability. The components of each period of the CIP are described in the following sections.



5.2.1 Near-term CIP (FY2019-FY2023)

The near-term CIP includes construction of a new snow removal equipment (SRE) storage facility, acquisition of SRE and aircraft rescue and firefighting (ARFF) equipment, pavement rehabilitation, airfield lighting, and the first phase of the passenger terminal building expansion. **Table 5-3** shows the near-term CIP, and the projects are described in the following sections. **Figure 5-3** shows project locations.

Table 5-3. Near-term CIP					
Year	Project	Entitlement	Discretionary	Local	Total
2019	SRE Building	\$2,500,000	\$0	\$8,613,000	\$11,113,000
2020	SRE Vehicles	\$1,493,333	\$0	\$106,667	\$1,600,000
	SRE Building (Reimbursement)	\$490,000	\$0	\$0	\$490,000
2021	Rehabilitate Taxiways F, E, H, N, K	\$2,316,737	\$1,873,930	\$299,333	\$4,490,000
	Widen Taxiway F	\$0	\$4,648,000	\$332,000	\$4,980,000
	Rehabilitate Electrical Vault	\$933,330	\$0	\$66,667	\$1,000,000
2022	Pavement Management Plan	\$56,000	\$0	\$4,000	\$60,000
	Terminal Phase 1, Part 1	\$1,574,720	\$0	\$645,280	\$2,220,000
2023	Terminal Phase 1, Part 2	\$4,269,280	\$2,131,090	\$7,204,630	\$13,605,000
Near-Term CIP Total		\$13,633,403	\$8,653,020	\$17,271,577	\$39,558,000

2019 Projects

The Airport plans to build an SRE building on the north side of the Airport. This building will provide crews with a centralized storage location for their supplies and vehicles that are presently dispersed around the airfield. The project is expected to cost \$11 million dollars and will be funded by \$3 million in AIP entitlement funding, and \$8 million in local funds. The Airport will be reimbursing itself \$490,000 via entitlement funding in FY2020.

2020 Projects

The 2020 projects include the second phase of the SRE building and the purchase of two SRE vehicles. The Airport will carry the remaining \$250,000 of AIP entitlement funding over to the next year, which will help cover the costs of the planned pavement and electrical projects. No environmental, design, or construction projects are planned for 2020.

2021 Projects

The 2021 projects include rehabilitation of Taxiways F, E, H, N, and K, widening of Taxiway F, and rehabilitation of the lighting electrical vault. Taxiway F is the parallel taxiway to Runway 5-23, and Taxiways E, H, N, and K and the connector taxiways. Taxiway F is going to be widened near the passenger terminal apron to accommodate the wheelbase of the Bombardier Q400 aircraft used by Alaska Airlines.



The equipment in the electrical vault, located on the north side of the Airport in the general aviation area, is aging and in need of replacement.

These projects include a mix of AIP entitlement, discretionary, and local funds. The Airport has coordinated with the Seattle ADO on the needs for discretionary funds in 2021.

2022 Projects

The 2022 projects include an update of the pavement management plan and the start of the passenger terminal program. The pavement management plan will assess the condition of the airfield pavements and be used to plan future capital investment. The passenger terminal program is a multi-year project that includes terminal rehabilitation and expansion needed to meet the expected level of passenger demand.

The terminal program begins with environmental permitting and design for Phase 1A, reconfiguration of the existing holdroom and Phase 1B, expansion of the holdroom and additional terminal apron to accommodate parked aircraft. Phase 1A, 1B, and the terminal apron will occur over three years, starting with environmental permitting and design. It is expected that both phases of the project will be Categorically Excluded under FAA Order 5050.4B *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions* as it involves the rehabilitation of an existing building and expanding the building into a paved area.

The completion of the terminal program's design and environmental review is expected to be completed within one year. The project could experience a delay into early 2023; however, it is not expected the delay will impact the 2023 terminal construction project.

The availability of funds necessary to design and build the terminal improvements is a key consideration in implementing the project. Phase 1A and Phase 1B are expected to require more than \$2.6 million in discretionary funds and \$11 million in local funds. These shares were calculated assuming 93 percent of terminal square footage for Phase 1A and 91 percent for Phase 1B would be eligible for any type of AIP funding (entitlement or discretionary), and of that square footage, only 20 percent would be competitive for discretionary funds due to the nature of the project to enhance capacity. If discretionary funding is not available, or the terminal project does not compete as well for the funding as expected, then the local share will be higher. Airport operating revenues cannot cover the level of investment required and PFCs are needed for debt service on the existing terminal.

The Airport can issue a bond to cover construction costs and expects passenger growth will increase the operating revenues required for the debt service. The risk with this approach is that if passenger volumes decline, then the Airport may face a budget shortfall and need to reallocate funds to cover the debt. Demand projections and growth demonstrated by the Airport, the airlines that serve the airport, and the travelers coming to and from Deschutes County suggest that a severe decline is unlikely; however, it is recommended that the City perform a sensitivity analysis on this project prior to implementation.

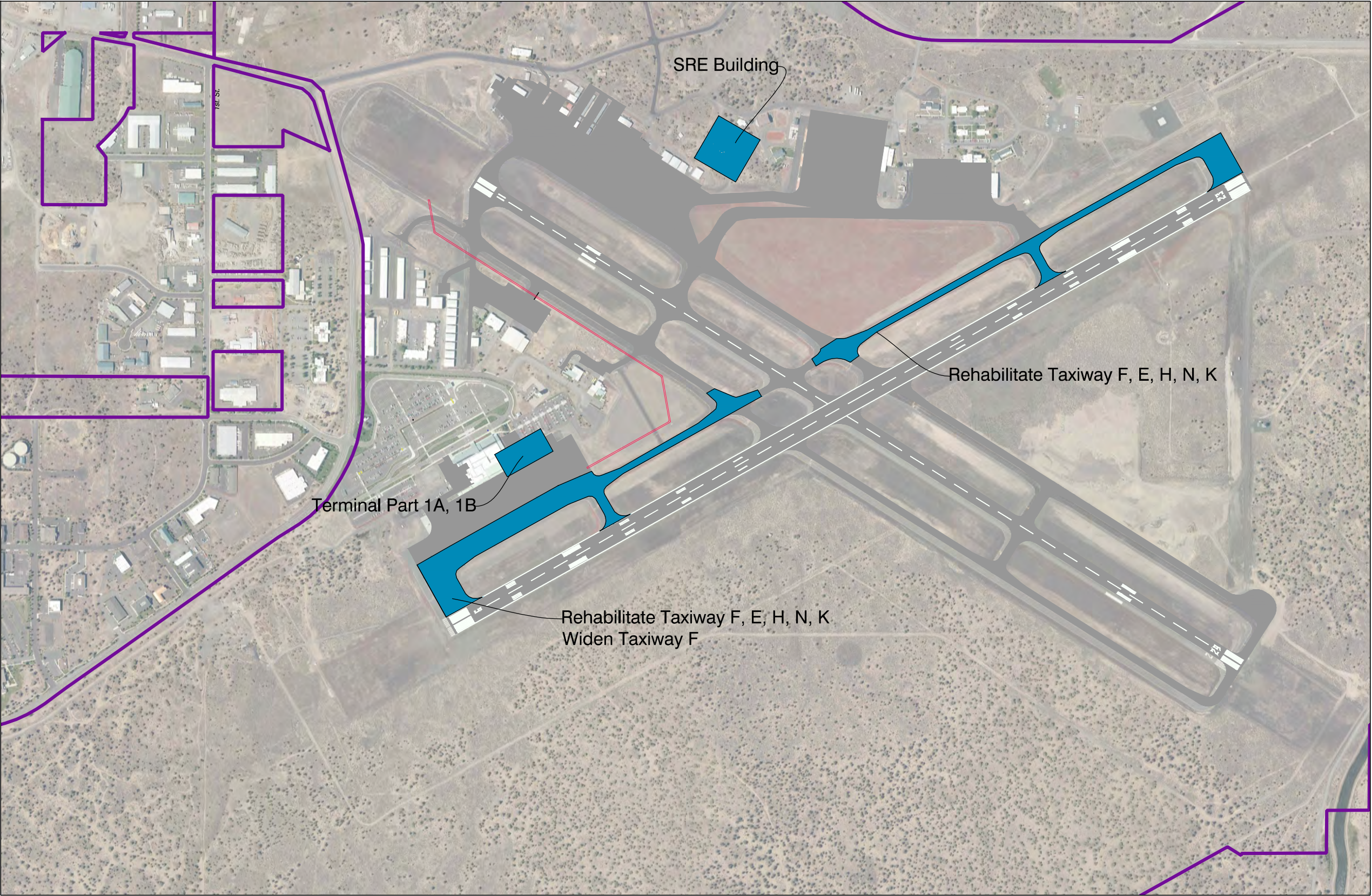


2023 Project

The 2023 project is the construction of Phase 1A, 1B, and the apron. Phase 1A and the apron will be built in one year. The 2023 project will be finished in 2024 when Phase 1B is completed. The project should be designed to minimize disruption for the traveling public; however, there is a risk that construction-related disruptions may negatively impact passenger numbers during construction. The Airport dealt with construction impacts on passenger volumes and landing fees during May 2016 when the intersection of the runways was re-constructed. The loss of PFCs, concessions and parking revenues, landing fees and fuel flowage fees should be accounted for when reviewing project financials.

The terminal project is expected to be completed in 2024. Completing the entire project in 2023 may be possible. This would increase capital expenditure, but reduce operational impacts associated with construction. Construction phasing will be explored in more detail when the project is designed, and an implementation plan is developed.





LEGEND

- RDM Property Boundary
- Fuel Truck Road
- CIP Projects

5.2.2 Mid-term CIP (FY2024-FY2028)

The mid-term CIP includes the completion of Terminal Phase 1B, acquisition of an ARFF truck, rehabilitation of the Taxiway G pavement and lighting, the environmental assessment for the general aviation expansion, a new Master Plan, a fuel truck haul road, and pavement maintenance. The mid-term CIP includes 500 additional stalls of automobile parking. **Table 5-4** shows the mid-term CIP, and the projects are described in the following sections. **Figure 5-4** shows the planned locations for these projects.

Table 5-4. Mid-term CIP					
Year	Project	Entitlement	Discretionary	Local	Total
2024	Terminal Phase 1, Part 3	\$2,066,667	\$1,024,660	\$2,538,673	\$5,630,000
	ARFF Truck	\$933,333	\$0	\$66,667	\$1,000,000
	Mid-term Auto Parking (300 stalls)	Ineligible	Ineligible	\$6,420,000	\$6,420,000
2025	Rehabilitate Taxiway G Pavement	\$2,596,000	\$1,118,667	\$265,333	\$3,980,000
	Rehabilitate Taxiway G Lighting	\$504,000	\$0	\$36,000	\$540,000
	Mid-term Auto Parking (200 stalls)	Ineligible	Ineligible	\$4,410,000	\$4,410,000
2026	Northside GA Expansion (Enviro)	\$289,333	\$0	\$20,667	\$310,000
2027	Northside GA Expansion	\$2,594,667	\$0	\$185,333	\$2,780,000
	Master Plan Update	\$592,667	\$0	\$42,333	\$635,000
2028	Master Plan Update, continued	\$606,667	\$0	\$43,333	\$650,000
	Fuel Truck Road	\$625,333	\$0	\$44,667	\$670,000
	Pavement Rehabilitation	\$1,052,813	\$0	\$70,188	\$1,123,001
Mid-Term CIP Total		\$12,798,980	\$11,861,480	\$2,143,327	\$14,143,194

2024 Project

Among the 2024 projects is the completion of construction for Phase 1B. This project will increase the height of the passenger holdroom floor to allow passenger boarding bridges to reach larger aircraft on the apron. Additional projects in 2024 include ARFF truck acquisition and construction of mid-term auto parking. Acquisition of an ARFF truck to replace the existing, older vehicle will require local funds. Construction of auto parking will create 300 additional parking stalls. This new lot requires removal of the United States Department of Agriculture building and is not eligible for AIP funding. The project will help the Airport meet parking demand. Transportation network companies Uber and Lyft began operating at the Airport in 2017. It is recommended that the Airport monitor the effect of these companies on parking demand and adjust capital programming as demand warrants.



2025 Projects

Taxiway G pavement and lighting rehabilitation projects will both occur in 2025. Both project timelines are flexible; however, while maintenance of existing pavement and lighting can keep them in working order, costs will increase over time as pavement and equipment deteriorate. The lighting equipment can be upgraded to use LEDs for long term cost savings through lower power consumption, as the types of LEDs planned for use are functional in the winter months when snow piles around the base of the lights. Traditional incandescent lights melt snow with the heat they release where LEDs may not without being equipped with thermostatically-controlled heating units.

The third project to occur in 2025 is the construction of 200 parking stalls. As with the parking project in 2024, the additional parking stalls will help the Airport meet parking demands.

2026 Projects

The 2026 projects include the environmental permitting phase of the Northside GA Expansion project and the reimbursement of ARFF truck costs. Design and construction of the Northside GA Expansion will take place in 2027. The project expands the available GA area with additional hangars and facilities and will also involve rerouting an existing road. This project will require an environmental assessment. The reimbursement of the ARFF truck costs is a financial transaction with which the airport is reimbursed through the entitlement funds for the ARFF truck acquisition in 2024.

2027 Projects

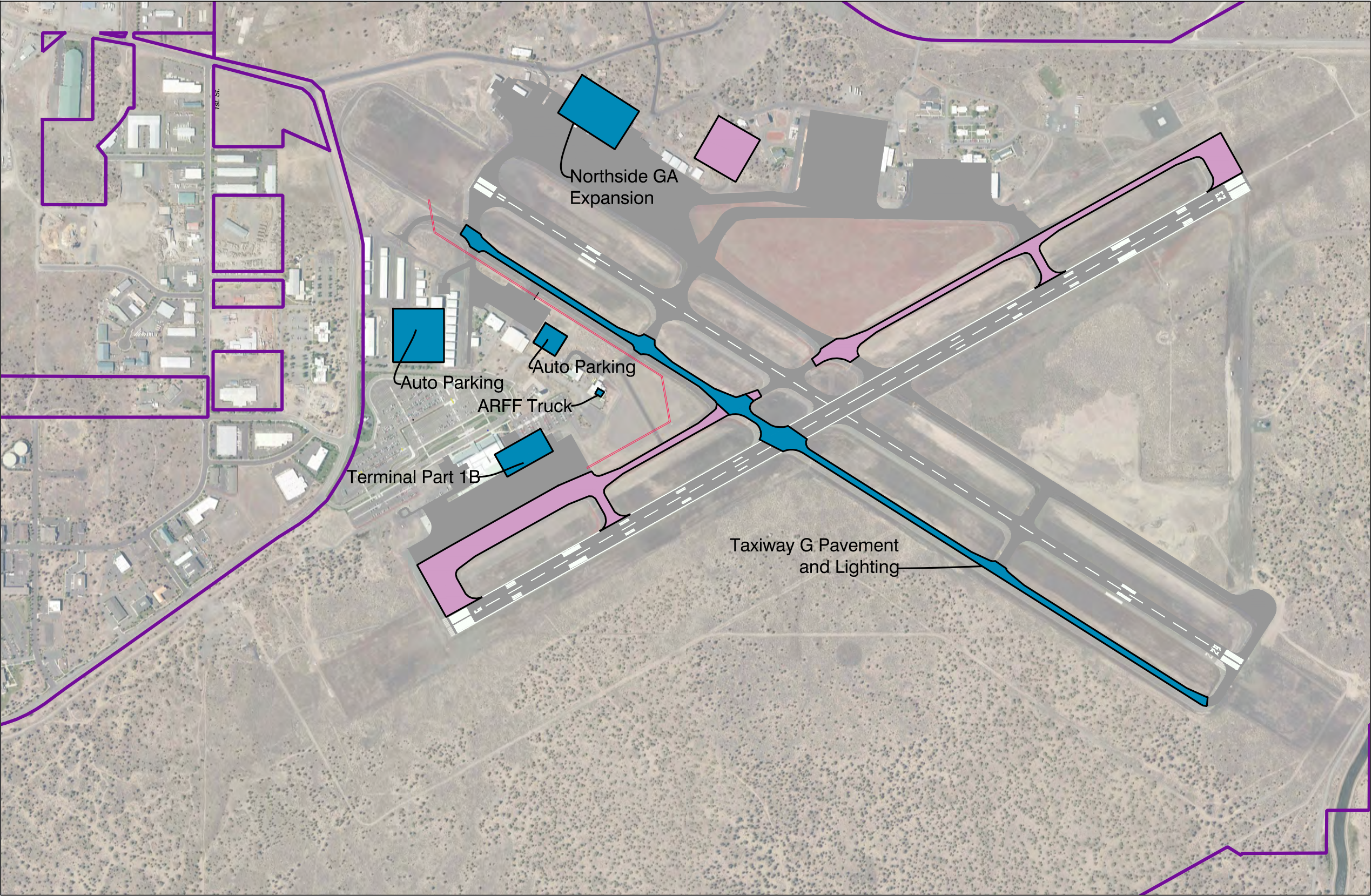
The design and construction phase of the Northside GA Expansion will take place in 2027. Due to the geology, there will be significant work required to bring the terrain to airport grade before construction of the facilities can occur. The Airport will prepare sites for private investment and construct automobile and aircraft access. Tenants will develop these sites and the speed at which this occurs can impact the Airport's return on investment. The project is a low priority compared to other CIP projects and not very competitive for discretionary funding due to it not being a necessity for Airport operations.

The second 2027 project is the beginning of an Airport Master Plan. The Master Plan will likely revisit the need for the runway extension, assess long-term passenger terminal needs, and determine if additional automobile parking is needed. The implementation details of the Long-term Projects will be planned during the master plan project.

2028 Projects

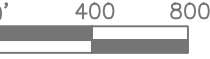
Projects in 2028 include completing the Master Plan, the fuel truck road, and a placeholder for pavement rehabilitation if needed. The road is intended to minimize the amount of time trucks spend on aircraft movement areas when transferring fuel from the northside to the southside. The Airport is considering building Jet A fuel tanks near the terminal building, which may negate the need for a fuel truck road.





LEGEND

- RDM Property Boundary
- Fuel Truck Road
- Completed CIP Projects
- CIP Projects

5.2.3 Long-term CIP (FY2029-FY2038)

The long-term CIP encompasses the runway and taxiway extension projects as well as the ARFF building relocation needed to accommodate the extensions. Phase 2 of the terminal project is scheduled to take place between 2035 and 2037. Three pavement rehabilitation projects are planned within that period but are considered “as-needed.” **Table 5-5** shows the long-term CIP, and the projects are described in the following sections. **Figure 5-5** shows the planned locations for these projects.

Table 5-5. Long-term CIP					
Year	Project	Entitlement	Discretionary	Local	Total
2029	Runway Extension Environmental	\$1,754,667	\$0	\$125,333	\$1,880,000
	Taxiway Extension Environmental	\$373,333	\$0	\$26,667	\$400,000
2030	Runway Extension Design	\$2,846,667	\$0	\$203,333	\$3,050,000
	Taxiway Extension Design	\$513,333	\$0	\$36,667	\$550,000
	ARFF Building Design	\$392,000	\$0	\$28,000	\$420,000
2031	Runway Extension 1 of 2	\$372,520	\$22,382,147	\$1,625,333	\$24,380,000
	Taxiway Extension 1 of 2	\$4,456,667	\$0	\$318,333	\$4,775,000
	ARFF Building Relocation	\$3,929,333	\$0	\$280,667	\$4,210,000
2032	Runway Extension 2 of 2	\$3,800,000	\$19,636,000	\$1,674,000	\$25,110,000
	Taxiway Extension 2 of 2	\$0	\$4,592,000	\$328,000	\$4,920,000
2033	Pavement Rehab	\$2,818,667	\$0	\$201,333	\$3,020,000
2034	Terminal Phase 2 Environmental	\$1,332,533	\$0	\$420,800	\$1,753,333
2035	Terminal Phase 2 Design	\$6,855,200	\$0	\$2,164,800	\$9,020,000
2036	Terminal Phase 2 (1 of 2)	\$5,593,600	\$8,686,800	\$42,869,600	\$57,150,000
2037	Terminal Phase 2 (2 of 2)	\$4,400,000	\$8,947,227	\$45,516,107	\$58,863,334
2038	Pavement Rehab	\$3,266,667	\$0	\$233,333	\$3,500,000
Long-Term CIP Total		\$39,351,587	\$42,705,187	\$64,244,174	\$96,052,306

2029 Projects

The two 2029 projects are the environmental phases of the southwest runway extension and the associated parallel taxiway extension. The runway extension NEPA process may take 18 months or more. Justification for the runway extension is expected to occur as part of the 2027 Master Plan, and much of the environmental baseline work will occur at this time. The 2017 Master Planning process included the concept of runway extension in stakeholder meetings and the response was generally positive. The underlying goal of the extension is to open the Airport to additional markets in the Midwest that are out of range or payload-limited with the existing runway configuration. The runway length assessment is included in **Chapter 3**.



2030 Projects

Both design phases of the southwest runway extension and the associated full-length parallel taxiway will occur in 2030. The design phase of the ARFF building will also occur in 2030. The existing ARFF building lies within the runway visibility zone of extended Runway 5-23 and will need to be relocated. This project is considered part of the runway extension project as the building would not need to be moved if the runway was not extended.

2031 Projects

Construction of the runway and taxiway extensions will begin in 2031 and is expected to take two years. The ARFF building relocation will also take place in 2031 and is expected to be completed within a year. The first year of work is expected to include earthwork and grading. There is an elevation change between the existing location of Runway End 5 and where future Runway End 5 will be located. Cost estimates include approximately 950,000 cubic yards of fill for the embankment required to meet runway and taxiway grading and safety area requirements.

2032 Projects

Construction on the runway and taxiway extensions is scheduled for completion in 2032. Work completed in 2032 will include paving of the runway and taxiways and relocation of navigational aids. Runway 5-23 will need to be temporarily shortened during construction to keep aircraft clear of the construction equipment. Project phasing and implementation will be structured to minimize runway closure and downtime.

2033 Project

There are no definitive capital projects for 2033; however, the Airport can use that year to catch up on pavement rehabilitation, if needed. It is recommended that the Airport begin to save its primary entitlement funds this year to help offset the cost of Phase 2 of the passenger terminal building. The need for Phase 2 is expected to be validated by the 2037 Master Plan. The Master Plan will include new enplanement forecasts and an assessment of the performance of the passenger terminal building since Phase 1 was constructed.

2034 Project

The 2034 project is the environmental permitting of Passenger Terminal Phase 2. This improvement extends the overall building footprint to the southwest, over what is now the vendor parking lot. Passenger Terminal Phase 2 is expected to be eligible for a categorical exclusion under NEPA because impacts are limited to previously disturbed parcels. Should an environmental assessment be required, it is expected that one can be completed within a year and not delay the start of construction.



2035 Project

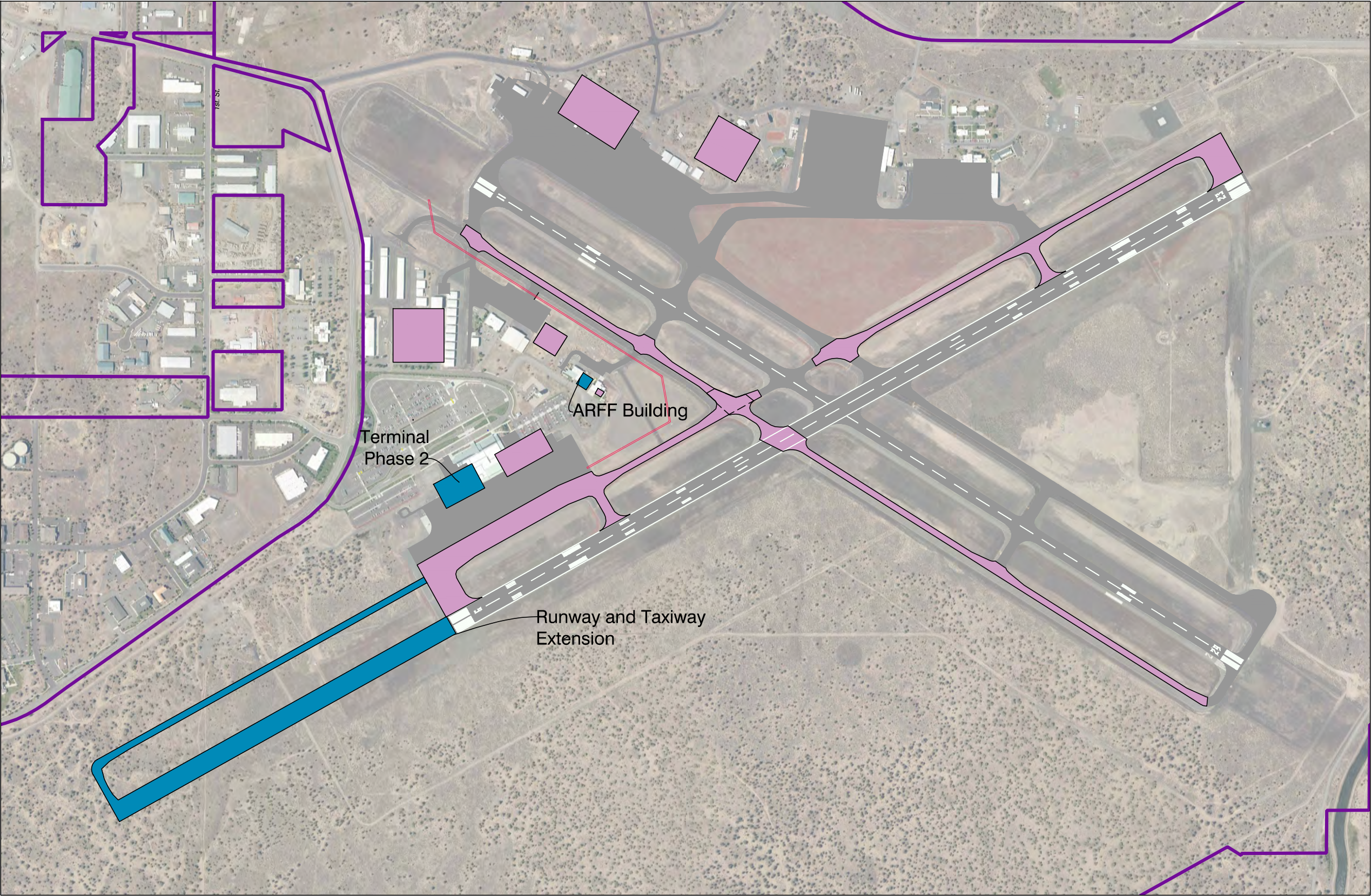
The 2035 project is the design of Passenger Terminal Phase 2. Phase 2 will expand the terminal and add a new concourse adjacent to the second floor holdroom. The new building will have the ticket hall and larger baggage handling area on the ground floor and a new concourse on the second floor adjacent to the existing second floor holdroom. The existing ticket hall and offices will be repurposed as the new security checkpoint after the new ticket hall is completed.

2036-2037 Projects

Passenger Terminal Phase 2 will be built over two years and construction will be structured to minimize impact on existing terminal operations. It is possible that closure and relocation of terminal facilities during construction may temporarily decrease airline activities; however, this impact is not expected to extend past construction.

Passenger Terminal Phase 2 is expected to cost more than \$126 million when it is constructed (assuming 3 percent inflation), or roughly \$72 million in 2018 dollars. Passenger Terminal Phase 2 will be funded by a combination of entitlement, discretionary, and local funds. PFCs are expected to be obligated for debt service on previously completed capital projects like Passenger Terminal Phase 1. Preliminary estimates suggest that 76 percent of square footage will be eligible for AIP funding, and of that, 20 percent will compete well for discretionary funding. The high-level funding split is 14 percent for entitlement (\$18 million), 14 percent for discretionary (\$18 million), and 72 percent for local funds (\$91 million). This funding split is expected to be revised as part of the 2027-2028 Master Plan.





LEGEND

- RDM Property Boundary
- Fuel Truck Road
- Completed CIP Projects
- CIP Projects

Figure 5-5
Long-Term (2029-2038) CIP Projects

5.3 CHAPTER SUMMARY

The 20-year CIP provides a flexible guideline for the Airport to plan for near-, mid-, and long-term project goals. Project phasing allows the Airport to account for economic changes and adjust project priorities to meet the Airport's financial capabilities. The projects have been distributed across 20 years to reflect the airport needs and to distribute capital costs evenly.

The near-term, five-year (FY2019-2023) CIP will help the Airport grow and meet demand by organizing resources to rehabilitate taxiways and runways as well as begin the large-scale terminal remodeling and expansion project. Including taxiway and runway rehabilitation in the near-term will help lower overall costs by mitigating the need for ongoing maintenance, which will increase in cost over time.

The mid-term (FY2024-2028) CIP projects include the continuation of the terminal phase and Taxiway G pavement and lighting rehabilitation. Additionally, the planned Northside general aviation expansion and additional parking is aimed at meeting the forecasted increase in activity at the Airport. The long-term (FY2029-2032) CIP projects consist of large-scale projects including runway extension, taxiway extension, and the second phase of terminal expansion. Many of these projects are multi-year and will require a large amount of funding. The long-term projects will increase the Airport's capabilities and contribute to helping the Airport meet increased demand.



APPENDIX A:

ALP CHECKLIST (in development)



APPENDIX B:

SUPPLEMENTAL FORECAST INFORMATION



APO TERMINAL AREA FORECAST DETAIL REPORT

For ecast Issued January 2017

RDM

AIRCRAFT OPERATIONS

Enplanements				Itinerant Operations				Local Operations				Total Ops	Total Tracon Ops	Based Aircraft
Fiscal Year	Air Carrier	Commuter	Total	Air Carrier	Air Taxi & Commuter	GA	Military	Total	Civil	Military	Total			
REGION: ANM STATE: OR LOCID: RDM CITY: REDMOND AIRPOR T: ROBERTS FIELD														
2006	1,427	195,796	197,223	1,433	16,803	22,170	366	40,772	27,376	240	27,616	68,388	0	129
2007	9,262	220,771	230,033	2,781	16,349	26,174	306	45,610	48,990	336	49,326	94,936	0	129
2008	13,886	229,311	243,197	4,413	13,795	20,221	312	38,741	42,519	303	42,822	81,563	0	146
2009	26,618	191,208	217,826	4,444	9,680	16,014	173	30,311	25,261	134	25,395	55,706	0	125
2010	28,031	197,530	225,561	4,858	9,396	14,767	221	29,242	22,416	300	22,716	51,958	0	118
2011	26,259	205,719	231,978	4,140	8,886	13,610	224	26,860	19,554	96	19,650	46,510	0	75
2012	16,660	214,173	230,833	3,931	8,649	14,709	212	27,501	18,565	371	18,936	46,437	0	75
2013	430	226,980	227,410	4,201	8,232	13,414	323	26,170	16,124	812	16,936	43,106	0	91
2014	305	255,560	255,865	4,738	8,573	12,372	383	26,066	17,213	406	17,619	43,685	0	83
2015	303	268,829	269,132	4,335	6,578	11,551	241	22,705	22,854	214	23,068	45,773	0	83
2016*	536	297,786	298,322	5,127	6,340	10,985	341	22,793	16,829	540	17,369	40,162	0	85
2017*	536	359,803	360,339	6,897	6,245	10,711	341	24,194	15,877	540	16,417	40,611	0	87
2018*	536	369,043	369,579	7,682	5,659	10,735	341	24,417	15,909	540	16,449	40,866	0	89
2019*	536	377,594	378,130	8,528	4,981	10,759	341	24,609	15,941	540	16,481	41,090	0	91
2020*	536	385,844	386,380	9,356	4,315	10,783	341	24,795	15,973	540	16,513	41,308	0	93
2021*	536	394,034	394,570	10,139	3,699	10,807	341	24,986	16,005	540	16,545	41,531	0	95
2022*	536	402,010	402,546	10,733	3,297	10,832	341	25,203	16,037	540	16,577	41,780	0	97
2023*	536	409,726	410,262	11,038	3,222	10,857	341	25,458	16,069	540	16,609	42,067	0	100
2024*	536	417,274	417,810	11,246	3,254	10,882	341	25,723	16,101	540	16,641	42,364	0	102
2025*	536	425,305	425,841	11,462	3,293	10,907	341	26,003	16,134	540	16,674	42,677	0	105
2026*	536	433,799	434,335	11,691	3,333	10,932	341	26,297	16,167	540	16,707	43,004	0	108
2027*	536	442,039	442,575	11,913	3,373	10,957	341	26,584	16,200	540	16,740	43,324	0	111

2028*	536	450,341	450,877	12,136	3,414	10,982	341	26,873	16,233	540	16,773	43,646	0	114
2029*	536	458,968	459,504	12,368	3,455	11,007	341	27,171	16,266	540	16,806	43,977	0	117
2030*	536	467,560	468,096	12,599	3,497	11,032	341	27,469	16,299	540	16,839	44,308	0	120
2031*	536	476,332	476,868	12,835	3,539	11,057	341	27,772	16,332	540	16,872	44,644	0	123
2032*	536	485,049	485,585	13,070	3,582	11,082	341	28,075	16,365	540	16,905	44,980	0	126
2033*	536	493,906	494,442	13,308	3,625	11,107	341	28,381	16,398	540	16,938	45,319	0	129
2034*	536	503,097	503,633	13,555	3,669	11,132	341	28,697	16,431	540	16,971	45,668	0	132
2035*	536	512,709	513,245	13,814	3,713	11,157	341	29,025	16,464	540	17,004	46,029	0	135

APO TERMINAL AREA FORECAST DETAIL REPORT

For ecast Issued January 2017

RDM

AIRCRAFT OPERATIONS

Fiscal Year	Enplanements			Itinerant Operations				Local Operations				Total Ops	Total Tracon Ops	Based Aircraft
	Air Carrier	Commuter	Total	Air Carrier	Air Taxi & Commuter	GA	Military	Total	Civil	Military	Total			
2036*	536	522,589	523,125	14,080	3,758	11,182	341	29,361	16,497	540	17,037	46,398	0	138

The 20 Fastest-Growing Metro Areas from July 1, 2013, to July 1, 2014

Rank	Metro Area	Percent Change
1.	The Villages, Fla.	5.4
2.	Myrtle Beach-Conway-North Myrtle Beach, S.C.-N.C.	3.2
3.	Austin-Round Rock, Texas	3.0
4.	Odessa, Texas	2.9
5.	St. George, Utah	2.9
6.	Cape Coral-Fort Myers, Fla.	2.7
7.	Bend-Redmond, Ore.	2.7
8.	Greeley, Colo.	2.6
9.	Midland, Texas	2.6
10.	Naples-Immokalee-Marco Island, Fla.	2.5
11.	Houston-The Woodlands-Sugar Land, Texas	2.5
12.	Fort Collins, Colo.	2.4
13.	Hilton Head Island-Bluffton-Beaufort, S.C.	2.4
14.	Daphne-Fairhope-Foley, Ala.	2.4
15.	Raleigh, N.C.	2.3
16.	Orlando-Kissimmee-Sanford, Fla.	2.2
17.	Charleston-North Charleston, S.C.	2.2
18.	North Port-Sarasota-Bradenton, Fla.	2.2
19.	Panama City, Fla.	2.2
20.	Boise City, Idaho	2.1



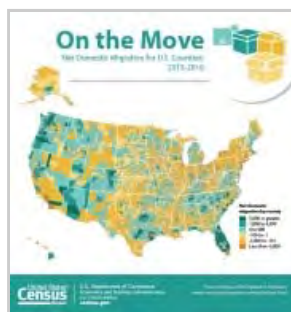
Newsroom

FOR IMMEDIATE RELEASE: THURSDAY, MARCH 23, 2017

Maricopa County Added Over 222 People Per Day in 2016, More Than Any Other County

March 23, 2017

Release Number: CB17-44



MARCH 23, 2017 — Maricopa County, Ariz., replaced Harris County, Texas, as the county with the nation's highest annual population growth, according to U.S. Census Bureau population estimates released today. Harris County was the largest numeric gainer for eight years in a row. Maricopa County gained 81,360 people between July 1, 2015 and July 1, 2016, or about 222 people per day, while the nation's second-largest population gainer, Harris County, gained 56,587 people, or about 155 people per day on average.

Maricopa County, home to Phoenix, primarily grew through the addition of 43,189 residents from net domestic migration, a measure of how many people move to or from an area versus other parts of the United States. The county also added 25,428 people from natural increase (more births than deaths) and 10,188 people from net international migration.

Harris County, Texas, home to Houston, saw changes in net domestic migration, going from a net gain of more than 17,000 to a net loss of more than 16,000. Despite this, Harris County had the second largest gain in population due to high natural increase (46,412) and net international migration (27,922).

"In the early 2000s, Maricopa County was in the top one or two counties by numeric growth. From 2009-2011, Maricopa County saw much lower net migration than in the years before or after, which caused the county to drop out of the top population-gaining counties," explained

Peter Borsella, a demographer in the Census Bureau's population division. "While net international migration has not reached prior levels, net domestic migration and natural increase have continued to rise, making Maricopa County this year's largest numeric gainer." In addition, Maricopa grew the fastest among the top 10 largest counties at 1.95 percent, an increase from 1.90 percent from the previous year. Harris County remained the third-largest county with 4.6 million people, and Maricopa County remained the fourth-largest county with 4.2 million people. Los Angeles County and Cook County, Ill., remained the largest and second-largest counties, respectively.

The statistics released today provide population estimates and components of change for our nation's 382 metropolitan statistical areas, 551 micropolitan statistical areas, and 3,142 counties, as well as Puerto Rico's metropolitan statistical areas, micropolitan statistical areas and municipios.

Find more highlights from this year's release below and local-level statistics on [census.gov](https://www.census.gov).

In the coming months, the Census Bureau will release 2016 population estimates for cities and towns, as well as national, state and county population estimates by age, sex, race and Hispanic origin.

Some High-Population Counties or County-Equivalents Continued to Experience Population Loss

These notable high-population counties continued to see population loss:

- Cook County, Ill. (Chicago): -21,324.
- Wayne County, Mich. (Detroit): -7,696.
- Baltimore city, Md.: -6,738.

Baltimore city saw an increase in population loss this year primarily due to a doubling of its net domestic out-migration.

Fastest-Growing Areas in Utah

Three of the 20 fastest-growing metro areas between 2015 and 2016 were located either partially or completely in Utah (St. George, Utah; Provo-Orem, Utah; and Logan, Utah-Idaho).

- Provo-Orem, Utah, and Logan, Utah-Idaho, saw natural increase as a larger component of growth than either net international migration or net domestic migration, while St. George, Utah, saw net domestic migration as a larger component of growth than either net international migration or natural increase.
- Also, San Juan County, Utah, was the fastest-growing county in the United States among counties with populations of 10,000 or more in 2015. It grew by 7.6 percent.

Second-Fastest-Growing U.S. County in 2015 Fell to 2,858th in 2016

North Dakota counties no longer top the list of fastest-growing counties by percentage change.

- McKenzie County fell from second-fastest growing by percentage change to 2,858th.
- Williams County fell from third to 3,105th.
- Mountrail County fell from sixth to 2,375th.
- Stark County fell from eighth to 3,103rd.

All of these counties lost population due to people moving away to other parts of the United States (negative net domestic migration). Formerly fast-growing North Dakota counties have been replaced in the top 10 by counties in Iowa, Oregon and Washington. Other top 10 counties once again are in Utah, Texas and Florida.

County Highlights

- Eight of the 10 counties with the most natural decrease (more deaths than births) were in Florida. Four of the top 10 counties with the most natural increase were in California, and 3 of the 10 were in Texas.
- St. Louis County, Mo., dropped below 1 million for the first time since 2011, largely due to a rise in net domestic out-migration.
- Three counties reached a population milestone of 100,000 or higher: Fairbanks North Star Borough, Alaska; Highlands County, Fla., and Carver County, Minn.
- Pasco County, Fla., reached a population of 500,000, and Tarrant County, Texas, reached 2 million.

Metropolitan Statistical Area Highlights

- The nation's 382 metro areas contained approximately 277.1 million people in 2016, representing approximately 86 percent of the nation's population. This was an increase of approximately 2.3 million people from 2015.
- For the fourth year in a row, The Villages, Fla., a metro area west of the Orlando-Kissimmee-Sanford, Fla., metro area, was the nation's fastest-growing metro area, with a 4.3 percent population increase between 2015 and 2016.
- The Dallas-Fort Worth-Arlington, Texas, and Houston-The Woodlands-Sugar Land, Texas, metro areas were the two largest numeric-gaining metro areas between 2015 and 2016, increasing by more than 100,000 each.
- Four metro areas were among both the 25 fastest growing and the 25 largest numeric gaining between 2015 and 2016: Austin-Round Rock, Texas; Raleigh, N.C.; Orlando-Kissimmee-Sanford, Fla.; and Las Vegas-Henderson-Paradise, Nev. For all four areas, net domestic migration was a larger component of change than either net international migration or natural increase.
- Among the 10 largest metro areas, the Chicago-Naperville-Elgin, Ill.-Ind.-Wis., metro area was the only metro area that did not grow in population between 2015 and 2016.

Micro Metropolitan Statistical Area Highlights

- The nation's 551 micro areas contained approximately 27.7 million people in 2016, representing approximately nine percent of the nation's population. This is an increase of approximately 16,000 people from 2015.
- Micro areas in the West grew the most.
 - Heber, Utah, was the fastest-growing micro area, with an increase of 4.7 percent between 2015 and 2016. The five fastest-growing micro areas were in the West: Heber, Utah; Prineville, Ore.; Ellensburg, Wash.; Bozeman, Mont.; and Cedar City, Utah. Among these five areas, net domestic migration was a larger component of change than either net international migration or natural increase.
 - Bozeman, Mont., had the largest numeric gain among micro areas between 2015 and 2016, increasing by approximately 3,800 people. Four of the five largest numeric-gaining micro areas between 2015 and 2016 were in the West: Bozeman, Mont.; Hilo, Hawaii; Kalispell, Mont.; and Oak Harbor, Wash.

Puerto Rico

- Overall, Puerto Rico's population has been decreasing since 2010. The Commonwealth total resident population decreased by 314,850 (or 8.4 percent) since 2010 to 3,411,307 on July 1, 2016.
- San Juan experienced the largest numeric decrease in population of any municipio, losing 8,497 residents between July 1, 2015 and July 1, 2016, followed by Bayamón (-4,448 residents) and Ponce (-3,748 residents).
- Of Puerto Rico's 78 municipios, only Gurabo experienced growth between July 1, 2015, and July 1, 2016, gaining 56 residents (an increase of 0.1 percent).
- All other municipios experienced a decline in population. The fastest-declining municipios were Peñuelas, Lares and Guánica, featuring a decline of 2.7 percent each.

To find where people are leaving from and moving to, visit [Census Flows Mapper](#).

-X-

The Census Bureau develops county, metro area and micro area population estimates by measuring population change since the most recent census. The Census Bureau uses births, deaths, administrative records and survey data to develop estimates of population. For more detail regarding the methodology, see www.census.gov/programs-surveys/popest/technical-documentation/methodology.html.

The Office of Management and Budget's statistical area delineations (for metro and micro areas) are those issued by that agency in July 2015. Metro areas contain at least one urbanized area of 50,000 or more population, and micro areas contain at least one urban cluster of at least 10,000 (but less than 50,000) population. Both metro and micro areas consist of one or more whole counties or county equivalents. Some metro and micro area titles may be abbreviated in the text of the news release. Full titles are shown in the tables.

Top 10 Largest-Gaining Counties (Numeric Change): July 1, 2015 to July 1, 2016

County	Population	Numeric Change	Percent Change	Births	Deaths	Domestic Migration	International Migration
Maricopa County, Arizona	4,242,997	81,360	1.95	56,073	30,645	43,189	10,188
Harris County, Texas	4,589,928	56,587	1.25	73,072	26,660	-16,225	27,922
Clark County, Nevada	2,155,664	46,375	2.20	27,352	16,501	27,735	6,566
King County, Washington	2,149,970	35,714	1.69	25,905	13,580	8,511	15,500
Tarrant County, Texas	2,016,872	35,462	1.79	28,682	12,903	13,411	6,348
Riverside County, California	2,387,741	34,849	1.48	30,845	17,092	16,961	3,099
Bexar County, Texas	1,928,680	33,198	1.75	28,283	13,458	13,077	5,361
Orange County, Florida	1,314,367	29,503	2.30	16,721	8,198	10,083	11,078
Dallas County, Texas	2,574,984	29,209	1.15	40,063	16,407	-6,193	12,133
Hillsborough County, Florida	1,376,238	29,161	2.16	17,345	11,179	14,806	7,774

Top 10 Fastest-Growing Counties (Percent Change, Counties With a Population of 10,000 or More): July 1, 2015 to July 1, 2016

County	Population	Numeric Change	Percent Change	Births	Deaths	Domestic Migration	International Migration
San Juan County, Utah	16,895	1,188	7.56	240	112	1,038	13
Kendall County, Texas	42,540	2,088	5.16	391	389	1,844	77
Hays County, Texas	204,470	9,896	5.09	2,553	1,011	7,932	171
Wasatch County, Utah	30,528	1,363	4.67	475	126	891	77
Dallas County, Iowa	84,516	3,739	4.63	1,268	433	2,500	296
Comal County, Texas	134,788	5,675	4.40	1,597	1,085	4,760	109
Sumter County, Florida	123,996	5,114	4.30	501	1,742	4,873	55
Crook County, Oregon	22,570	923	4.26	240	236	886	7
Juab County, Utah	11,010	444	4.20	185	74	319	-1
Kittitas County, Washington	44,866	1,809	4.20	391	286	1,563	72

Top 10 Largest-Declining Counties or County Equivalents (Numeric Change): July 1, 2015 to July 1, 2016

County	Population	Numeric Change	Percent Change	Births	Deaths	Domestic Migration	International Migration
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Cook County, Illinois	5,203,499	-21,324	-0.41	68,049	42,297	-66,244	18,434
Wayne County, Michigan	1,749,366	-7,696	-0.44	23,209	18,231	-17,346	4,279
Baltimore city, Maryland	614,664	-6,738	-1.08	8,654	6,871	-11,008	2,195
Cuyahoga County, Ohio	1,249,352	-5,673	-0.45	14,941	13,563	-10,122	3,402
Suffolk County, New York	1,492,583	-5,320	-0.36	15,446	12,793	-11,278	4,327
Milwaukee County, Wisconsin	951,448	-4,866	-0.51	13,675	8,176	-13,186	2,505
Allegheny County, Pennsylvania	1,225,365	-3,933	-0.32	13,193	13,995	-5,821	3,479
San Juan County, New Mexico	115,079	-3,622	-3.05	1,703	1,026	-4,341	42
St. Louis City, Missouri	311,404	-3,471	-1.10	4,547	3,070	-6,189	981
Jefferson County, New York	114,006	-3,254	-2.78	2,000	945	-4,674	345

Top 25 Fastest-Growing Metro Areas (Percent Change): July 1, 2015 to July 1, 2016

Rank by Percent Change	Metro Area	2015 Population	2016 Population	Numeric Change	Percent Change	Natural Increase	Births	Deaths	Net Migration	Domestic Migration	International Migration
1	The Villages, FL	118,882	123,996	5,114	4.3	-1,241	501	1,742	4,928	4,873	55
2	Myrtle Beach-Conway-North Myrtle Beach, SC-NC	432,493	449,295	16,802	3.9	-488	4,214	4,702	15,308	14,881	427
3	Bend-Redmond, OR	174,942	181,307	6,365	3.6	398	1,853	1,455	5,698	5,695	3
4	Greeley, CO	285,053	294,932	9,879	3.5	2,381	4,106	1,725	7,300	6,991	309
5	Cape Coral-Fort Myers, FL	700,285	722,336	22,051	3.1	-658	6,666	7,324	20,780	17,769	3,011
6	St. George, UT	155,450	160,245	4,795	3.1	1,026	2,232	1,206	3,285	3,267	18
7	Provo-Orem, UT	585,362	603,309	17,947	3.1	10,004	12,347	2,343	7,765	6,893	872
8	Punta Gorda, FL	173,194	178,465	5,271	3.0	-1,614	1,044	2,658	6,154	5,800	354
9	Austin-Round Rock, TX	1,998,104	2,056,405	58,301	2.9	17,071	27,375	10,304	40,273	33,395	6,878
10	North Port-Sarasota-Bradenton, FL	768,013	788,457	20,444	2.7	-3,227	6,545	9,772	21,138	18,913	2,225
11	Coeur d'Alene, ID	150,364	154,311	3,947	2.6	480	1,834	1,354	3,169	3,123	46
12	Lakeland-Winter Haven, FL	649,425	666,149	16,724	2.6	892	7,678	6,786	15,061	12,152	2,909
13	Sebastian-Vero Beach, FL	147,792	151,563	3,771	2.6	-766	1,284	2,050	3,828	3,530	298
14	Raleigh, NC	1,271,381	1,302,946	31,565	2.5	8,414	15,893	7,479	22,607	18,510	4,097
15	Orlando-Kissimmee-Sanford, FL	2,382,132	2,441,257	59,125	2.5	10,798	28,849	18,051	46,922	29,441	17,481
16	Port St. Lucie, FL	454,111	465,208	11,097	2.4	-890	4,357	5,247	10,724	9,759	965

Rank by Percent Change	Metro Area	2015 Population	2016 Population	Numeric Change	Percent Change	Natural Increase	Births	Deaths	Net Migration	Domestic Migration	International Migration
17	Naples-Immokalee-Marco Island, FL	356,570	365,136	8,566	2.4	-220	3,270	3,490	7,434	5,292	2,142
18	Daphne-Fairhope-Foley, AL	203,690	208,563	4,873	2.4	161	2,274	2,113	4,289	4,046	243
19	Boise City, ID	675,777	691,423	15,646	2.3	4,157	8,753	4,596	10,757	9,950	807
20	Logan, UT-ID	133,093	136,159	3,066	2.3	1,991	2,578	587	1,052	728	324
21	Deltona-Daytona Beach-Ormond Beach, FL	623,378	637,674	14,296	2.3	-2,437	5,714	8,151	15,419	13,981	1,438
22	Fayetteville-Springdale-Rogers, AR-MO	513,449	525,032	11,583	2.3	3,660	7,266	3,606	7,845	6,564	1,281
23	Olympia-Tumwater, WA	269,183	275,222	6,039	2.2	1,000	3,172	2,172	4,725	4,060	665
24	Charleston-North Charleston, SC	744,603	761,155	16,552	2.2	3,710	9,662	5,952	12,377	11,471	906
25	Las Vegas-Henderson-Paradise, NV	2,109,289	2,155,664	46,375	2.2	10,851	27,352	16,501	34,301	27,735	6,566

Contact

Public Information Office

301-763-3030

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Related Information



Press kit



Detailed tables



Graphic: Embed, Download or Print



Spanish Version



Presentation - November 4th, 2016

MISSION: Creating Prosperity through Community and Business Development

VISION: Redmond - A great place to live and prosper



Recruitment

Help local businesses & pursue outside leads



Retention

Expansion



Policy

Advocate, collaborate, & track



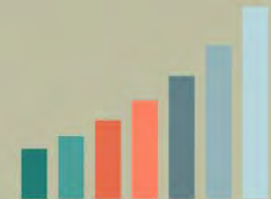
Workforce

Space



Organizational Development

Pursue funding, quantify impact, & expand reach



Financial Sustainability

Marketing



23 Member Board of Directors

Representing a Cross Section of the Community:

Elected Officials

Real Estate/Escrow

Utilities

Traded Sector Businesses

Communications

Banking

City Leadership

Healthcare

Legal

Marketing

Workforce/Staffing

Financial/Accounting

Education

Economist



Local Companies: expanding and adding



Consumer Cellular®



BASX
SOLUTIONS

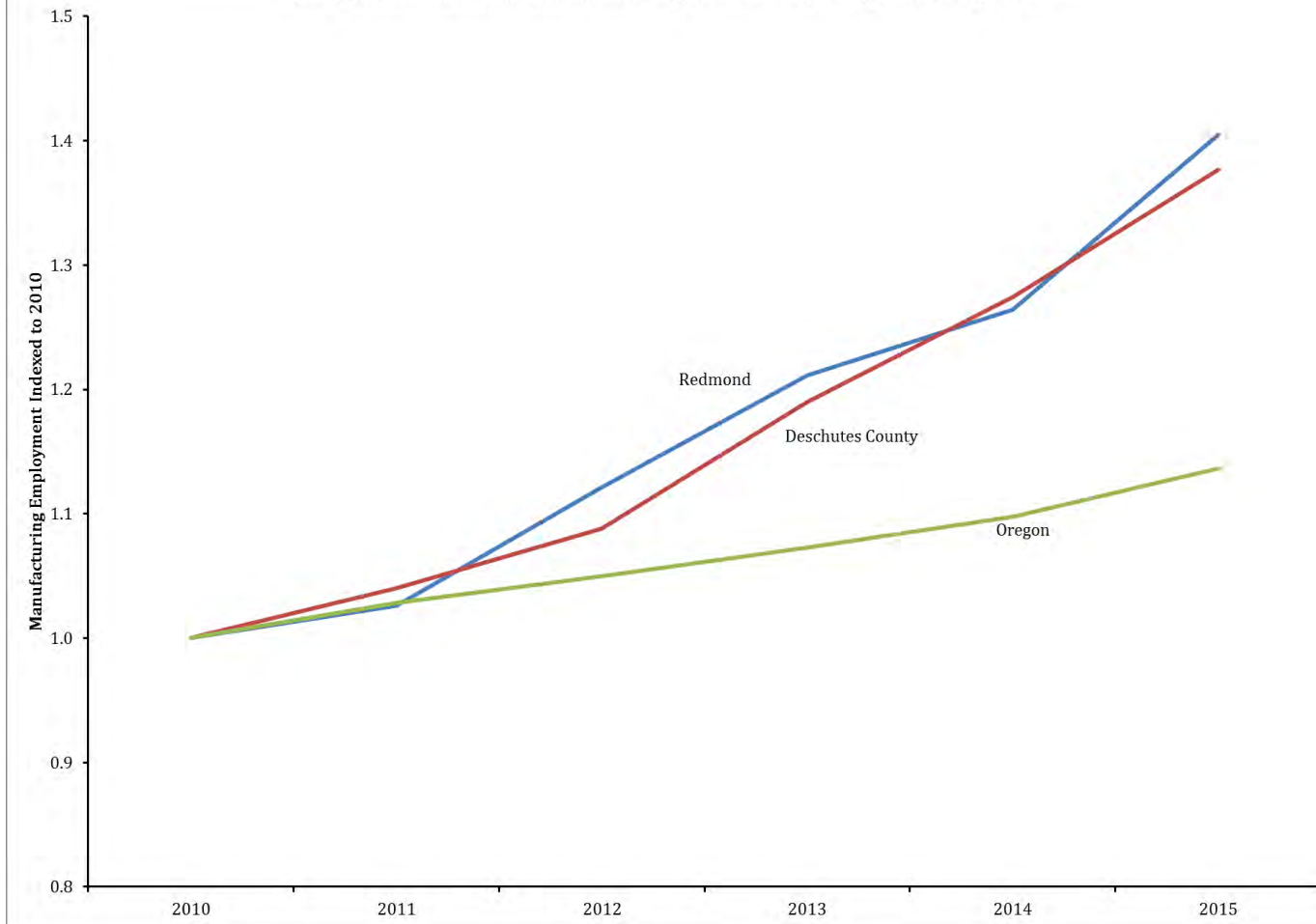


STRATOS
AIRCRAFT





Job growth in Redmond's manufacturing sector is outpacing statewide growth



Manufacturing Growth in Redmond

-6.9% Increase '14-'15

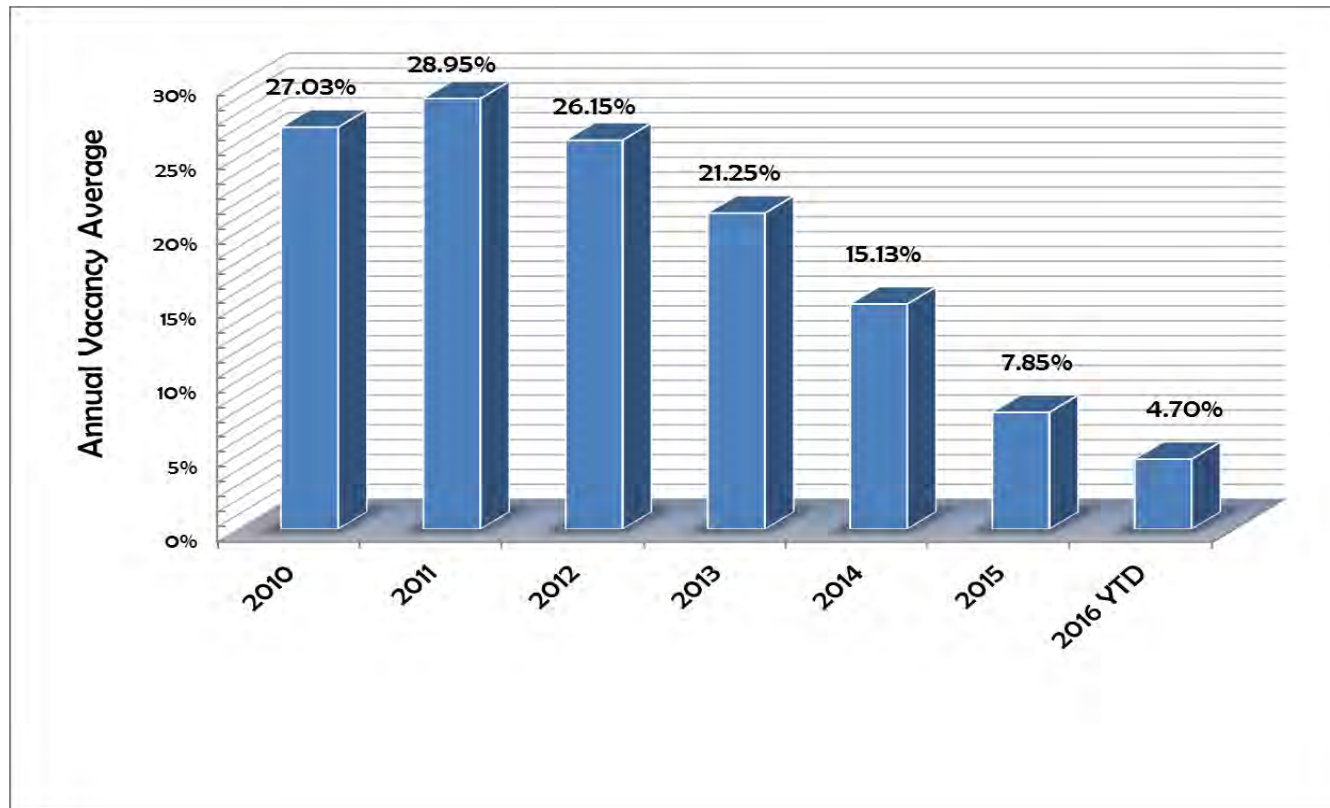
-8th of all 382 Metro's

-41% 2010-2015

-Bend/Redmond MSA:
6th Fastest Year/Year Job
Growth in US – all
occupations



Redmond Industrial Vacancy Rate Trend



*Compass
Points
Publication

Available Space



Flex Space 1,500-3,000 sf – **4** options exist



Flex Space 3,000-8,000 sf – **6** options available



Stand Alone buildings over 15,000 sf – **2** options exist
2 heavy industrial flex spaces at 13,000 and 28,000





Industrial Land and Lease Rates

Industrial Land (M1 and M2)

\$2.50-\$4.50 sf

Industrial Warehouse Lease Rate (avg)

\$.50/sf+ NNN

Upper Edge of Lease Market

\$.70/sf + NNN



Industrial Space - Market Demand (REDI Pending Projects)

PROJECT NEED

DEMAND

1,500-3000 sf

3 Projects

3,000-8,000 sf

7 Projects

10,000-25,000 sf

8 Projects

25,000 sf and up

4 Projects

[illegible]

We HAVE Land!



Lead Generation Activity

- Team Oregon Advanced Manufacturing



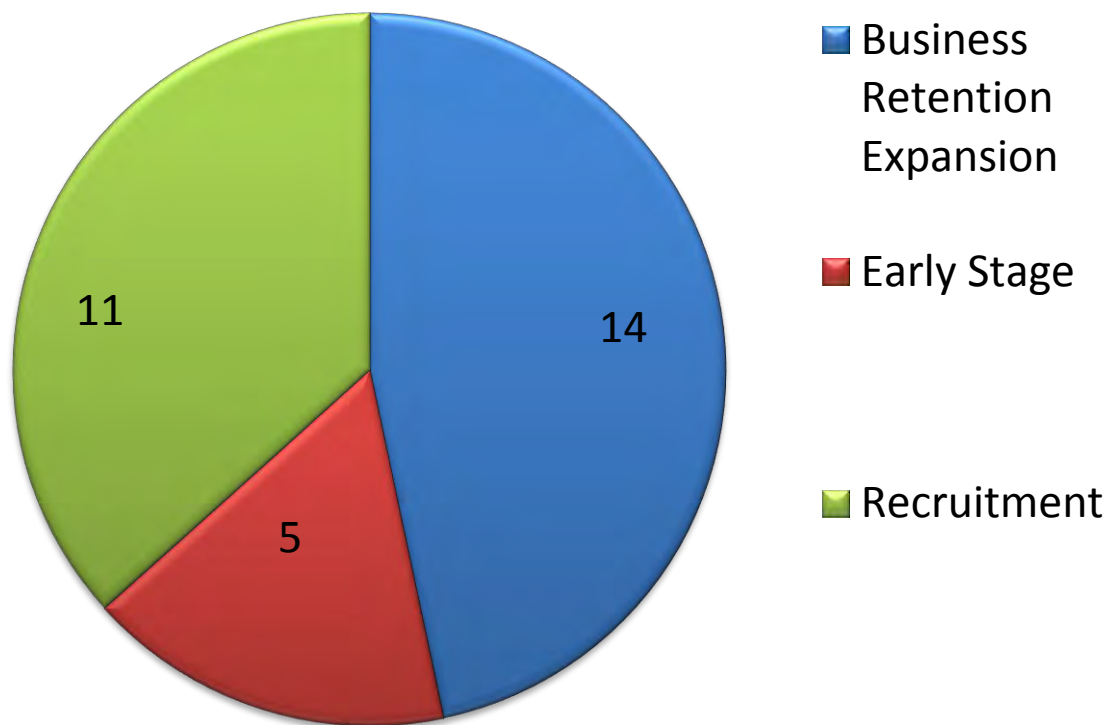
FABTECH 2016 NOVEMBER 16-18 | LAS VEGAS CONVENTION CENTER | LAS VEGAS, NV USA

- Lead Generation Pilot



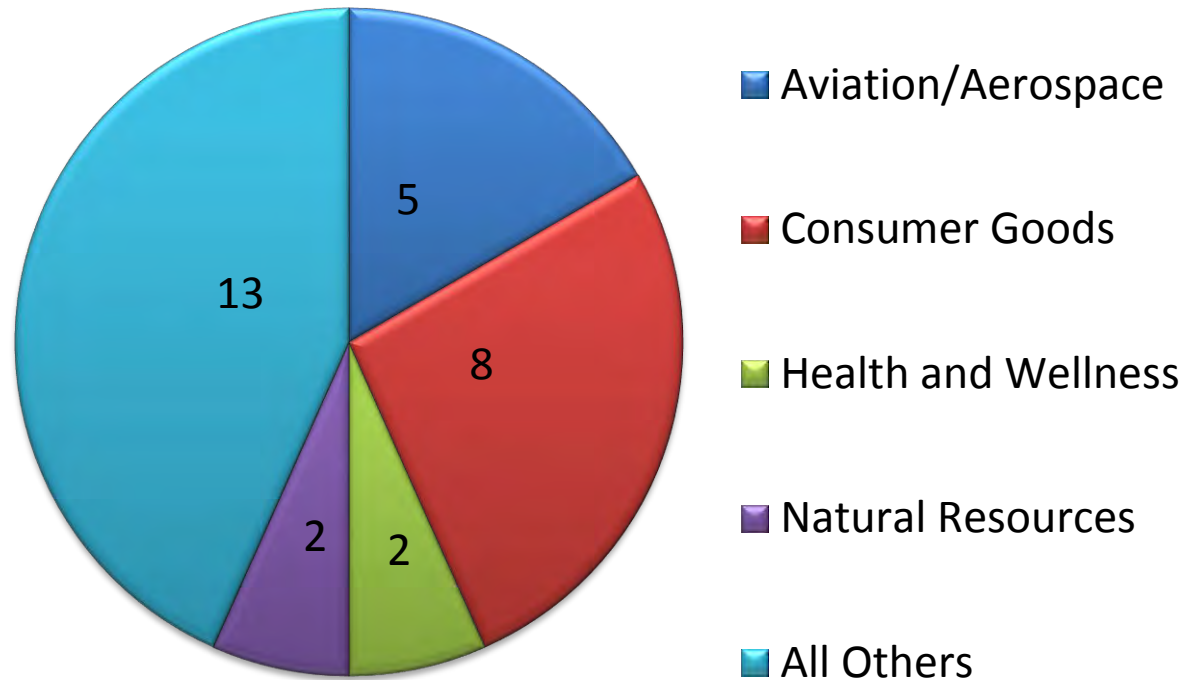


Project Type



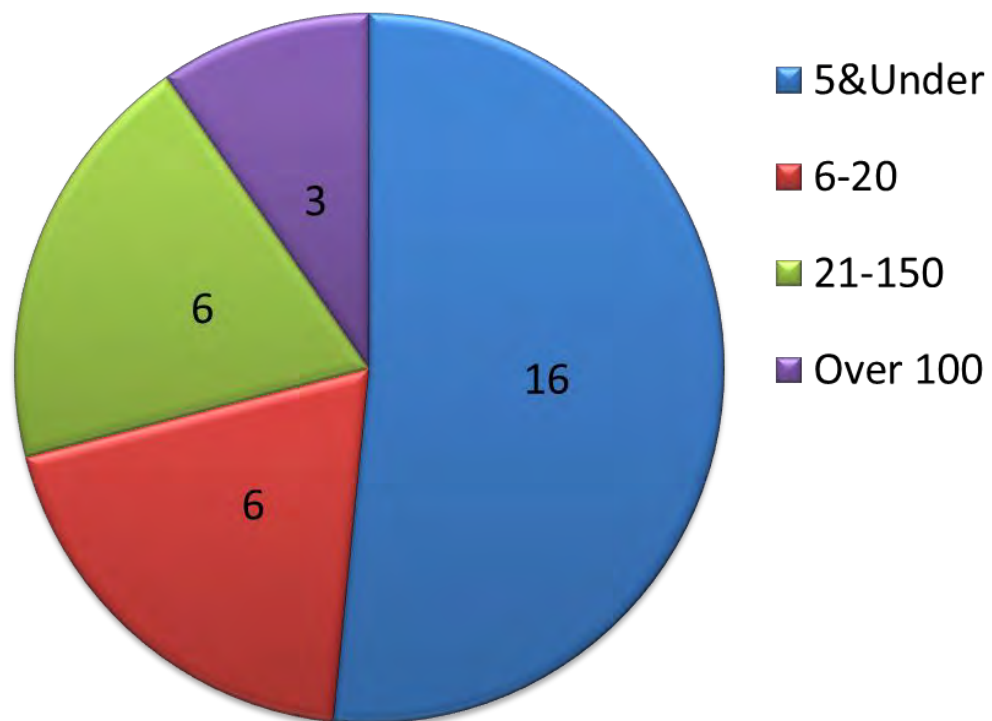


Industry Type





Project Pipeline: Jobs





Strategic Initiatives: Strengthening Redmond's Business Environment

Certified Work Ready Communities



Airlines Meetings (COAST)



Education @ Work **Central Oregon Education @ Work**
powered by Better Together

Advanced Mfg. Industry Consortium





Sustainable Operations:

Social Media Presence



3rd Annual Investor Social
Membership Development



Annual Luncheon

Made in Redmond Tour



Made In Redmond Tour

Questions?

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Redmond Economic Development
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Figure A4-1: TAF and Airport Records Comparison

Fiscal Year	Enplanements				Air Carrier (AC) Operations				Air Taxi (AT) Operations				Commercial Operations (AC + AT)			
	TAF	Airport	Δ#	Δ%	TAF	Airport	Δ#	Δ%	TAF	Airport	Δ#	Δ%	TAF	Airport	Δ#	Δ%
2006	197,223	205,061	7,838	4%	1,433	887	-546	-38%	16,803	17,768	965	6%	18,236	18,655	419	2%
2007	230,033	239,096	9,063	4%	2,781	3,043	262	9%	16,349	17,508	1,159	7%	19,130	20,551	1,421	7%
2008	243,197	252,665	9,468	4%	4,413	5,211	798	18%	13,795	14,498	703	5%	18,208	19,709	1,501	8%
2009	217,826	229,987	12,161	6%	4,444	5,615	1,171	26%	9,680	10,119	439	5%	14,124	15,734	1,610	11%
2010	225,561	235,921	10,360	5%	4,858	6,151	1,293	27%	9,396	9,997	601	6%	14,254	16,148	1,894	13%
2011	231,978	242,888	10,910	5%	4,140	5,064	924	22%	8,886	9,616	730	8%	13,026	14,680	1,654	13%
2012	230,833	241,488	10,655	5%	3,931	4,898	967	25%	8,649	9,218	569	7%	12,580	14,116	1,536	12%
2013	227,410	236,586	9,176	4%	4,201	4,785	584	14%	8,232	9,185	953	12%	12,433	13,970	1,537	12%
2014	255,865	265,213	9,348	4%	4,738	5,812	1,074	23%	8,573	8,526	-47	-1%	13,311	14,338	1,027	8%
2015	269,132	277,157	8,025	3%	4,335	5,860	1,525	35%	6,578	6,586	8	0%	10,913	12,446	1,533	14%
2016	298,322	304,588	6,266	2%	5,127	6,697	1,570	31%	6,340	6,451	111	2%	11,467	13,148	1,681	15%
CAGR	2.1%	2.0%			6.6%	10.6%			-4.8%	-4.9%			-2.3%	-1.7%		

TAF records (enplanements and operations) come from TAF issued January 2017.

Airport records come from airlines (enplanements) and payment of landing fees (operations).

CAGR = Compound Annual Growth Rate

Figure A4-2: Airport Commercial Operations Records

		FAA Fiscal Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	RATE	CHART
Subtotal	Air Carrier	Scheduled Commercial Passenger	209	2,184	4,636	5,142	5,742	4,542	4,413	4,207	4,995	5,240	6,254	40.5%	
Subtotal	Air Carrier	Charter	52	136	51	34	41	8	-	22	44	39	21	-8.7%	
Subtotal	Air Carrier	Air Tanker	626	723	524	439	368	514	485	556	773	581	422	-3.9%	
Subtotal	Air Carrier	Sched. Com. Pax + Charter + Tanker	887	3,043	5,211	5,615	6,151	5,064	4,898	4,785	5,812	5,860	6,697	22.4%	
Subtotal	Air Taxi	Scheduled Commercial Passenger	14,455	14,006	10,961	6,764	6,186	6,283	6,340	5,916	6,602	4,560	4,522	-11.0%	
Subtotal	Air Taxi	Scheduled Commercial Freight	3,313	3,502	3,537	3,355	3,811	3,333	2,878	3,269	1,924	2,026	1,929	-5.3%	
Subtotal	Air Taxi	Sched. Com. Pax + Freight	17,768	17,508	14,498	10,119	9,997	9,616	9,218	9,185	8,526	6,586	6,451	-9.6%	
Total		Air Carrier + Air Taxi	18,655	20,551	19,709	15,734	16,148	14,680	14,116	13,970	14,338	12,446	13,148	-3.4%	

Source: Airport records depicting landing fees.

Figure A4-3: Airport Enplanement Records by Month

Enplanement/Deplanement by Airlines																				
Summary																				
FY	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16
July Enplane	10,019	9,924	11,849	13,948	15,054	16,137	13,410	13,559	14,017	18,349	18,763	23,618	23,354	22,583	22,879	23,819	24,812	24,320	26,448	28,710
July Deplane	10,176	10,177	12,415	14,554	15,235	16,508	13,868	13,788	13,849	18,552	19,059	23,704	23,807	23,405	23,713	24,022	25,560	24,529	27,272	29,650
August Enplane	10,440	10,638	12,796	14,765	15,746	17,598	14,511	13,886	15,646	18,536	22,290	24,251	23,321	23,205	23,728	23,986	24,210	23,877	27,374	29,276
August Deplane	10,750	10,420	12,321	13,783	15,495	17,634	14,175	13,676	14,603	17,789	21,844	24,018	22,954	22,341	22,849	23,452	23,821	23,660	27,414	28,118
September Enplane	9,183	9,879	11,149	12,954	13,792	9,694	12,205	12,255	13,263	16,221	19,002	20,542	18,743	19,374	19,475	20,702	19,686	21,797	23,466	24,896
September Deplane	8,409	9,132	10,789	12,650	13,236	9,126	11,456	11,538	12,924	15,787	18,304	19,601	17,808	18,958	19,125	20,322	19,119	20,544	21,192	24,250
October Enplane	8,896	9,053	10,795	12,336	14,000	11,181	11,567	12,635	13,381	16,115	19,282	21,106	18,728	18,785	19,310	19,456	18,943	21,207	21,796	24,496
October Deplane	8,652	8,856	10,618	12,184	13,578	10,781	11,074	12,178	13,166	15,962	18,617	20,419	18,220	18,446	18,880	19,317	18,328	20,968	21,311	23,962
November Enplane	7,548	7,871	10,311	11,897	13,231	10,903	11,039	11,852	13,239	14,164	18,347	20,292	17,835	18,790	19,016	18,945	18,192	20,075	20,405	23,974
November Deplane	7,614	8,215	10,006	12,052	13,020	10,847	11,372	12,009	13,107	13,513	18,204	20,139	18,117	18,885	19,144	18,855	18,178	20,707	19,985	23,272
December Enplane	8,835	9,840	12,368	12,519	13,708	11,513	12,751	12,718	14,101	17,176	19,081	22,085	19,649	21,159	21,057	20,051	18,885	22,806	19,988	25,286
December Deplane	9,250	10,419	13,029	13,297	14,722	12,171	13,442	13,293	14,930	17,959	20,027	23,514	20,481	22,615	22,421	22,003	19,960	24,281	20,651	26,871
January Enplane	9,151	9,455	10,443	12,218	12,726	11,243	11,485	11,678	14,216	16,126	18,166	21,328	17,633	18,621	19,826	18,578	18,194	20,550	21,225	24,863
January Deplane	8,079	8,337	9,288	10,823	11,276	10,089	9,995	10,088	12,715	14,372	16,646	19,010	15,466	16,413	17,465	16,547	16,644	18,108	18,651	22,364
February Enplane	8,493	8,555	10,579	11,293	12,506	10,422	10,757	11,859	12,275	14,930	16,523	20,509	16,620	16,427	17,158	17,039	16,469	17,502	19,357	22,912
February Deplane	8,182	8,348	10,555	11,207	12,063	10,410	10,707	11,872	12,246	14,753	16,285	20,610	16,575	16,286	16,914	16,812	16,456	18,209	19,118	22,633
March Enplane	8,983	9,449	11,525	13,347	14,627	11,633	11,866	12,601	15,229	17,271	18,969	19,852	19,179	18,887	20,231	19,860	18,926	21,067	22,469	25,313
March Deplane	9,202	9,625	11,620	13,400	14,360	11,876	11,742	12,758	15,320	16,393	18,291	19,706	18,936	19,363	20,512	19,427	18,901	20,692	22,361	25,514
April Enplane	8,577	8,802	11,027	11,853	12,753	10,597	10,276	11,353	14,089	15,243	18,224	19,362	16,970	17,870	17,570	17,533	17,561	19,479	20,986	23,656
April Deplane	8,474	8,833	10,550	11,450	13,230	10,549	10,365	11,149	13,830	15,619	18,769	19,688	17,195	17,241	17,243	17,871	17,477	19,706	20,973	24,180
May Enplane	9,069	9,387	10,975	12,851	13,672	11,064	11,427	11,799	15,535	16,066	20,003	20,391	17,578	18,350	18,916	18,944	18,398	21,165	21,901	7,379
May Deplane	8,732	9,501	11,085	13,921	13,927	11,335	11,526	12,308	15,728	16,797	20,288	20,812	18,256	18,886	19,390	19,840	19,138	22,021	22,305	7,086
June Enplane	9,794	11,277	12,541	14,190	14,755	12,664	12,933	13,686	16,476	17,915	22,090	22,322	20,633	20,950	21,297	22,374	21,024	24,074	26,148	30,397
June Deplane	9,793	11,224	12,310	14,293	15,104	12,788	13,093	13,477	16,697	17,828	22,672	22,603	21,190	21,003	22,131	22,732	21,379	24,623	25,978	30,578
TOTAL Enplane	108,988	114,130	136,358	154,171	166,570	144,649	144,227	149,881	171,467	198,112	230,740	255,658	230,243	235,001	240,463	241,287	235,300	257,919	271,563	291,158
TOTAL Deplane	107,313	113,087	134,586	153,614	165,246	144,114	142,815	148,134	169,115	195,324	229,006	253,824	229,005	233,842	239,787	241,200	234,961	258,048	267,211	288,478
TOTALS	216,301	227,217	270,944	307,785	331,816	288,763	287,042	298,015	340,582	393,436	459,746	509,482	459,248	468,843	480,250	482,487	470,261	515,967	538,774	579,636
FAA FY (Oct-Sep)	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Enplanements	109,787	119,483	142,231	157,096	165,407	141,346	143,801	153,107	181,647	205,061	239,096	252,665	229,987	235,921	242,888	241,488	236,586	265,213	277,157	304,588
Deplanements	107,707	118,883	140,048	156,593	164,548	140,345	142,318	150,508	179,867	202,403	237,122	251,070	229,140	234,825	241,896	241,904	235,194	265,193	273,351	301,464
Total	217,494	238,366	282,279	313,689	329,955	281,691	286,119	303,615	361,514	407,464	476,218	503,735	459,127	470,746	484,784	483,392	471,780	530,406	550,508	606,052

Source: Airport records, reported by the airlines.

APPENDIX C:

RECYCLING PLAN





**REDMOND MUNICIPAL AIRPORT
RECYCLING, REUSE &
WASTE REDUCTION PLAN
2018**





REDMOND MUNICIPAL AIRPORT
RECYCLING, REUSE &
WASTE REDUCTION PLAN
2018



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TABLE OF CONTENTS

Executive Summary	2
1. Introduction	3
A. Regulatory Background and Project Purpose	3
B. Airport Description	4
C. Waste Definitions and Plan Focus	4
D. Key Airport Buildings and Plan Scope	5
2. Existing Program	12
A. Drivers	12
B. Alignment with Local Programs	12
C. Infrastructure	12
D. Operation and Maintenance Requirements / Roles and Responsibilities	51
E. Current Waste Reduction, Reuse, and Recycling Efforts	52
F. Tracking and Performance	53
3. Waste Audit	54
A. Quantity and Sources	54
B. Composition	55
Toiletries, Food, and Beverages - TSA Restrictions	57
Liquids	58
C. Purchases	58
4. Review of Waste Management Contracts	59
A. Custodial and Waste Hauling Contracts	59
B. Tenant Leases and Service Contracts	59
C. Expiring Leases and Contracts	62
D. Funding	62
5. Recycling Feasibility	63
A. Commitment and Support	63
B. Technical and Economic Factors	64
Recycling, Landfill, and Energy-from-Waste Facility Requirements	66
C. Guidelines and Policies	67
D. Other Incentives	72
6. Cost Savings or Revenue Generation	73
7. Recommendations	74
A. Objectives and Targets	74
B. Tracking and Reporting	74
C. Reduce and Reuse	75
Donation of Food, Beverages, and Toiletries	76
D. Recycle and Compost	77
E. Education and Outreach	81
F. Containers and Bins	82
G. Signage and Labeling	84
H. Other Recommendations	84
I. Continuous Improvement	85
J. Recommendations Summary	87
8. Conclusion	89
9. References	90



EXECUTIVE SUMMARY

The City of Redmond, Oregon, operator of Redmond Municipal Airport (RDM or the Airport) is committed to environmentally responsible operations. The Airport is updating their master plan and is including planning for solid waste in keeping with the *FAA Modernization and Reform Act of 2012* (FMRA) requirements. The purpose of this task was to evaluate RDM's existing waste and recycling program and provide recommendations to increase landfill diversion through waste reduction, reuse, and recycling.

The consultant conducted a facility walk-through and informal interviews with RDM staff to develop a baseline and identify areas of opportunity to divert waste from the landfill. The consultant developed recommendations appropriate for the Airport's waste stream based on the baseline information and identified opportunities.

Highlights of these recommendations include:

- ✓ Establish goals and objectives
- ✓ Track progress and report regularly
- ✓ Continue to promote emptying of water bottles pre-security and refilling post-security
- ✓ Collect and donate food, beverages, and toiletries
- ✓ Continue paper, plastic, plastic bottle, aluminum can, cardboard, and glass recycling and expand to other areas, including deplaned waste
- ✓ Improve education and outreach for passengers, employees, tenants, and contractors
- ✓ Supplement, right size, collocate, and standardize recycling stations and garbage cans
- ✓ Expand and improve signage, specifically at the security checkpoint
- ✓ Update contracts/leases and establish purchasing policy
- ✓ Maintain and improve recycling program according to Plan Do Check Act cycle

This range of recommendations will allow RDM the flexibility to implement those that are compatible with changing conditions and available resources, while providing the opportunity increase landfill diversion over time through a phased, comprehensive program.



1. INTRODUCTION

A. REGULATORY BACKGROUND AND PROJECT PURPOSE

Section 132(b) of the FMRA expanded the definition of airport planning to include “developing a plan for recycling and minimizing the generation of airport solid waste.” FMRA Section 133 added a requirement that airports that prepare or update a master plan and receive Federal Aviation Administration (FAA) Airport Improvement Program (AIP) funding ensure that new or updated master plans address issues related to solid waste recycling. These issues include:

- 1) the feasibility of solid waste recycling
- 2) minimizing the generation of solid waste
- 3) operation and maintenance requirements
- 4) review of waste management contracts
- 5) the potential for cost savings or revenue generation.

In September 2014, the FAA released a memorandum titled “Guidance on Airport Recycling, Reuse, and Waste Reduction Plans.” This memo details the FAA’s expectations and suggestions for an airport’s recycling plan. To comply with FMRA and according to the FAA’s guidance memo, RDM is preparing this recycling, reuse, and waste reduction plan. The purpose of this plan is to document and assess RDM’s existing waste and recycling program based on the factors listed above and to recommend improvements.

An airport’s waste and recycling program and documented plan depend on several factors including:

- ✓ the size, location, and layout of the airport
- ✓ the amount and type of waste generated
- ✓ markets for recyclable commodities
- ✓ costs for recycling
- ✓ available local infrastructure
- ✓ the willingness of an airport and its tenants to implement recycling and other strategies

The extent and accuracy of available information governed the content of this plan.



B. AIRPORT DESCRIPTION

RDM is in the high desert region of central Oregon in the City of Redmond within Deschutes County. The City of Redmond owns RDM. The Airport Manager reports to the City Manager, and City employees are responsible for day to day airport operations. An Airport Committee advises elected City Council members on Airport matters. The Committee includes representation from Redmond, the City of Bend, Deschutes County, Jefferson County, and Crook County.

RDM, a non-hub primary airport, serves as the high desert region's only commercial service airport. The Airport is a public-use facility and is included in the FAA *National Plan of Integrated Airport Systems (NPIAS)*. The Airport is an FAA Class I Part 139 facility, with facilities and services to accommodate scheduled passenger aircraft with 30 or more passenger seats. The Oregon Department of Aviation classifies RDM as a Category I – Commercial Service Airport.

The Airport serves commercial, general aviation (GA), military, and US Forest Service (USFS) activity. In fiscal year 2016, RDM saw approximately 546,700 total passengers (273,351 enplanements), saw 39,211 total operations, and had 40 based aircraft. Four airlines serve the Airport (American Airlines, Alaska Air, Delta Air, and United/United Express) and reach seven domestic destinations. Additional background and activity information is available in the Airport Master Plan.

C. WASTE DEFINITIONS AND PLAN FOCUS

Municipal Solid Waste (MSW) consists of everyday items that are used and then discarded. There are six primary types of MSW generated at airports:

- a. General MSW consists of common inorganic waste, such as product packaging, disposable utensils, plates and cups, bottles, and newspaper. Less common items, such as furniture and clothing, are also considered general MSW.
- b. Food waste is either food that is not consumed or the waste generated and discarded during food preparation. Food waste and green waste make up a waste stream known as “compostable” waste.
- c. Green waste consists of tree, shrub and grass clippings, leaves, weeds, small branches, seeds, pods and similar debris generated by landscape maintenance activities. Green waste and food waste together may be referred to as “compostables.”
- d. Deplaned waste is a specific type of MSW that is removed from passenger aircraft. These materials include bottles and cans, newspaper and mixed paper, plastic cups, service ware, food waste, food soiled paper, and paper towels.
- e. Construction and Demolition Waste (C&D) is generally categorized as MSW and is any non-hazardous solid waste from land clearing, excavation, and/or the construction, demolition, renovation or repair of structures, roads, and utilities. C&D waste commonly includes concrete, wood, metals, drywall, carpet, plastic, pipes, land clearing debris, cardboard, and salvaged building components.



This plan focuses on the management of MSW and other materials that can be recycled or disposed of in a landfill. This plan does not address the management of other types of waste, specifically:

- ✓ hazardous waste
- ✓ universal waste
- ✓ industrial waste
- ✓ waste from international flights
- ✓ C&D waste that is subject to special requirements or requires special handling (asbestos, lead, etc.).

The handling, recycling, and disposal of these materials are regulated by federal, state, and local laws.

D. KEY AIRPORT BUILDINGS AND PLAN SCOPE

The Airport's buildings include an airline passenger terminal, airport support facilities, GA facilities and tenant facilities.

AIRLINE PASSENGER TERMINAL

The passenger terminal serves airline passengers and provides space for airline-related services.

Airport administration offices, airline ticketing counters and offices, restrooms, food and retail store, security queuing area, meeter/greeter area, baggage claim, and rental car counters and offices comprise the pre-security or non-sterile portion of the terminal.

The administration offices include a reception area, offices, one conference room, and a breakroom. The firm providing airport security services has an office adjacent to the security checkpoint, and the City of Redmond Police Department also has an office in the terminal.

The ticketing counters, associated queuing lines and kiosks, and adjacent offices are allocated to each airline. A shop offering packaged food and drinks and retail items, including souvenirs, is in the non-sterile area. There are restrooms in the non-sterile area.

The meeter/greeter area connects the secure area exit with baggage claim and the car rental counters. This space also has a children's play area. There are two luggage belts in the baggage claim area, as well as a space for oversized baggage claim. Each rental car company has a counter and adjacent office for their use.

Passengers access the security checkpoint via a queuing area at its entrance. The Transportation Security Administration (TSA) operates the security checkpoint, which offers two lanes for screening of passengers and carry-on items. TSA personnel also have access to training areas, locker room space, and offices.



The post-security or secure portion of the terminal offers services for passengers already screened at the security checkpoint. The secure area includes a second food and retail shop, a bar/restaurant, restrooms, airline gates, and passenger holdrooms.

Secure area food and retail space is occupied by a small convenience store that also offers packaged foods and drinks as well as souvenirs (Figure 1).



Figure 1 : Terminal convenience store



The convenience store has a small coffee condiments area with a built-in trash can (Figure 2).



Figure 2 : Coffee condiments area in convenience store



A bar/restaurant is located on the second floor of the secure area and features bar seating as well as tables and chairs with wait staff service (Figure 3). The restaurant also sells packaged beverages (Figure 4).



Figure 3 : Bar and restaurant in secure area





Figure 4 : Bar area and cooler with packaged beverages

The secure area also has restrooms.

Six gates serve deplaning and enplaning passengers with each gate is dedicated to one airline. Holdrooms, where passengers wait to board departing flights within the departure lobby, are loosely defined at RDM by their proximity to each gate; the first-floor departure lobby is one space with seating available throughout. Additional general departure seating is available on the second-floor atrium.

Additional areas of the terminal are accessible only to credentialed staff and contractors. These areas include baggage screening, a maintenance shop, storage, and a breakroom.



AIRPORT SUPPORT FACILITIES

Airport staff maintain the property and perform snow removal and deicing activities. The Airport's plows, other winter equipment, and grounds maintenance vehicles are stored in the Snow Removal Equipment (SRE) Building.

The City of Redmond provides personnel to meet RDM's aircraft rescue and firefighting (ARFF) requirements. On-duty firefighters, ARFF vehicles, and associated activities are housed in a dedicated facility at RDM.

GENERAL AVIATION FACILITIES

One fixed-base operator (FBO) offers services such as ground handling, aircraft maintenance, hangar rental, fueling, and pilot/passenger facilities to support GA activity at RDM. The Airport has box hangars and T-hangars to store GA aircraft.

CARGO

Cargo facilities are made up of hangars that RDM leases and adjacent areas of the aircraft ramp/apron.

USFS

The USFS leases space to operate the Redmond Air Center, a firefighting facility protecting areas in Oregon, Washington, and Alaska. The Air Center is a hub of USFS firefighting operations, such as training and dispatching, as well as an incident support base for Federal Emergency Management Agency (FEMA) efforts in the event of a natural disaster in the Pacific Northwest.

PLAN SCOPE

The facilities described above include buildings and areas in which RDM has direct control of waste management and others in which RDM has influence but not direct control. According to FAA guidance, areas over which RDM has "direct control" or "influence" should be included in the Recycling, Reuse, and Waste Reduction Plan; areas outside Airport control or influence may be excluded. The Airport has direct control over operations and activities related to waste management in these areas:

- ✓ Passenger Terminal Building
 - public use spaces
 - airport administration offices
 - other staff work areas
- ✓ Airport SRE Building
- ✓ Airport maintenance activities



In addition, RDM can influence the management of waste and recyclables in tenant spaces through lease agreements and contracts, including:

- ✓ Passenger Terminal Building
 - TSA spaces
 - Airline leased areas
(including ticketing counters, offices, breakrooms, and deplaned waste)
 - Rental car tenant areas
 - Retail areas and bar/restaurant
- ✓ FBO Building (leased by RDM)
- ✓ Aircraft hangars (leased by RDM)
- ✓ USFS facilities (leased by RDM)
- ✓ ARFF building (coordination with City of Redmond)

The Airport does not have control or influence over waste management in the FAA Air Traffic Control Tower (ATCT) nor areas adjacent to Airport property controlled by neighboring businesses and property owners; therefore, they are excluded from this plan.



2. EXISTING PROGRAM

A. DRIVERS

The Airport established its recycling program to reduce the quantity of material disposed of in the landfill and to conserve resources, including financial resources. The Airport staff's commitment and practices drive the program; it is supported by local recycling infrastructure.

B. ALIGNMENT WITH LOCAL PROGRAMS

The City, who owns and operates RDM, contracts with a waste hauling contractor to provide waste and recycling collection services for residents, multifamily units, and commercial businesses. RDM's program aligns with the City's efforts; RDM recycles all the material types collected by the City's contractor.

C. INFRASTRUCTURE

Employees, tenants, and passengers have access to a network of trash cans and recycling stations in the terminal. In general, there are many trash cans throughout the building and a few recycling stations in specific locations. The recycling stations and the garbage cans are lined/fitted with bags.

In the ticketing lobby and airline counter area, there are tall round, metal garbage cans with round openings in the lids (Figure 5). These garbage cans are also available at the entrance to the security screening checkpoint (Figure 6), in the baggage claim and meeter / greeter space (Figures 7 and 8), and throughout the sterile area, including in the holdroom (Figure 9) and atrium (Figures 10 and 11).





Figure 5 : Garbage cans in ticketing lobby





Figure 6 : Garbage cans at entrance to security screening checkpoint





Figure 7 : Garbage cans in baggage claim





Figure 8 : Garbage cans in meeter / greeter area





Figure 9 : Garbage cans in holdroom





Figure 10 : Garbage can in atrium near restaurant





Figure 11 : Garbage can in atrium



Recycling stations, conjoined units with four labeled compartments, are positioned in four locations within the non-sterile and sterile areas: in the security queuing area, at the base of the stairs leading to the atrium (Figure 12), within the atrium seating area near the restaurant (Figure 13), and in the meeter/greeter area near baggage claim (Figure 14).



Figure 12 : Recycling station in holdroom area, near stairs to atrium





Figure 13 : Recycling station in atrium, near restaurant





Figure 14: Recycling station in meeter/greeter area near baggage claim



At the curbside entrances to and exits from the terminal, there are large garbage cans featuring hoods with large openings (Figure 15).



Figure 15 : Curbside garbage can



The terminal restrooms feature paper towel dispensers and air hand dryers (Figure 16), with garbage cans positioned below the paper towel dispensers and small bins located in each toilet stall.



Figure 16 : Terminal restrooms offer both hand dryers and paper towel dispensers



Drinking fountains are available near the restrooms throughout the terminal; RDM has installed one water bottle refill station in the sterile area (Figure 17).



Figure 17 : Water bottle filling station and drinking fountain in holdroom



The restaurant kitchen and back of house area include space for food preparation, dishwashing, storage, and other activities. Space in this area is limited. Garbage is collected in a large container (Figure 18).



Figure 18 : Restaurant back of house area, including garbage can



Glass, plastic bottles, and cans are taken to the recycling station located in the atrium. Restaurant staff break down cardboard boxes and stack them throughout the day (Figure 19); they carry these to the terminal cardboard dumpster as needed to clear the space and at the end of the day.



Figure 19 : Restaurant collection of cardboard for recycling

The restaurant offers paper carryout containers, and restaurant employees use refillable water bottles. The retail areas have small trash cans near the register, and retail employees use the terminal recycling stations for paper, plastic bottles, cans, and glass.



In Alaska Air's ticketing area, each station has space for a small trash can. The cargo desk also has a small trash can (Figure 20). The airline's office/breakroom space has two large trash cans (Figure 21); a low, squat recycling bin for paper (Figure 22); and a container for cans and plastic bottles (Figure 23).



Figure 20 : Garbage can in airline cargo area





Figure 21 : Garbage can in airline breakroom area





Figure 22 : Recycling bin in airline office area





Figure 23 : Garbage and recycling collection in airline office area



The Delta ticket counter also has a space for a “trash box” (Figure 24). In the Delta offices, there are small garbage cans by the desks (Figure 25), and the area also has a low, squat recycling bin for paper (Figure 26).



Figure 24 : Airline ticketing counter with "trash box"





Figure 25 : Garbage can in airline office





Figure 26 : Recycling bin in airline office



In the airline baggage handling area, a space shared by all the airlines, there are small trash cans located by the vending machine (Figure 27).



Figure 27 : Vending machine and garbage cans in baggage handling area



The car rental offices have containers for trash, and some use the terminal recycling stations for paper, plastic bottles, cans, and glass.

In the administration offices, there are in-cabinet waste and recycling bins in the breakroom/kitchenette (Figure 28) and in the conference room (Figure 29).



Figure 28 : In-cabinet garbage and recycling bins in Airport administration breakroom





Figure 29 : In-cabinet garbage and recycling bins in Airport conference room



In the copy room, there is one bin each for garbage and recycling (Figures 30 and 31), as well as a small paper shredder.



Figure 30 : Airport administration copy room





Figure 31 : Garbage can and recycling bin in Airport administration copy room



Each office/desk has a garbage can and some employees use copy paper box lids to collect paper for recycling (Figures 32 and 33).



Figure 32 : Garbage can in Airport administration office





Figure 33 : Garbage can and box lid for recycling in Airport administration office



The labels on recycling stations in the terminal and on the bins in the administration offices are the primary method to convey messaging about and instructions related to recycling. The recycling stations in the terminal are labeled for plastic, glass, paper, and cans with graphics depicting a plastic bottle, glass bottle, stack of paper and envelope, and aluminum can, respectively (Figure 34). Additional signage posted on the recycling bins alerts passengers that there is a “Water bottle refill station in the boarding area” (Figure 35).



Figure 34: Recycling station labeling





Figure 35 : Recycling station sign alerting passengers about water bottle refill station located in the boarding area (holdroom)



RDM has also installed signage in the restrooms in the non-sterile area encouraging passengers to “Reuse your water bottle” (Figures 36 and 37). These signs instruct passengers to empty their bottles pre-security and refill them post-security at the drinking fountain in the boarding area.



Figure 36 : Restroom signage encouraging passengers to reuse water bottles





Figure 37 : Restroom signage encouraging passengers to reuse water bottles (closeup)



At the Maintenance building, there are several garbage cans, including in the supervisor's office and in the breakroom. The ARFF facility has carts for waste and recyclable materials (Figure 38), and there are also several recycling bins and trash cans (Figures 39 and 40).



Figure 38: Carts for garbage and recyclables at ARFF facility





Figure 39 : Garbage cans or recycling bins in ARFF building kitchen





Figure 40 : Container for recycling beverage containers in ARFF building



A trash dumpster, cardboard dumpster, and cart for recyclables are in the GA area (Figure 41).



Figure 41 : Dumpsters and carts located in GA area

The FBO terminal has several garbage cans but no recycling bins.



The carts, dumpster, and compactor used to consolidate waste and recyclables materials generated in the terminal are positioned within a landside fenced enclosure adjacent to the terminal building (Figure 42). The four, 95-gallon carts are used for comingled recyclables, the six-yard dumpster for cardboard, and the 20-yard compactor for waste. Containers for glass recycling are also located in the enclosure. A second 2-yard waste dumpster is in a landside enclosure near the terminal smoking area. The waste and recycling hauler provides these containers. Access to the enclosure is restricted to specific airport staff and the contractors' collection crews. The contractor uses its own vehicles to collect the waste and recyclable materials from RDM and transfer them for processing or disposal.



Figure 42 : Carts and compactor in fenced enclosure



Waste materials (food waste and other MSW) are collected from the dumpster weekly and the compactor biweekly. These materials are transported for disposal at Deschutes County's Knott Landfill. Recyclable materials (comingled paper, plastic, and aluminum, as well as segregated glass and cardboard) are collected weekly and transported to a recycling facility at the landfill where they are sorted, compressed into bales, marketed, and sold.

D. OPERATION AND MAINTENANCE REQUIREMENTS / ROLES AND RESPONSIBILITIES

RDM's recycling program is maintained by facilities staff, with support from Airport management personnel.

The facilities manager is primarily responsible for the recycling program, including directing housekeeping activities, adjusting the program, purchasing custodial supplies, and communicating with RDM's business coordinator about collection services.

Airport facilities staff includes six full time personnel. Facilities staff are responsible for custodial activities in specific buildings and areas, including collecting waste and recyclables from cans and bins and transferring these materials to the appropriate dumpsters. Airport facilities staff are responsible for custodial activities:

- ✓ in public spaces of the terminal
- ✓ in TSA areas
- ✓ in RDM offices
- ✓ in the SRE building
- ✓ in other Airport spaces
- ✓ on the airfield
- ✓ in GA hangars leased through Airport Administration

The Airport's terminal tenants (restaurant and shop, rental car companies, and airlines) and tenants in some of the outlying buildings (FBO and one GA hangar) are responsible for custodial activities in their areas including transferring waste to the appropriate dumpsters. The operators of the FBO, ATCT, and ARFF building are each responsible for securing their own waste and recycling services.

The Airport's business coordinator is responsible for communicating with the collection service providers and tracking program invoices. The aviation program manager is responsible for supporting the program through allocation of resources (financial and other) and for coordinating tenant leases.



High County Disposal (formerly High Desert Disposal) is the primary waste and recycling hauling contractor for RDM. High County Disposal collects garbage from RDM's dumpsters and transports this material to a transfer station for disposal at the Deschutes County's Knott Landfill. The transfer station is located approximately five miles south of the Airport, and the landfill is approximately 20 miles south of the Airport in Bend, Oregon.

High County Disposal also collects recyclable materials from RDM and transports them to one of the county's recycling facilities (located at the transfer station and the landfill) for processing. The Airport is also serviced by the parent company of High County Disposal, Bend Garbage & Recycling, for the collection of shredded paper and waste syringes. Deschutes Recycling, a sister company to High County Disposal, accepts yard waste for composting and sells compost to the public. The area does not appear to have a commercial food waste compost facility.

E. CURRENT WASTE REDUCTION, REUSE, AND RECYCLING EFFORTS

WASTE REDUCTION

Also called "waste minimization," waste reduction refers to reducing the volume of waste produced at its source. This can be accomplished through changing habits and practices, such as printing and purchasing. RDM currently employs the following practices to reduce the total amount of waste generated:

- ✓ Double sided printing in administration offices
- ✓ Email and internal websites for inter-office communication
- ✓ Shared drives for storage of documents
- ✓ Computer software to receive fax messages
- ✓ On-screen print preview and PDF printer or other electronic printing
- ✓ Outsourcing large print jobs

REUSE

In a waste management context, reuse refers to using materials and items more than once and as many times as possible before disposal. Reuse can include using items and materials for the original purpose or repurposing something for a different use. Reuse can require purchasing durable materials and items instead of disposable or single use options.



The Airport currently reuses:

- ✓ Ceramic coffee mugs and durable silverware, plates, bowls, and cups (instead of plastic, paper, or Styrofoam) in Administration breakroom
- ✓ Office supplies, including inter-office envelopes
- ✓ Towels/rags in maintenance areas
- ✓ Office furniture

RECYCLING

Using the infrastructure and resources described above, RDM currently recycles three streams: cardboard; glass; and comingled paper, plastic bottles, and aluminum cans.

Terminal tenants generate most of the cardboard in the form of shipping boxes. The paper stream includes printer paper, mail, envelopes, and other paper from the Airport Administration offices as well as paper items, such as newspapers and magazines, collected in the public areas of the passenger terminal. The plastic, aluminum, and glass streams are primarily made up of beverage containers, collected from the public areas of the passenger terminal as well as the administration offices and restaurant. Some plastic bottles and aluminum cans may be collected by employees and tenants for refund under the State's bottle bill.

CONSTRUCTION AND DEMOLITION DEBRIS, GREEN WASTE, AND OTHER WASTE

The Airport reuses and recycles the waste generated during construction projects where possible. For example, asphalt millings from a runway project were used to improve the perimeter road. Removed lighting fixtures were donated for reuse. The Airport works with the City Department of Public Works and follows the City's surplus goods policy/practices. Green waste generated from the maintenance of the property is managed on-site where possible. The Airport collects hazardous waste; used oil and filters; batteries; paint; used tires; and scrap metal for beneficial reuse, recycling, or return to supplier programs.

TENANT EFFORTS

In addition to the recycling program operated by RDM, tenants at the Airport may be recycling on their own. In some instances, these tenants may be using the Airport's bins, carts, dumpsters, and compactor.

F. TRACKING AND PERFORMANCE

The Airport does not currently track overall waste generation, recycled material volume, or other metrics. At present, RDM does not have specific waste or recycling objectives, targets, or goals.



3. WASTE AUDIT

RDM staff provided information about:

- ✓ airport buildings and facilities
- ✓ areas that generate waste
- ✓ the types of waste generated in each area
- ✓ the materials that can be recycled under the current program.

Facilities staff have informally observed passenger and employee waste and recycling related behaviors and, for this document, described generally how waste flows through the facility. The staff also described waste and recycling collection and hauling practices.

The consultant evaluated Airport information and records as well as aviation industry waste and recycling trends to identify the source, composition, and quantity of waste generated at RDM, including areas under RDM's direct control or influence. The consultant then used this information to identify opportunities to improve and monitor program effectiveness.

A. QUANTITY AND SOURCES

According to invoices provided by Airport staff, Bend Garbage & Recycling collects a 35-gallon roll cart of shredded paper approximately annually. Using conversion factors from the United States Environmental Protection Agency (EPA), this equates to approximately 8.5 pounds of paper.

According to invoices provided by Airport staff, the waste compactor serviced by High County Disposal has a capacity of 20 yards and is collected every other week. Assuming a load factor of 75 percent and based on conversion factors from the EPA, each load is estimated to contain 15 cubic yards or 4 tons of compacted municipal solid waste each collection. This totals approximately 105 tons a year. The Airport also uses a two-yard dumpster for waste; this container is serviced weekly. Based on the same load and conversion factors, this smaller container is estimated to contain 400 pounds of waste each collection for a total of 10 tons a year. Together, these dumpsters represent an annual generation of 115 tons of waste each year.

The invoices do not detail the size or collection frequency for the recycling carts and dumpsters. A representative from High County Disposal provided the following information about RDM's other waste and recycling containers' capacities and service schedules:

- ✓ Cardboard: one 6-yard dumpster; collected weekly
- ✓ Comingled recyclables: four, 95-gallon carts; collected weekly
- ✓ Glass: collected weekly



Based on a 75 percent load factor and conversion factors from the EPA, the consultant estimated that RDM recycles approximately 10 tons of cardboard and 10 tons of commingled recyclables. To estimate the annual quantity of glass recycled, information about the capacity of the glass recycling containers and their collection schedule is needed.

According to the invoices, the Airport also rented two 30-yard dumpsters for airfield waste collection and scrap metal collection in 2017. The quantity of waste generated from these occasional collection events is not included in the Airport's baseline annual generation.

Based on industry averages, the overall contribution of waste and recyclables from various areas and activities at RDM is likely similar to the distribution shown in Table 1.

Table 1: Estimated Generation at RDM by Area/Activity		
RDM Area/Activity	Estimated Percent	Estimated Weight
Deplaned	20%	27 tons
Other Airline	24%	32 tons
Administration	3%	4 tons
Public Areas	35%	48 tons
Concessions	18%	24 tons
Total	100%	135 tons

Based on this distribution, programs that focus on the airlines and public areas may represent the best opportunities to reduce waste generation and increase landfill diversion. A physical waste sort could provide more detailed information about the amount and proportion of waste generated in total and by each area, activity, tenant, etc.

Based on the waste and recycling data presented above, the Airport's current recycling rate is about 15 percent.

B. COMPOSITION

Based on the activities taking place at RDM, a varied waste stream can be expected. According to industry case studies and previous waste planning projects, an airport's waste stream is approximately 40 percent recyclable, 35 percent compostable, and 25 percent waste that cannot be recycled or composted due to current technologies and, as a result, must be placed in a landfill.

Table 2 lists each area included in the scope of this plan and the type(s) of waste likely generated there.



Table 2: Redmond Municipal Airport Waste by Area and Material

Area Material	Office Paper	Newspapers	Magazines	Plastic	Aluminum	Cardboard	Glass	Food Waste	Paper Products	Liquids	Toiletries	Packaging	Styrofoam	Metals	Deplaned Waste	Green / Yard Waste	Construction and Demolition Waste	Other Waste
Airline Terminal Building																		
Public passenger areas Curbs, ticketing lobby, restrooms, security screening queuing area, sterile gate areas, public “meet and greet” spaces, baggage claim area		x	x	x	x			x	x	x	x	x						x
Tenant areas Shops, bar/restaurant, and associated activities	x	x	x	x	x	x	x	x	x	x		x						x
Airline areas Offices, ticketing counters, gate stations, breakrooms, underwing services, and deplaned waste	x	x	x	x	x	x		x	x	x		x			x			x
Rental Car areas Offices, counters, return areas, service areas, breakrooms	x			x	x			x	x	x								x
TSA Spaces	x	x	x	x	x			x	x	x	x	x						x
Airport Administration Offices	x	x	x	x	x	x		x	x			x						x
ARFF Building	x	x	x	x	x	x	x	x	x			x						
SRE Building	x	x	x	x	x	x		x	x						x	x	x	x
Airport Maintenance Activities															x	x	x	x



A physical waste sort could provide more detailed information about the specific composition of waste at RDM. This information may include:

- ✓ the types of items included in each general category
- ✓ the contamination rate of the recycling stream (items that are not recyclable in the recycling bins)
- ✓ the recovery rate for recycling (the proportion of recyclable items that are segregated properly).

The data from a waste audit can also be used to identify opportunities to improve the composition of the waste stream (by item substitution, by improving recycling to reduce the volume of waste, etc.).

The following sections describe in more detail some of the waste and recyclable materials generated at an airport like RDM: toiletries, food and beverages at security screening, and liquids throughout the facility.

TOILETRIES, FOOD, AND BEVERAGES - TSA RESTRICTIONS

The TSA restricts the volume of liquids, gels and aerosols that can be carried onto an aircraft. Passengers are allowed three-ounce containers of toiletries in one one-quart baggie (3-1-1) in their carry-on luggage. Even though these restrictions have been in place for longer than 10 years, toiletries, beverages, and food items that do not meet the requirements are regularly found in passenger luggage during security screening.

When these items are found, the TSA gives passengers three options: pack the item in a checked bag, give the item to a non-traveling family member or friend, or forfeit the item. By law, the TSA cannot retain any items removed from passenger luggage, so items that are not repacked or handed off end up in the trash. In addition, when a restricted item is discovered in a passenger's carry-on or bag, the passenger may be subject to additional screening, which requires extra time and can interrupt the flow at a security screening checkpoint.

Some problematic items that end up in the trash at security checkpoints include: bottled water, other bottled or canned beverages, toothpaste (larger than travel size), shampoo and/or conditioner (larger than three ounces), sunscreen, and aloe gel. Some other, less obvious unallowable items are peanut butter, yogurt, applesauce, and maple syrup.

It is expected that the garbage cans and recycling station located in the security queuing area receive a fair amount of liquids and beverage containers due to TSA restrictions. These items end up in the waste stream where the liquids are difficult to manage and the containers cannot be recycled. Liquids add significant weight to the waste stream, contaminate other materials like paper, and may be rejected by a recycler, which can result in them being landfilled.



LIQUIDS

Liquids contaminate and degrade other materials within the recycling stream and add weight to recycling or waste streams where they are found. In some cases, liquids are thrown away in their containers, which means the recyclable material found in water bottles, aluminum soda cans, and plastic beverage containers is not captured for recycling.

C. PURCHASES

The Airport does not currently track the quantity and type of disposable items and supplies purchased for the facility. This information could provide insight on some of the materials coming into the Airport which will go back out as waste (other materials are brought on-site by passengers, employees, and vendors). The purchase list may include:

- ✓ items that have reusable or recyclable alternatives (foam cups)
- ✓ some items which could be eliminated (by converting paper forms to digital to reduce paper waste generated)
- ✓ some which indicate scale of the activity at the Airport (paper towel and garbage bags).



4. REVIEW OF WASTE MANAGEMENT CONTRACTS

As noted in Section 1, the FMRA lists the review of waste management contracts as an element of addressing solid waste recycling at an airport. The FAA memorandum titled “Guidance on Airport Recycling, Reuse, and Waste Reduction Plans” explains that the purpose of reviewing these contracts is to “identify opportunities for improving (waste) program scope and efficiency, as well as identify constraints.”

In general, the Airport’s contracts and leases address housekeeping requirements and related expectations for managing trash and provide limited information about recycling. These contracts and leases do not necessarily impede recycling or other waste management strategies; however, they do not explicitly require conformance with or support of the Airport’s recycling and related efforts. The following sections describe the content of various Airport contracts related to waste and recycling.

A. CUSTODIAL AND WASTE HAULING CONTRACTS

RDM does not contract for custodial services for the areas under airport control; these areas are maintained by City employees.

The City has an exclusive franchise agreement established by ordinance with High County Disposal for the collection of waste and recyclable materials. The City’s solid waste franchise ordinance outlines the responsibilities of the collection contractor, including:

- ✓ Dispose of waste at site owned and/or operated by Deschutes County
- ✓ Provide opportunity to recycle in accordance with State law and the Department of Environmental Quality (DEQ) rules
- ✓ Provide necessary collection vehicles, containers, facilities, and personnel

The Airport is also serviced by Bend Garbage & Recycling, the parent company of High County Disposal. The Airport does not have contractual agreements with High County Disposal or Bend Garbage & Recycling. The Airport is serviced by these companies under the City’s franchise agreement and ordinance.

B. TENANT LEASES AND SERVICE CONTRACTS

Two of the Airport’s agreements with tenant and service providers reference recycling or recycled products; however, the rest have basic requirements pertaining to trash removal and janitorial activities in leased areas. The Airport’s template T-hangar lease agreement (dated 2016) specifies that the hangar tenant will perform or pay for housekeeping services including trash collection and removal in the leased space. The Airport uses a template titled, “Lease for Aeronautical Use Improvements.” The lease template requires the tenant to perform maintenance including cleaning and trash collection and removal to keep the property clean and orderly.



An example agreement titled, “On-airport Rental Car Concession,” dated October 2016 stipulates that the rental car company will provide janitorial and cleaning services and supplies for the leased spaces. It also requires that the rental car company provide for “handling and disposal of all trash, garbage, recyclable material, and other refuse” generated in the tenant’s areas. This agreement explains that the City (Airport) will provide receptacles for these materials for the tenant’s use. Through the lease agreement, the rental car tenant agrees to bear any reasonable costs “associated with the implementation of any existing or future recycling program.” The tenant can also propose an alternative recycling plan for the City’s approval. The agreement also commits the tenant to undertaking “reasonable steps to minimize the impact of their operation on the environment.” Because this agreement is more recent than the other described in this section, its provisions about recycling may serve as an example for future contracts.

The Airport’s lease with one of the FBOs (dated July 2015) requires the operator to “make suitable arrangements for the storage, collection, and removal of all trash, garbage and other refuse resulting from (their) activities...in accordance with any applicable laws, ordinances, and rules and regulations of the Airport.” This lease does not specifically mention recycling. The 2003 agreement between these parties required the tenant to provide “proper containers for trash and garbage” and to “keep the lease premises free and clear of rubbish, debris, and litter at all times.”

An example agreement for commercial passenger air service dated July 2014 requires the airline to provide “arrangement for the adequate, sanitary handling and disposal of all trash, garbage, aircraft sewage, and other refuse.” This agreement explains that the City (Airport) will provide “covered metal receptacles” for these materials. No reference is made to recycling.

A 2014 addendum to the FBO’s 2010 agreement with a tenant stipulates that the tenant will provide containers for trash and garbage. Recycling is not mentioned.

The City has an intergovernmental agreement with one of the County’s fire protection organizations for ARFF services. This agreement does not specifically address waste (or recycling); however, it does detail that the organization is responsible for the maintenance of the Airport Fire Station.

The Airport has two agreements with a food and beverage service provider. The first, for food and beverage concession, specifies that the City (Airport) “will provide a common-use trash compactor or dumpsters with scheduled trash collection for the Airport tenants and concessionaries.” The concessionaire agrees to provide arrangement for the handling and disposal of trash, garbage, and other refuse and to maintain temporary collection areas in a sanitary and presentable condition. The concessionaire is required to handle waste materials to “prevent the presence of rodents” and to keep all garbage materials in durable, pest-proof, covered or lidded containers that are easily cleaned. When waste materials are transported within the Terminal, the concessionaire is required to package them in containers that prevent leaks and use only the routes established by the City (Airport). This agreement also details the concessionaire’s responsibilities as related to cooking oil/liquid grease.



The Airport's second agreement with the food and beverage service provider covers retail, coffee, and snack food concession. This second agreement includes the same language regarding use of the compactors and dumpsters, maintaining leased areas in a sanitary condition, and movement of materials. Neither agreement describes the recycling program.

The Airport's 2001 agreement with the USFS (amended in 2004 and 2011) stipulates that the tenant pays rent based on costs for janitorial services and garbage collection and removal.

The Airport's agreement with a GA tenant/aviation business requires the tenant to maintain the premises "in a neat, clean, safe, and sanitary condition" and to pay charges for utilities such as garbage collection and removal and janitorial work.

The Airport's contract with a parking management company, dated June 2011, prohibits this company from accumulating trash or waste material and requires the company to promptly dispose of materials daily. This agreement does include a clause in conformance to State law that requires the company to use recycled material where applicable, if the recycled product:

- ✓ is available
- ✓ meets standards
- ✓ can substitute for a non-recycled product
- ✓ cost does not exceed the cost of the non-recycled by more than five percent.

This agreement was the only one reviewed under this project that discussed recycled products; it may serve as an example for future contracts.

The parking agreement also includes a mechanism for the City (Airport) to reimburse the company for cost and expenses according to an operating budget; however, the line item for cleaning and janitorial supplies was listed for zero dollars in the copy provided for review under this project.

Two GA hangar leases dated 2008 and 2005, respectively, contain the same language: "Tenant shall provide proper containers for trash and garbage and shall keep the leased premises free and clear of rubbish, debris, and litter at all times." This is likely standard GA hangar tenant lease language, which does not include information about recycling.

A 2002 U.S. Government Lease for Real Property leased space at the Airport for use by the TSA. This agreement describes the services provided by the Airport, including trash removal and janitorial service and supplies. It also outlines other requirements including:

- ✓ cleaning to be completed during Airport hours
- ✓ rent to be adjusted annually based on actual janitorial costs
- ✓ the Airport to maintain the area in a clean condition and provide supplies and equipment



- ✓ daily emptying of trash receptacles, disposal of trash and garbage, and cleaning of cans used for collection of waste

C. EXPIRING LEASES AND CONTRACTS

Specific information regarding the expiration, extension and/or renewal dates of the Airport's numerous leases was not reviewed under this project. As outlined in the FAA guidance memo, "this information can signal the Airport's next opportunity to add recycling, reuse, and waste reduction objectives to existing leases and contracts."

D. FUNDING

Waste and recycling collection are funded in RDM's operating budget. RDM does not currently receive payment or rebates for recycled materials.



5. RECYCLING FEASIBILITY

Many factors impact the feasibility of recycling at RDM; some are universal, and others, specific to the facility. The following sections describe the more influential of these factors.

A. COMMITMENT AND SUPPORT

The willingness of RDM and its contractors and tenants to commit to and support the facility's recycling program are critical to the success of such a program. Without the commitment of resources such as funding, labor and time, space, and access to secure areas, a waste management program could struggle.

AIRPORT POLICY AND CONTRACTOR DEDICATION

RDM's administration has supported the recycling program in the past, and it is expected that this will continue in the foreseeable future. The administration has implemented other sustainability projects, for example, as a solar energy installation. Based on the resources allocated to these programs, the Airport Committee and City of Redmond appear to generally support recycling, practical waste management, and sustainable operations.

The City's waste management contractor is "committed to providing outstanding customer service, being recognized as leaders in our industry, and maintaining a connection (the) community of Central Oregon by supporting charitable endeavors." High Country Disposal's goal is to "continue to be on the forefront offering new programs and ways for our customers to recycle more." These commitments and goals align with continued support of the City and the Airport's recycling programs.

AIRLINE POLICIES

All four airlines that operate at RDM have established sustainability programs that include elements of waste and recycling. At least one of the airlines serving RDM separates and recycles materials deplaned from commercial service flights.

American Airlines has implemented recycling programs on the ground and in the skies. American recycles in back offices and breakrooms at their major hub at Dallas/Fort Worth International Airport, at maintenance centers, and in other offices/employee work areas. According to their website, the airline introduced the industry's first onboard recycling program and recycles aluminum cans, paper, and plastic in-flight.

During information interviews, Alaska Air staff and contractors described the process for separating recyclables in flight and during cabin cleaning activities. Alaska Airlines' environmental strategy includes working to reduce waste from flights and other facilities, including recycling and composting of coffee grounds. Alaska's 2015 goal was to increase recycling capture rate on flights from 79 percent to 85 percent. The airline specifically mentions that their recycling goals are "limited by local infrastructure as many airports and municipalities have different protocols and capabilities for co-mingled recycling." Alaska has



worked with a reuse company to salvage leather from old plane seats and reuse the material in consumer goods. The airline is also working with inflight crews to keep unused disposable items such as cups and napkins on aircraft instead of returning them to the catering carts, where they are thrown away in the unstocking process. Alaska's goal is to ensure all inflight service ware items are recyclable, reusable, and/or sustainably sourced. Alaska has also taken steps to reduce dependence on printed paper using iPads, iPhones, and tailored applications ("apps") in their operations.

Per corporate policy, Delta is "committed to minimizing waste streams through diversion and re-use, waste, recycling programs, and (waste reduction)." Delta has been working to increase the number of cities where they recycle and the volume of material collected. In addition, they track employee recycling at the headquarters campus in Atlanta and upcycle life vests, carpet, and leather seat covers. Aboard Delta flights, single stream materials, including plastic, aluminum, and paper, are collected by flight attendants in designated bags. These materials are collected by cabin service and transported to designated recycling containers. Empty cans and bottles left in the beverage carts are recycled by Delta's catering partners.

United Airlines is "committed to operating sustainably and responsibly" and has recycled over 28 million pounds of aluminum cans, paper, and plastic from flights and facilities. In 2014, United began to replace its hot beverage cups with fully recyclable alternatives made from recycled plastic water bottles.

Offering recycling for deplaned waste at RDM aligns the Airport with its airline partners.

B. TECHNICAL AND ECONOMIC FACTORS

LOCAL MARKETS AND INFRASTRUCTURE

Markets for recycled materials fluctuate widely based on many factors and interactions. Local waste haulers typically accept materials that can be recycled cost-effectively in the area. Manufacturers purchasing recycled material want it to be predictable and ready for use; therefore, recycling facilities are particular about what materials they accept and prefer materials that are of high value and clean and easy to separate.



The materials listed in Table 3 are accepted under the City’s commercial recycling program. As noted above, inclusion in such programs typically indicates that the market and/or infrastructure for these materials is strong. RDM currently recycles all the materials the City’s commercial recycling program accepts.

Table 3: Materials Accepted for Residential Curbside Recycling in the City of Tulsa	
Recyclable Materials – City of Redmond Commercial Program	
Cardboard	
Tin and aluminum	
Plastic bottles, tubs, and jugs	
Mixed paper, newspaper, magazines	
Glass	
<i>Source: High Country Disposal Commercial Recycling website</i> https://highcountrydisposal.com/services-2/commercial-services/recycling-collection/	

Deschutes County operates one landfill and four transfer stations/recycling centers in the Redmond area.

LOGISTICAL CONSIDERATIONS AND CONSTRAINTS

To maintain a recycling program at RDM, certain elements must be in place. These include:

- ✓ a proactive and engaged custodial staff
- ✓ a willing and affordable hauling contractor
- ✓ space for bins, dumpsters, and compactors
- ✓ access to secure areas of the facility (including airside ramps and sterile terminal areas).

At this time, these elements appear unconstrained; additional resources including custodial labor, waste hauling services, space, and airport access are anticipated to be available to support the continuation and/or expansion of the recycling program at RDM.



CONTRACTUAL ISSUES

A detailed evaluation of the Airport's contracts is included in Section 4. Any major contractual issues with maintaining and improving the recycling program at RDM are not anticipated. RDM and the waste and recycling collection contractor will need to continue to collaborate to support the facility's recycling program.

C. RECYCLING, LANDFILL, AND ENERGY-FROM-WASTE FACILITY REQUIREMENTS

The recycling facility and landfill that accept waste from RDM have specific acceptance criteria and requirements. Adherence to these specifications protects the safety of employees handling these materials; the integrity and operation of the equipment and infrastructure used to transfer, sort, and convert these materials; and the value of the recyclable stream. Information provided by High County Disposal indicates that the glass stream collected from the Airport has included contamination (non-glass materials); this presents challenges to recycling this material.

Components that seem recyclable (plastic, glass, or metal parts) comprise some items generated at RDM; however, the recycling facility has specific material standards, so it is important that non-recyclable items are not included in the facility's recycling stream.

Waste items that may be generated at the Airport, but are prohibited at the recycling facility include:

- | | |
|-------------------------|-------------------------|
| ✓ Styrofoam | ✓ Paper/plastic cups |
| ✓ Plastic bags | ✓ Waxed cardboard |
| ✓ Saran wrap | ✓ Plastic lids and caps |
| ✓ Frozen food packaging | ✓ Liquid in container |
| ✓ Plastic clamshells | ✓ Lightbulbs |
| ✓ Bakery containers | ✓ Batteries |
| ✓ Paper/plastic plates | ✓ Other garbage |
| ✓ Paper napkins | |

Waste material that may be generated at RDM but is prohibited by the Deschutes County's Knott Landfill includes hazardous waste, radioactive waste, large batteries, paint, and C&D waste.

Some waste items cannot be recycled or landfilled, for example hazardous waste and chemicals, paint, batteries, and C&D waste. These items must be managed through hazardous waste or universal waste programs or disposed of at a specialized landfill.



COSTS

RDM strives to be as self-sustaining as feasible; therefore, it is imperative that programs implemented and maintained at the facility, including recycling, are as cost-effective as possible.

D. GUIDELINES AND POLICIES

To evaluate RDM's existing recycling plan in the context of local, state, and national requirements, the consultant reviewed federal, State of Oregon, and local waste and recycling regulations and policies/factors.

FEDERAL

At the federal level, the United States Environmental Protection Agency (EPA) is responsible for developing a solid waste management program under the Resource Conservation and Recovery Act (RCRA) and related policies and guidance. RCRA provides the framework for management of hazardous and non-hazardous waste. All generators of hazardous waste, including airports, are required to comply with RCRA and all other federal waste laws and regulations.

As described in Section 1, the FAA's definition of "airport planning" was updated in 2012 through FMRA to include planning for recycling and waste minimization. The Airport is required to address solid waste as part of airport master planning. The FAA provides guidance on airport waste and recycling in the September 2014 memo on the topic as well as in a synthesis document prepared in 2013 (both available on the FAA's website).



The EPA has developed a hierarchy of waste management strategies. This hierarchy, shown below, ranks these strategies from most- to least-environmentally preferred and places emphasis on reducing, reusing, and recycling.



In addition to the general waste management hierarchy, the EPA has also developed a preference ranking of management strategies for food waste, as shown below.



STATE

The State of Oregon's bottle bill was the first of its kind in the country and was introduced in 1971 to reduce litter. Under the current form of this law, customers pay a ten-cent deposit when they purchase soft drinks, water, and beer in metal, glass, and plastic bottles and cans. Then, customers return the empty containers to stores and centers to receive a ten-cent refund per container. This bill is administered by the Oregon Liquor Control Commission.

Outside of the bottle bill, the base recycling law is the Opportunity to Recycle Act, first passed in 1983 and last amended in 2015. The DEQ establishes Recycling and Waste Reduction administrative rules to elaborate on the Act and is responsible for regulating cities, counties, and other local governments regarding waste. The DEQ has developed a policy and integrated plan for managing waste materials, *Materials Management in Oregon: 2050 Vision and Framework for Action*.

The Opportunity to Recycle Act prioritizes certain waste management strategies over others in alignment with the hierarchy promoted by the EPA:

- ✓ Reduce
- ✓ Reuse
- ✓ Recycle
- ✓ Compost
- ✓ Energy Recovery
- ✓ Disposal

The state's material recovery rate goal is 52 percent for 2020 and 55 percent for 2025. In addition, the state's recovery rate goals for food waste, plastic waste, and carpet waste are all 25 percent by 2020. Each county (and some metropolitan areas) set their own voluntary recovery goals by statute.

To make progress under the 2050 Vision, cities of a certain size or within a certain region must implement three to five listed reduction and reuse elements. All other cities must implement a minimum number of recycling program elements, based on their size and location, chosen from the thirteen options listed in Senate Bill 263. The state's laws and plans allow the local units to implement programs to meet the statewide mandatory and individual voluntary goals.



LOCAL

Deschutes County operates one landfill, Knott Landfill, Recycling, and Transfer Facility, which is expected to reach capacity in 2029. The County has set a goal to recover 45 percent of waste generated by 2025 to reduce the amount disposed of in the landfill. As of 2018, the County has formed an advisory committee, hired a consultant, and is preparing a comprehensive solid waste management plan. The final plan may provide additional guidance and support for recycling in Redmond and at RDM.

According to the *Code of the City of Redmond*, the City's goal is to make RDM the "best airport of its size in the country." Sections 2.550 through 2.570 of the City's code describe the requirements for FBOs, airlines, charter and taxi flight operators, aircraft and parts dealer, and provider of agricultural services (crop dusting). The code also defines regulations for petroleum products sold and used at the facility, for leasing space, and for prohibiting unauthorized business as well as other aspects of the Airport's operation. The sole mention of waste or recycling appears in the section on commercial vehicle operations: drivers of commercial vehicles (car services, taxis, and courtesy vehicles) are to dispose of trash in the receptacles located on the sidewalk in the taxi parking area. Sections 2.590 through 2.588 outline the roles and responsibilities of the Airport Committee.

The *Code of the City of Redmond* includes information about garbage service in Sections 4.400 through 4.420. As outlined in the code, the City has contracted for the "exclusive right to collect, remove, and dispose of all refuse except recognized industrial by-products." The final section under the garbage heading details the City's conformance with the State's Opportunity to Recycle legislation. The City requires the collection contractor to provide recycling collection service for recyclable materials at the minimum level as required by the State or higher level as permitted by the City Council. The code specifies that the contractor's recycling program must include:

- ✓ One durable recycling container for each residential customer
- ✓ Expanded education and promotion
- ✓ Multifamily recycling
- ✓ Commercial recycling
- ✓ Recycling depots (drop-off locations)

The Code specifies that the promotion of the program is the responsibility of the contractor. However, the Code also recognizes that education on the need for recycling is a joint responsibility of the City, schools, community organizations, the contractor, the County, and other parties.

Based on the availability of residential and commercial recycling, the project team assumes the residents of the communities surrounding the airport, and therefore the employees and passengers, have been exposed to recycling, receive on-going messaging about its importance, and are generally supportive of recycling efforts.



E. OTHER INCENTIVES

As noted earlier in Section 5, most of the airlines serving RDM have recycling programs and targets. Aligning the RDM program with the airlines' practices provides the opportunity for a win-win scenario whereby the facility can reduce its environmental impact and, by helping the airlines reduce their impacts, generate goodwill with the airlines.



6. COST SAVINGS OR REVENUE GENERATION

The costs associated with a recycling program depend on available infrastructure, material markets, and the type of waste generated at a facility. These costs sometimes include capital costs for containers, landfill tipping fees, hauling costs, material rebates, and labor. An evaluation of the potential cost savings and revenue generation opportunities is required for an Airport Recycling, Reuse, and Waste Reduction Plan according to FMRA.

Airport staff provided a garbage collection expenses tracking spreadsheet for review under this project. This spreadsheet included costs for terminal waste collection, airfield waste collection, and general waste collection (specific single collection events), with the fees for collection of recyclable materials included in the waste costs. Based on data from 2015 through 2017, on average, the Airport spends approximately \$8,800 each fiscal year (July 1 to June 30) for collection of waste from the terminal. One scrap metal collection from a GA hangar conducted in August 2017 cost two thousand dollars. Calendar year 2017, the Airport spent approximately fifty dollars a month for collection of waste from the airfield. The Airport pays to have waste syringes collected from the restrooms and shredded paper collected from the offices about once a year.

To estimate approximate annual costs for recycling, information about the charges associated with the collection of the recycling dumpster and carts and other services is needed. After supplementing the information compiled and analyzed in this document, RDM can make informed solid waste management decisions over time. Using the information provided in this plan and cost information available to RDM, RDM can begin to analyze the program's financials, evaluate costs, and determine if enhancements should be implemented. If expansion of the program is not technically or economically feasible at this time, this information will help RDM determine when improvements might be feasible.



7. RECOMMENDATIONS

This section documents recommendations for the Airport, including waste reduction, reuse, and recycling strategies, based on the information presented earlier, specifically the waste audit and feasibility discussion.

A. OBJECTIVES AND TARGETS

It is recommended that the Airport set specific, measurable, achievable, realistic, and time-bound (SMART) goals for its waste and recycling program. Having an established set of objectives and targets provides a basis and foundation for subsequent activities and actions. Progress toward such goals does require tracking, but can also provide information on progress and improvements, which can be a valuable marketing and education tool.

The waste source, quantity, and composition information in Section 3 provides baseline data for establishing objectives and targets, and Section 5 describes the goal and target established by the State of Oregon. The objectives and targets derived from this information can be used to calculate target levels for RDM. A physical material sort would further inform goal-setting efforts.

These are potential objectives and targets RDM might adopt or use as inspiration for other goals:

- ✓ Recover 45 percent of waste generated by 2025
(based on Deschutes County goal, current rate is estimated at 15 percent)
- ✓ Recover 55 percent of waste generated by 2025
(based on State of Oregon goal, current rate is unknown)
- ✓ 100 percent of tenant leases include recycling provisions
- ✓ 100 percent of RDM employees completed simple training on recycling program
(more details later in this section)

In the absence of established specific objectives and targets, the following sections present general, universal recommendations for increasing recycling and reducing waste generation at an airport like RDM.

B. TRACKING AND REPORTING

As noted in Section 2, RDM does not currently track metrics associated with the waste management program. It is recommended that RDM begin to regularly estimate and track the volume of waste sent to the landfill and the volume of material collected for recycling as well as the costs associated with these services. Trends associated with waste generation, landfill, recycling, and cost can be assessed for issues or opportunities for improvement.



RDM's waste and recycling performance is not currently reported to stakeholders. It is recommended that RDM proactively provide this information to management, employees, tenants, and interested external stakeholders on a regular basis. The purposes of this reporting are:

- ✓ to remind management employees, tenants, and contractors about the recycling program
- ✓ to communicate the Airport's commitment to its recycling program and its broader commitment to sustainability
- ✓ to solicit feedback and suggestions for improving the recycling program.

The frequency of reporting is up to the Airport, but it is recommended that reporting be completed at least annually. The reporting schedule should also be updated as needed to accommodate changes to the program. The schedule is expected to initially increase in frequency as the program evolves and new strategies are implemented, and then potentially return to a lesser frequency as the program is maintained.

C. REDUCE AND REUSE

To reduce the facility's environmental impacts, RDM should focus on moving materials up the waste management hierarchy. Waste reduction is the most environmentally preferred waste management strategy as determined by the EPA. Waste reduction can be accomplished in many ways, including reusing items.

It is recommended that the Airport evaluate the following reduction and reuse strategies to determine which, if any, are feasible and prudent for implantation at RDM.

- ✓ Substituting disposable items with durable alternatives in the administration office and other staff work areas
- ✓ Reusing items and materials where possible
- ✓ Working with the restaurant tenant to donate edible food to a community food security organization
- ✓ Collecting and donating unopened food, beverage, and toiletry items subject to TSA restrictions
- ✓ Encouraging reuse by passengers, tenants, and contractors

LIQUIDS

It is expected that the garbage can located in the security queuing area receives a fair amount of liquids and beverage containers due to TSA restrictions. Unfortunately, when these materials end up in the waste stream, the liquids are difficult to manage, and the containers cannot be recycled. Liquids add significant weight to the waste stream, contaminate other materials like paper, and may be rejected by a recycler, which will result in them being landfilled.



To minimize the amount of liquid discarded in the security checkpoint area, it is recommended that RDM continue to promote emptying of water bottles in the restroom sinks and refilling post security. Existing colorful, graphic signs in the terminal restrooms encourage passengers to empty water bottles prior security and to refill them after screening. These signs are positioned above eye-level. The message might reach more passengers if the signs were lowered and supplemented, for example, with vinyl cling decals on the mirrors over the sinks and posters or other visuals in the checkpoint queuing area.

In the future, these signs could be revised to also encourage passengers to recycle disposable water bottles if they do not wish to refill them. It is further recommended that RDM make a recycling station available in the immediate proximity of the pre-security restrooms so that passengers who do empty their disposable containers in the sinks have a convenient place to recycle the items they do not wish to refill.

D. DONATION OF FOOD, BEVERAGES, AND TOILETRIES

It is recommended that RDM work with the food and beverage concessionaire to assess the possibility of donating edible food to a local food bank, soup kitchen, or shelter for distribution to the populations they serve. Feeding people is the second preferred strategy for addressing food waste according to the EPA. Federal and state laws protect organizations that donate food in good faith from liability. Some organizations will pick up food at the source which reduces the demand on the Airport and concessionaire.

It is recommended that RDM investigate the feasibility of collecting unopened bottles of water, other beverages, food and toiletries that are restricted from carry-on luggage and donating them to a local charity or other organization. These items can be very heavy and add weight to the waste stream.

In compliance with TSA requirements, these items may need to be collected prior to the security checkpoint queuing area. RDM would collect these items by locating a container at the security checkpoint and managing storage of the items until the receiving organization could collect them. To implement this recommendation, coordination between RDM, the designated receiving organization, and the TSA would be needed. An example of an Airport with such a program is McCarran International Airport in Las Vegas, Nevada.



Example Donation Collection at McCarran International Airport (LAS)



E. RECYCLE AND COMPOST

Recycling is the second preferred waste management strategy, according to the EPA, after waste reduction/reuse. Recycling allows waste items to be processed into raw materials to make new products. The FAA guidance expects an airport's recycling, reuse, and waste reduction plan to document, at a minimum, the facility's existing program to recycle paper, plastic bottles, aluminum cans, and plastic cups. The Airport recycles most of these materials as well as cardboard and glass.

PAPER

The Airport is currently recycling paper (printer paper, mail, envelopes, and other items) collected from the administration offices as well as from the terminal (newspapers and magazines). Paper is also recycled from the other Airport buildings (Maintenance and ARFF.) These paper streams are comingled with other recyclables. Bend Waste & Recycling collects shredded paper from the offices under a separate service.

Managing recyclable paper separately from plastic bottles and aluminum cans protects the value of the paper stream and increases its recycling potential by minimizing contamination from liquids and creating a stream that may not need to be sorted. It is recommended that the Airport ask Bend Waste & Recycling about adding non-shredded office paper, newspapers, or magazines to the shredded paper collection.

It is also recommended that the Airport expand the program to additional areas, including the airline and rental car company offices, and encourage increased recycling of paper by employees, tenants, and passengers. Doing so reduces the environmental impacts associated with landfilling this material and manufacturing virgin paper.



Collaborate concession tenant to evaluate adding paper items from newsstands to this program



PLASTIC BOTTLES AND ALUMINUM CANS

The Airport is currently recycling plastic bottles and aluminum cans collected in the terminal, Maintenance, and ARFF buildings. Some plastic bottles and aluminum cans may be collected by employees and tenants for refund under the State's bottle bill. Recycled plastic bottles and aluminum cans are comingled with paper.

It is recommended that the Airport continue the current program and expand to additional areas. It is also recommended that the Airport support return of containers included in the bottle bill refund program as these programs typically have a higher recovery rate than a comingled stream. Whether through recycling or return for refund, increased recovery of plastic bottles by employees, tenants, and passengers reduces the environmental impacts associated with landfilling this material and manufacturing virgin plastic.

Plastic bottles are also generated aboard commercial flights; it is recommended that the Airport collaborate and coordinate with the airlines serving RDM to evaluate adding plastic bottles from deplaned waste to this program.

PLASTIC CUPS

Plastic cups are typically generated aboard commercial flights. It is recommended that the Airport collaborate and coordinate with the airlines serving RDM to evaluate adding plastic cups from deplaned waste to the recycling program.

CARDBOARD

The Airport currently recycles cardboard collected from the terminal food and beverage tenants and the administration offices. This material is collected and managed separately from the comingled recyclable and glass streams; this protects the value of the cardboard material by creating a single material stream (more desirable because it reduced contamination from liquids and requires less processing after collection). It is recommended that the Airport continue to recycle cardboard. It is also recommended that RDM provide feedback to the tenants on the progress and performance of this program and solicit their feedback regarding improvements that could be made to increase or support their participation. Marketing this program to all the terminal tenants could result in additional participation and remind existing participants of the program's specific requirements.

GLASS

The Airport currently recycles glass collected from the terminal restaurant tenant and passengers. This material is collected and managed separately from the comingled recyclable and cardboard streams; this protects the value of the other material by reducing contamination glass. It is recommended that the Airport continue to recycle glass and work to reduce contamination in this material stream. It is also recommended that RDM provide feedback to the tenants on the progress and performance of this program and solicit their feedback regarding improvements that could be made to increase or support their participation.



OTHER RECYCLABLES

As other recyclable materials are identified in RDM's waste stream, it is recommended that the Airport work with the waste hauling contractor to design and implement strategies to separate, collect, and process these materials.

GREEN WASTE

It is recommended that the Airport evaluate how green waste is managed and explore opportunities to align the facility's practices with the waste hierarchy; for example, by reducing the generation of this material at the source (mulching lawnmowers), reusing material where possible (chipped branches as mulch), composting (via the local facility), and disposing of the material on or off site as a last resort.

FOOD WASTE COMPOSTING

According to industry case studies, food waste is typically a major component of the waste stream at an Airport (on average, 35 percent). As described in Section 5, the EPA's food recovery hierarchy assigns priority to composting of food waste over landfill of this material (after using it to feed people as discussed under **Reduce and Reuse**). Composting is the process of decomposing food and other waste into a nutritious soil additive.

Composting of food waste at RDM is largely dependent on the availability of a local composting facility interested in accepting this material. As noted in Section 2, there does not appear to be a commercial composting facility in the area.

If a composting facility is found or established in the area, RDM should evaluate implementing composting at the Airport. In a terminal, pre-consumer food waste (waste generated by food preparation activities) is generally easier to compost because restaurant employees are at a facility more frequently and on a more regular basis than passengers, so they are easier to train and educate on composting practices and requirements. The specific items accepted by a composting facility are dependent on that facility's design and the process used to break down the waste; some facilities accept all food waste (including meat and bones and breads) while others accept only vegetables and fruit.

One option for easing into composting gradually is to first implement a composting program for coffee grounds generated by restaurants in the terminal. Coffee grounds have a pleasant odor, are easily identifiable (therefore easy to separate), are typically uncontaminated by other materials, and are generated in a predictable manner and quantity. Once tenants are comfortable composting coffee grounds, other materials can be added by name (banana peels, apple cores, etc.) and/or by type (fruits, vegetables, etc.) until all food waste appropriate for composting is included.



PAPER PRODUCTS

Once a commercial composting facility is available in the area, the Airport may wish to collect paper towels and other paper products (napkins and tissues) for composting. Composting is environmentally preferred over landfilling this material.

Because the Airport's restrooms are equipped with paper towel dispensers and nearby garbage cans, the waste stream collected in these cans will primarily consist of paper towel. This stream can be expected to contain low contamination and a steady volume of material, making it an attractive material for composting.

No modifications to the paper towel dispensers or garbage bins would be needed to implement paper towel composting. Alternative bins would need to be conveniently located and clearly labeled to accept other waste generated in the restrooms that is not paper towel, and the bins reserved for paper towel should be labeled "Paper Towel Only – Collected for Composting" (or similar) to instruct use and explain how this material is managed. The Airport would also need a dedicated cart for this material and a procedure to collect and store it separately until it was collected by the waste hauling contractor for delivery to the composting facility.

F. EDUCATION AND OUTREACH

Under the existing program, education of and outreach to Airport employees, tenants, contractors and passengers is primarily accomplished through container signage in the terminal.

To supplement these efforts, it is recommended that RDM improve the in-terminal messaging for passengers and provide brief, clear instructions for recycling. Providing clear, instructional signage at the recycling stations or recycling bins can improve passenger participation and reduce contamination. See Section G below for information about signage.

It is recommended that RDM provide simple, on-going training for employees, tenants, and contractors that explains the recycling program, including its purpose and requirements. Such a training program will promote program participation and compliance, resulting in increased recycling and reduced contamination. In addition, training can designate a contact and a mechanism to receive feedback and ideas for improvement.

The format of employee training could take any number of forms, including emails, meetings, posters, etc. The content of such training should include:

- ✓ reminders about the materials that are accepted for recycling at the Airport and the location of the containers to be used for the program,
- ✓ information about purchasing requirements, and
- ✓ information about the positive effect the program is having on RDM's environmental impact.



Information and participation from the waste collection contractor should also be incorporated into the training program. In addition, different stakeholders and organizations involved in collection, housekeeping, recycling, composting, and other waste activities could also be asked to provide content or to be present during training.

It is recommended that the Airport include a brief overview of the recycling program during employee onboarding training and recurrent refresher training at regular intervals. To use employee time as effectively as possible, waste training could be combined with other trainings or meetings.

RDM should consider providing introductory level information to new tenants and provide training materials such as postings, postcards, etc. to existing tenants for use with their employees. As some airport tenants may experience significant employee turnover, providing this information on a regular basis (for example, annually) will help keep everyone up to date on the program.

Once a training and education program is implemented, it is recommended that RDM actively maintain such a program to facilitate its continued success. The content of trainings should be updated as the program changes and grows.

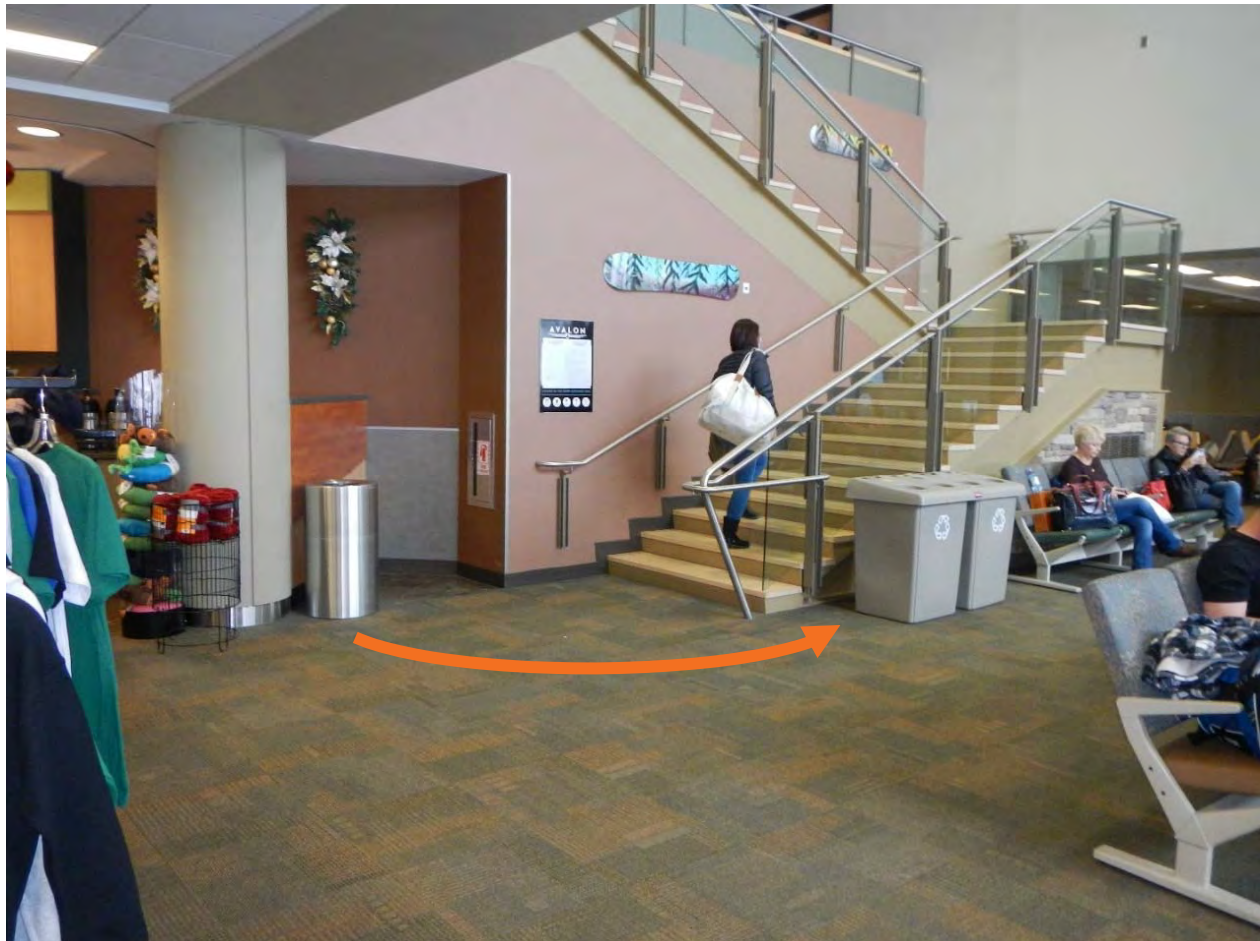
G. CONTAINERS AND BINS

The existing recycling stations in the terminal are conjoined units with four compartments, top facing signage, and restrictive lids; no changes to the design of the containers are recommended at this time. Conjoined containers ensure a consistent format at every recycling station location; top facing signage and restrictive lids have also been shown to educate and instruct passengers to separate materials appropriately. It is recommended that RDM install additional recycling stations in high traffic areas of the terminal as resources allow.

The recycling containers in other areas at the Airport are typically blue and have varying sizes and designs. No major changes are recommended to the design of these bins other than to ensure they and their service schedule are rightsized for the existing and future volume of material collected under the program and future improvements.



Collocation of recycling containers with garbage cans has been shown to decrease contamination and increase recycling participation. It is highly recommended that RDM move a garbage can next to any recycling station or container that does not currently have one paired with it (as space allows).



Move garbage cans next to recycling stations and containers

In addition, RDM should consider removing some of the stand-alone garbage cans inside the public areas of the terminal. There are many garbage cans in the terminal, and they are typically closer/more available than a recycling station; therefore, in many cases, it is more convenient for passengers, employees, and tenants to locate and use a garbage can for all materials than to find and use a recycling station. These containers could be repurposed as recycling containers in other spaces for comingled or single stream recyclables (in offices for paper, in breakrooms for bottles and cans, etc.)

The design of the garbage cans varies by location. As these containers are retired or replaced, the Airport may want to consider standardizing the shape and color of the containers to aid in recognition. It is recommended that RDM install additional recycling bins in other areas as the other areas are added to the program and resources allow.



Airport maintenance staff conduct the day to day waste activities, their insight is valuable in improving and maintaining the recycling program at RDM. Their insight on which containers are underused or undersized can help inform changes to the location and size of existing and future recycling stations, recycling containers, and garbage cans.

H. SIGNAGE AND LABELING

The Airport's recycling signage could be expanded and improved. The recycling stations in the terminal are labeled for each accepted material but RDM should consider providing additional signage adjacent to recycling stations that elaborates on the Airport's program and provides direction for passengers.

A key location for additional signage is in the security checkpoint queuing area in the terminal. As described in Section 3, the TSA restrictions compel the generation of waste, and items discovered in passenger luggage must be disposed in accordance with the agency's policies. In addition, restricted items discovered in passenger luggage by TSA can prompt additional security screening that increases congestion and wait times in the security line. Clear signage in this area would help educate passengers on the restrictions as well as their options to comply with the restrictions to reduce wait times and without throwing these items away. Signage pertaining to the emptying of liquids and refill of containers post-security is discussed above.

Signage and labeling for recycling bins in other areas of the Airport is inconsistent or absent and could be improved with color, images, and short, clear, instructive text to improve understanding of which items are recyclable and which should be thrown away.

I. OTHER RECOMMENDATIONS

In addition to the strategies recommended above, the following strategies are recommended for RDM's waste and recycling program.

CONTRACTS AND LEASES

As described in Section 4, contracts are a vehicle through which the Airport can influence tenant behavior, including recycling. As contracts and leases expire, extend, or renew, it is recommended that the Airport consider revising the new contract language to include waste management requirements or preferences, for example, support of the recycling program. This could be a general clause stating a preference that tenants reduce, reuse, and recycle where practicable or specific information about recycling, reuse, or waste reduction objectives and requirements. Two agreements reviewed for this project include language regarding conformance with the State's Opportunity to Recycle law and recycled content purchasing, respectively (see Section 4). Another approach is to update the City's Airport Ordinance to include recycling requirements and preferences and ensure each contract or lease requires adherence to these policies.



PURCHASING POLICIES AND REQUIREMENTS

The Airport's existing purchases may create waste; specific purchase information was not available for this project. It is recommended that the Airport (or City) consider adopting a purchasing policy that prioritizes items that are durable (versus disposable), reusable, recyclable, compostable, and/or made from recycled content. Once established, this policy could be shared with the Airport's tenants to encourage their own adoption of sustainability-minded purchasing practices.

ADDITIONAL FACILITIES AND NEW DEVELOPMENT

The Airport may wish to consider expanding the recycling program to additional areas, for example, in the buildings and activities that were excluded from this plan. Expanding recycling and waste reduction to areas outside the Airport's control or influence will require cooperation and collaboration with the operators of those areas as well as with their housekeeping and waste hauling contractors. Expansion could be as simple as encouraging these areas to recycle and acting as a resource for their questions or as complex as assisting these areas with an evaluation of their facility and/or container selection and signage design.

As the Airport grows and changes, it is recommended that recycling and waste management be considered as a part of designing and constructing new development projects. This could be accomplished by establishing construction specifications that outline waste management requirements or preferences for Airport projects (for example, any landfill diversion rate requirements or recycled-content material preferences) and involving the waste collection contractor in the design and planning of new facilities. The operation and maintenance of new facilities under the control or influence of RDM, once constructed, should be included in the Airport's recycling program (for example a new general aviation hangar development).

Any expansions of the existing program should be designed with care to maintain consistency and compatibility with the program in the terminal, administration offices, and other established areas.

J. CONTINUOUS IMPROVEMENT

It is recommended that RDM maintains and implements improvements to the recycling program by following the Plan Do Check Act cycle.



PLAN

The recommended strategies and supporting references make up the "plan" portion of the process. Defining success (for example, something like 45 percent recycling by 2020), establishing materials and areas of focus, collecting baseline information (waste audit, surveys, etc.), identifying sub-goals, and identifying strategies are all part of planning. In the future, additional areas of focus, baseline measurements, and goals will likely be needed.



DO

Implementation of strategies included in this plan represents the “do” portion of the process. This involves implementing the recommendations in this plan and making progress toward achieving the goals. In “doing,” the Airport will continue developing a culture of awareness for waste management and will begin to shape the practices and processes for improving and optimizing its activities associated with reduction, reuse, recycling, composting, and other waste management elements at the facility.

CHECK

As strategies are implemented, the “check” portion of the process involves reporting that requires regularly tracking and checking the progress toward meeting the goals. The Airport has finite resources (financial, staffing, capital, etc.), therefore, the management and tracking of the plan must not be unnecessarily arduous. If tracking and checking become too difficult or time consuming, the entire plan may suffer. Checking may require the Airport to develop and use tools for measuring success and identifying areas for improvement, including a mechanism for feedback and process for reviewing suggestions.

The following scenarios may trigger re-evaluation of the program and/or the constraints described in this document:

- ✓ New state recycling laws, requirements, or goals
- ✓ New RDM programs or goals
- ✓ New City of Redmond programs or goals
- ✓ New Deschutes County programs or goals
- ✓ New local infrastructure, for example, composting facility
- ✓ Changes within or expiration of franchise agreement with waste hauling contractor(s)

ACT

The “act” portion of the process encompasses taking what has been learned in the previous stages and actively responding. It can be helpful to ask, “What did we learn?” and “How can we do better next time?” By re-evaluating the strategies, activities, goals, and metrics, adjustments can be identified and put into action.

It is recommended that meetings on waste and recycling be held on a regular basis to drive the continuous improvement cycle (review the recycling program and plan and implement improvements/adjustments). It is further recommended that these meetings include a representative from each of the following areas: the waste hauling company, the airlines serving RDM, the restaurant tenant, other terminal tenants, a hangar tenant, the Redmond community, and the traveling public.



K. RECOMMENDATIONS SUMMARY

The recommendations outlined in this document do not require major capital improvements and were designed to be compatible with RDM's in-progress master plan, the existing recycling program, and other airport requirements.

Table 4 summarizes recommendations for the RDM waste and recycling program.



Table 4: Recommendations Summary
RDM Waste and Recycling Program Recommendations
Objectives and Targets - Set SMART goals (see Section 7).
Tracking and Reporting - Regularly estimate and track volume of waste to landfill, volume of material collected for recycling, recycling rate, and costs for waste and recycling services. - Assess waste generation, landfill, recycling, and cost trends for issues or opportunities for improvement. - Establish a regular reporting schedule; proactively provide information about the program.
Reduce and Reuse - Substitute disposable items with durable alternatives. - Reuse items and materials. - Continue to promote emptying of water bottles in restroom sinks and refilling post security. - o Lower and supplement water bottle emptying/refilling signs. - o Revise water bottle emptying/refilling signs to encourage recycling of disposable water bottles. - o Place a recycling station in immediate proximity of the pre-security restrooms. - Work with the restaurant tenant to donate edible food. - Collect and donate unopened food, beverage, and toiletry items. - Encourage reuse by passengers, tenants, and contractors.
Paper - Continue the paper recycling program. - Ask about adding non-shredded office paper, newspapers, and magazines to the shredded paper collection. - Expand paper recycling program to additional areas, specifically airline deplaned newspapers and magazines and expired items from the newsstand.
Plastic Bottles and Aluminum Cans, Plastic Cups - Continue the plastic bottle and aluminum can recycling program. - Expand the program to additional areas, specifically airline deplaned beverage containers. - Support the return of containers included in the bottle bill refund program. - Coordinate plastic cup recycling with the airlines serving RDM.
Cardboard - Continue the cardboard recycling program. - Provide feedback to tenants on the progress and performance of this program, solicit their feedback, and market the program to all tenants.
Glass - Continue the glass recycling program. - Work to address contamination in this material stream. - Provide feedback to tenants on the progress and performance of this program and solicit their feedback.
Other Recyclables - Work with the waste hauling contractor to design and implement strategies for other materials as they are identified in the waste stream.
Green Waste - Evaluate how this material is managed and explore opportunities to align with the EPA hierarchy.
Food Waste - If a composting facility is established in the area, evaluate composting at RDM. - o Start with coffee grounds, then expand to other pre-consumer food waste.
Paper Products - If a composting facility is established in the area, evaluate composting at RDM.
Education and Outreach - Improve in-terminal messaging for passengers. - o Provide clear, instructional signage at recycling stations. - Provide simple, on-going training for employees, tenants, and contractors.
Containers and Bins - Install additional recycling stations in high traffic areas of the terminal. - Right-size recycling bins and the service schedule in other areas. - Collocate recycling bins and garbage cans. - Remove stand-alone garbage cans in public areas of terminal. - Standardize recycling bins and garbage cans as they are retired/replaced. - Install additional recycling bins and garbage cans in other areas, as they are added to program.
Signage and Labeling - Expand and improve signage to elaborate on the program and provide direction, specifically, in the checkpoint queuing area.
Contracts and Leases - Revise new contract language or update the City Airport Ordinance to include waste management requirements/preferences.
Purchasing Policies and Requirements - Adopt a purchasing policy that prioritizes materials that are durable, reusable, recyclable, compostable, and/or made from recycled content. - o Share with tenants to encourage them to adopt their own similar practices.
Additional Facilities and New Development - Collaborate with operators of areas excluded from this plan to expand the program. - Consider recycling and waste management as part of designing and constructing new development.
Continuous Improvement - Maintain and improve the recycling and waste program according to Plan Do Check Act cycle.



8. CONCLUSION

RDM currently has a simple recycling program in place that includes basic elements and has the potential to be expanded in phases to further reduce the facility's environmental impact. This document has described the existing program and outlined recommended improvements that will allow RDM to potentially increase both landfill diversion and recycling volumes. In addition, this plan documents and supports RDM's compliance with the FMRA of 2012 and FAA guidance for recycling, reuse, and waste reduction.



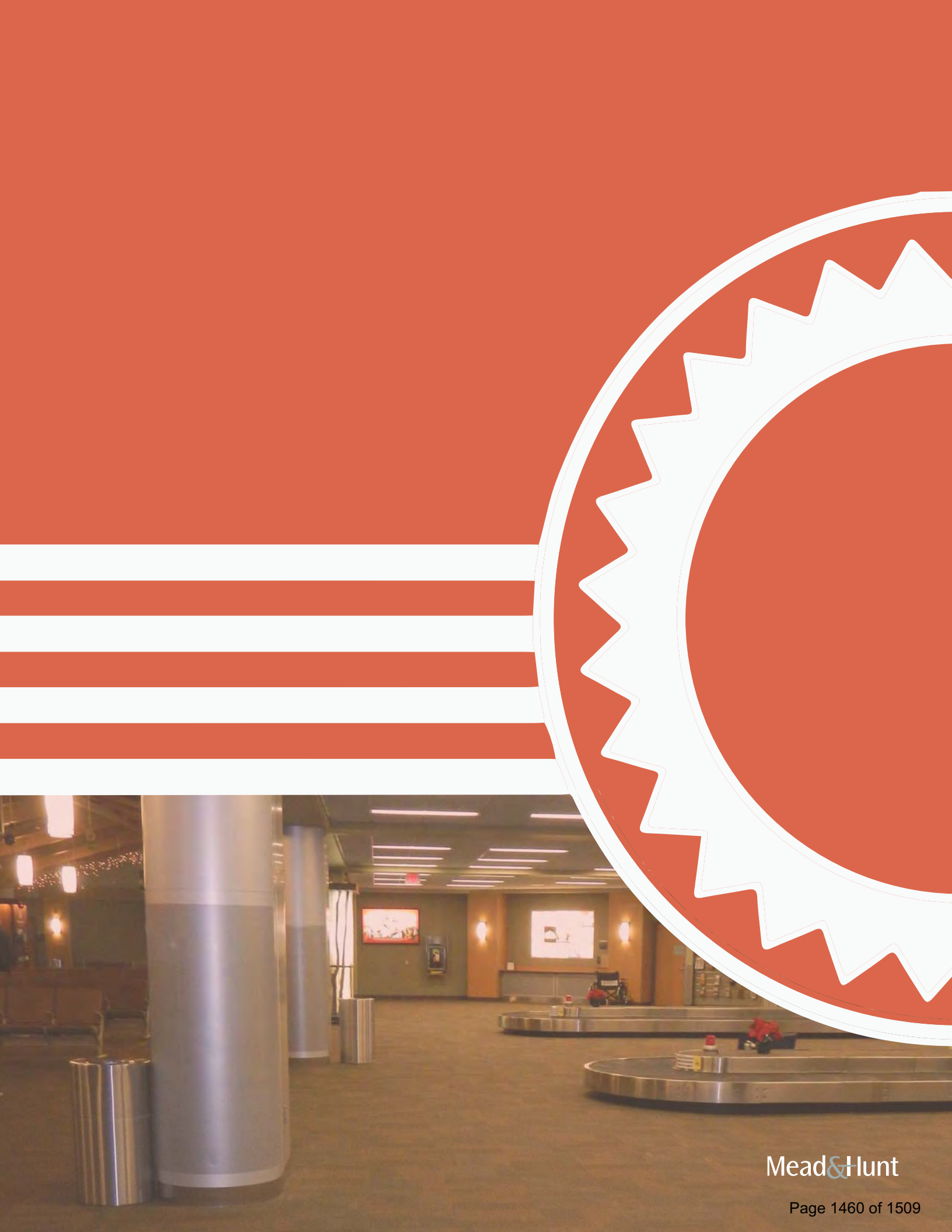
9. REFERENCES

- Atkin, P., et al., "Trash Landings: How Airlines and Airports Can Clean Up Their Recycling Programs," National Resources Defense Council, New York, N.Y., December 2006.
- Berry, F., F. Gillhespy, and J. Rogers, *ACRP Synthesis 10: Airport Sustainability Practices*, Transportation Research Board of the National Academies, Washington, D.C., 2008.
- Black, E., "Airport Sustainable Master Plan Pilot Program," FAA, Washington, D.C., May 27, 2010 [Online]. Available: http://www.faa.gov/airports/environmental/sustainability/media/interim_guidance_sustainable_master_plan_pilot.pdf [accessed December 3, 2014].
- Buckner, K., F. Pitters., and A. Wedding, *ACRP Synthesis 81: Food and Beverage and Retail Operators: The Costs of Doing Business at Airport*, Transportation Research Board of the National Academies, Washington, D.C., 2017.
- Cascadia Consulting Group and HF&H Consultant, California Department of Resources Recycling and Recovery *Cost Study on Commercial Recycling*. January 2011.
- Cascadia Consulting Group, LeighFisher Management Consultants, and Mary Loquvam Consulting, *ACRP Report 100 Recycling Best Practices – A Guidebook for Advancing Recycling from Aircraft Cabins*, Transportation Research Board of the National Academies, Washington, D.C., 2014.
- Chicago Department of Aviation, *Sustainable Airport Manual*. Version 3.0. 2012.
- EPA, "Sustainable Management of Food." n.d. <https://www.epa.gov/sustainable-management-food>
- EPA, *Developing and Implementing an Airport Recycling Program*. April 2009.
- FAA, Office of Airports, *Recycling, Reuse, and Waste Reduction at Airports – A Synthesis Document*, April 24, 2013
- FAA, "Report on the Sustainable Master Plan Pilot Program and Lessons Learned," 2012.
- Haseman, Z., *ACRP Synthesis 42: Integrating Environmental Sustainability into Airport Contracts*, Transportation Research Board of the National Academies, Washington, D.C., 2013.
- Katzev, R. and Mishima, H.R., *The Use of Posted Feedback to Promote Recycling*. Psychological Reports, 71(1), 259-264. 1992.
- Malick, A., *ACRP Synthesis 77: Airport Sustainability Practices*, Transportation Research Board of the National Academies, Washington, D.C., 2016



- Martin-Nagle, R. and A. Klauber, *ACRP Synthesis 66: Lessons Learned from Airport Sustainability Plans*, Transportation Research Board of the National Academies, Washington, D.C., 2015.
- Ralston, Phil, "PDX Waste Management" (Presentation, Airports Going Green Conference, Chicago, IL, August 6, 2009).
- SanMartin F. and D. Rinsler, "Guidance on Airport Recycling, Reuse, and Waste Reductions Plans," FAA, September 30, 2014.
- Szczepanski, M., "Wheels Up: A Look at How U.S. Airports Manage Waste and Recycling." Waste360. December 15, 2016. <http://www.waste360.com/business-operations/wheels-look-how-us-airports-manage-waste-and-recycling>
- Werner, C.M., R. Stoll, P. Birch, and P.H. White, "Clinical Validation and Cognitive Elaboration: Signs That Encourage Sustained Recycling." *Basic and Applied Social Psychology*, 24, 185-203. 2002.





APPENDIX D:

IMPLEMENTATION PLAN



Project Title:	Terminal Phase 1A	Project Number:	
Project Description:	Environmental, design, and construction of terminal holdroom remodel and reconfiguration.		
Total Cost (2017 Dollars):	\$6,160,000	Funding Sources:	PE, Discretionary, Local
Year:	2022-2023	Phased Project	☒ Yes ☐ No
Project Components	☐	Planning	
	☒	Design	\$274,000
	☒	Environmental	\$456,000
	☒	Construction	\$5,430,000
Enabling Projects:			
Equipment Acquisition	None		
Comments:	Environment and Design phases occur in Year 1 of 2 for Terminal Phase 1B.		
Is project timeline flexible? Are any projects dependent on this project?			



Planning and Zoning

Project Conformity	☒ Conforms to existing zoning ☐ May require rezone/Comprehensive Plan amendment
Project compliance with minimum standards	☒ Yes ☐ No
Any potential controversy based on stakeholder feedback?	Stakeholders generally support the project.
Process description and duration	Phase 1 will renovate existing ground floor holdroom and includes reconfiguring the boarding corridor into extra holdroom space to increase seating capacity.

Environmental

Level of state and federal environmental review required?	The project is AIP funded and will require NEPA process. Expected to be a categorical exclusion (CatEx).
Potential complications?	FAA may potentially ask for an environmental assessment instead of a CatEx.
Cost of mitigation	Mitigation not expected.
Description of mitigation process and uncertainty	Mitigation not expected.
Process description and duration	

Design

Any pre-implementation support facility construction or site prep required?	☐ Yes ☒ No
Potential challenges of site location?	No
Are there financial and operational risks based on project scale?	
Improvement suggestions of design process	
Process description and duration	



Funding

Can the Airport fund the project in its current state?	☐ Yes ☒ No
Fiscal impact of project on immediate and ongoing Airport finances.	Project costs exceed available funds. The Airport will need to issue a bond to cover costs.
How competitive is the improvement for discretionary funding?	
How competitive is the project for FAA priority compared to other Airport CIP projects?	

Operation and Maintenance

Potential impact on airport operating costs?	Project will increase terminal footprint which will impact operating and maintenance costs.
Are additional staff needed?	Project will increase terminal footprint which may require additional maintenance and/or janitorial staff.



Project Title:	Terminal Phase 1B	Project Number:	
Project Description:	Environmental, design, and construction phases of the elevated holdroom expansion.		
Total Cost (2017 Dollars):	\$11,020,000	Funding Sources:	Discretionary, Local
Year:	2022	Phased Project	☒ Yes ☐ No
Project Components	☐	Planning	
	☒	Design	\$816,000
	☒	Environmental	\$490,000
	☒	Construction	\$9,714,000
Enabling Projects:			
Equipment Acquisition	None		
Comments:			
Is project timeline flexible? Are any projects dependent on this project?			



Planning and Zoning

Project Conformity	☒ Conforms to existing zoning ☐ May require rezone/Comprehensive Plan amendment
Project compliance with minimum standards	☒ Yes ☐ No
Any potential controversy based on stakeholder feedback?	Stakeholders generally support the project.
Process description and duration	Phase 1B will elevate the ground floor of the holdroom by 5 feet to facilitate Passenger Boarding Bridge (PBBs). This will allow PBBs to reach larger aircraft on the apron.

Environmental

Level of state and federal environmental review required?	The project is AIP funded and will require NEPA process. Expected to be a categorical exclusion (CatEx).
Potential complications?	FAA may potentially ask for an environmental assessment instead of a CatEx.
Cost of mitigation	Mitigation not expected.
Description of mitigation process and uncertainty	Mitigation not expected.
Process description and duration	

Design

Any pre-implementation support facility construction or site prep required?	☐ Yes ☒ No
Potential challenges of site location?	No
Are there financial and operational risks based on project scale?	
Improvement suggestions of design process	
Process description and duration	



Funding

Can the Airport fund the project in its current state?	☐ Yes ☒ No
Fiscal impact of project on immediate and ongoing Airport finances.	A Bond will need to be considered for the greater terminal program. The City can issue a bond that contribute to local funds to cover construction costs.
How competitive is the improvement for discretionary funding?	
How competitive is the project for FAA priority compared to other Airport CIP projects?	

Operation and Maintenance

Potential impact on airport operating costs?	Project will increase terminal footprint which will impact operating and maintenance costs.
Are additional staff needed?	Project will increase terminal footprint which may require additional maintenance and/or janitorial staff.



Project Title:	Terminal Apron Expansion	Project Number:	
Project Description:	Environmental, design, and construction phases of Terminal Apron Expansion project		
Total Cost (2017 Dollars):	\$1,998,900	Funding Sources:	PE, Local
Year:	2022-2023	Phased Project	☐ Yes ☒ No
Project Components	☐	Planning	
	☒	Design	\$118,000
	☒	Environmental	\$73,000
	☒	Construction	\$1,808,000
Enabling Projects:			
Equipment Acquisition	None		
Comments:			

Planning and Zoning

Project Conformity	☒ Conforms to existing zoning ☐ May require rezone/Comprehensive Plan amendment
Project compliance with minimum standards	☒ Yes ☐ No
Any potential controversy based on stakeholder feedback?	Stakeholders generally support the project.
Process description and duration	As the Terminal Phase 1B project will allow PBBs to reach larger aircraft on the apron, the apron expansion will increase the overall capacity of the apron.



Environmental

Level of state and federal environmental review required?	The project is AIP funded and will require NEPA process. Expected to be a categorical exclusion (CatEx).
Potential complications?	FAA may potentially ask for an environmental assessment instead of a CatEx.
Cost of mitigation	Mitigation not expected.
Description of mitigation process and uncertainty	Mitigation not expected.
Process description and duration	

Design

Any pre-implementation support facility construction or site prep required?	☐ Yes ☒ No
Potential challenges of site location?	No
Are there financial and operational risks based on project scale?	A Bond will need to be considered for the greater terminal program. The City can issue a bond that contribute to local funds to cover construction costs.
Improvement suggestions of design process	
Process description and duration	

Funding

Can the Airport fund the project in its current state?	☐ Yes ☒ No
Fiscal impact of project on immediate and ongoing Airport finances.	A Bond will need to be considered for the greater terminal program. The City can issue a bond that contribute to local funds to cover construction costs.
How competitive is the improvement for discretionary funding?	
How competitive is the project for FAA priority compared to other Airport CIP projects?	





Project Title:	Mid-term Auto Parking Phase 1	Project Number:	
Project Description:	Design and construction of 300 additional parking stalls.		
Total Cost (2017 Dollars):	\$5,205,250	Funding Sources:	Local
Year:	2024	Phased Project	☒ Yes ☐ No
Project Components	☐	Planning	
	☒	Design	
	☐	Environmental	
	☒	Construction	
Enabling Projects:			
Equipment Acquisition	None		
Comments:	This is a Non-AIP project		
Is project timeline flexible? Are there any other projects dependent on this project?			



Planning and Zoning

Project Conformity	☒ Conforms to existing zoning ☐ May require rezone/Comprehensive Plan amendment
Project compliance with minimum standards	☒ Yes ☐ No
Any potential controversy based on stakeholder feedback?	
Process description and duration	Project will require removal of the USDA building.

Environmental

Level of state and federal environmental review required?	
Potential complications?	
Cost of mitigation	
Description of mitigation process and uncertainty	
Process description and duration	

Design

Any pre-implementation support facility construction or site prep required?	☒ Yes ☐ No
Potential challenges of site location?	Project requires removal of USDA building and tenants, potential reconfiguration of traffic circulation, and stormwater considerations.
Are there financial and operational risks based on project scale?	
Improvement suggestions of design process	
Process description and duration	



Scheduled start date	2024
Expected cost	\$339,000

Funding

Can the Airport fund the project in its current state?	☐ Yes ☐ No
Fiscal impact of project on immediate and ongoing Airport finances.	
How competitive is the improvement for discretionary funding?	
How competitive is the project for FAA priority compared to other Airport CIP projects?	

Operation and Maintenance

Potential impact on airport operating costs?	
Are additional staff needed?	



Project Title:	Rehab Taxiway G Pavement	Project Number:	
Project Description:			
Total Cost (2017 Dollars):	\$3,331,333	Funding Sources:	PE, Discretionary, Local
Year:	2025	Phased Project	☐ Yes ☒ No
Project Components	☐	Planning	
	☒	Design	\$203,000
	☐	Environmental	
	☒	Construction	\$3,128,000
Enabling Projects:			
Equipment Acquisition	None		
Comments:			
Is project timeline flexible? Are there any other projects dependent on this project?	Project timeline is flexible but needs to happen sooner than later. Ongoing maintenance of existing pavement can keep it in working order, but costs will grow over time as the pavement deteriorates.		

Planning and Zoning

Project Conformity	☒ Conforms to existing zoning ☐ May require rezone/Comprehensive Plan amendment
Project compliance with minimum standards	☒ Yes ☐ No
Any potential controversy based on stakeholder feedback?	Project is not controversial.
Process description and duration	



Environmental

Level of state and federal environmental review required?	The project is AIP funded and will require NEPA process. Expected to be a categorical exclusion (CatEx).
Potential complications?	FAA may potentially ask for an environmental assessment instead of a CatEx.
Cost of mitigation	Mitigation not expected.
Description of mitigation process and uncertainty	Mitigation not expected.
Process description and duration	

Design

Any pre-implementation support facility construction or site prep required?	☐ Yes ☒ No
Potential challenges of site location?	
Are there financial and operational risks based on project scale?	Pavement rehab is a simple project and not considered a risk.
Improvement suggestions of design process	
Process description and duration	
Scheduled start date	2025
Expected cost	\$203,000

Funding

Can the Airport fund the project in its current state?	☒ Yes ☐ No
Fiscal impact of project on immediate and ongoing Airport finances.	No major financial impact.
How competitive is the improvement for discretionary funding?	The project's competitiveness depends on what the scale of the project is anticipated to be.
How competitive is the project for FAA priority compared to other Airport CIP projects?	Competitiveness depends on the condition of the pavement and the scale of rehabilitation.



Operation and Maintenance

Potential impact on airport operating costs?	Rehabilitation should reduce maintenance costs in the short term.
Are additional staff needed?	No additional staff needed.



Project Title:	Rehab Taxiway G Lighting	Project Number:	
Project Description:			
Total Cost (2017 Dollars):	\$453,300	Funding Sources:	PE, Local
Year:	2025	Phased Project	☐ Yes ☒ No
Project Components	☐	Planning	
	☒	Design	\$28,000
	☐	Environmental	
	☒	Construction	\$425,000
Enabling Projects:			
Equipment Acquisition			
Comments:			

Planning and Zoning

Project Conformity	☒ Conforms to existing zoning ☐ May require rezone/Comprehensive Plan amendment
Project compliance with minimum standards	☒ Yes ☐ No
Any potential controversy based on stakeholder feedback?	Project is not controversial.
Process description and duration	



Environmental

Level of state and federal environmental review required?	The project is AIP funded and will require NEPA process. Expected to be a categorical exclusion (CatEx).
Potential complications?	FAA may potentially ask for an environmental assessment instead of a CatEx.
Cost of mitigation	Mitigation not expected.
Description of mitigation process and uncertainty	Mitigation not expected.
Process description and duration	

Design

Any pre-implementation support facility construction or site prep required?	☐ Yes ☒ No
Potential challenges of site location?	
Are there financial and operational risks based on project scale?	Light rehabilitation is not considered a risk.
Improvement suggestions of design process	
Process description and duration	
Scheduled start date	2025
Expected cost	\$28,000



Funding

Can the Airport fund the project in its current state?	☒ Yes ☐ No
Fiscal impact of project on immediate and ongoing Airport finances.	No major financial impact.
How competitive is the improvement for discretionary funding?	The project's competitiveness depends on what the scale of the project is anticipated to be.
How competitive is the project for FAA priority compared to other Airport CIP projects?	Competitiveness depends on the condition of the lights and the scale of rehabilitation.

Operation and Maintenance

Potential impact on airport operating costs?	Rehabilitation should reduce maintenance costs in the short term.
Are additional staff needed?	No additional staff needed.



Project Title:	Mid-term Auto Parking Phase 2	Project Number:	
Project Description:	Design and construction of 200 additional parking stalls.		
Total Cost (2017 Dollars):	\$3,695,382	Funding Sources:	Local
Year:	2025	Phased Project	☐ Yes ☒ No
Project Components	☐	Planning	
	☒	Design	\$226,000
	☐	Environmental	
	☒	Construction	\$3,469,000
Enabling Projects:	Mid-term Auto Parking Phase 1		
Equipment Acquisition			
Comments:	Non-AIP project		

Planning and Zoning

Project Conformity	☐ Conforms to existing zoning ☐ May require rezone/Comprehensive Plan amendment
Project compliance with minimum standards	☐ Yes ☐ No
Any potential controversy based on stakeholder feedback?	
Process description and duration	
Scheduled start date	
Expected cost	
Is project timeline flexible? Are there any other projects dependent on this project?	



Environmental

Level of state and federal environmental review required?	
Potential complications?	
Cost of mitigation	
Description of mitigation process and uncertainty	
Process description and duration	
Scheduled start date	
Expected cost	
Is project timeline flexible? Are there any other projects dependent on this project?	

Design

Any pre-implementation support facility construction or site prep required?	☐ Yes ☐ No
Potential challenges of site location?	
Are there financial and operational risks based on project scale?	
Improvement suggestions of design process	
Process description and duration	
Scheduled start date	2025
Expected cost	\$226,000
Is project timeline flexible? Are there any other projects dependent on this project?	



Funding

Can the Airport fund the project in its current state?	☐ Yes ☐ No
Fiscal impact of project on immediate and ongoing Airport finances.	
How competitive is the improvement for discretionary funding?	
How competitive is the project for FAA priority compared to other Airport CIP projects?	

Operation and Maintenance

Potential impact on airport operating costs?	
Are additional staff needed?	



Project Title:	Northside GA Expansion	Project Number:	
Project Description:			
Total Cost (2017 Dollars):	\$2,444,692	Funding Sources:	PE, Local
Year:	2026-2027	Phased Project	☒ Yes ☐ No
Project Components	☐	Planning	
	☒	Design	\$100,000
	☒	Environmental	\$251,000
	☒	Construction	\$2,093,000
Enabling Projects:			
Equipment Acquisition	None		
Comments:			
Is project timeline flexible? Are there any other projects dependent on this project?			



Planning and Zoning

Project Conformity	☒ Conforms to existing zoning ☐ May require rezone/Comprehensive Plan amendment
Project compliance with minimum standards	☒ Yes ☐ No
Any potential controversy based on stakeholder feedback?	Have not received controversial feedback.
Process description and duration	

Environmental

Level of state and federal environmental review required?	Environmental Assessment required.
Potential complications?	
Cost of mitigation	
Description of mitigation process and uncertainty	
Process description and duration	Less than 1 year

Design

Any pre-implementation support facility construction or site prep required?	☒ Yes ☐ No
Potential challenges of site location?	Site will need to be brought to Airport grade, requiring significant earthwork and rock excavation.
Are there financial and operational risks based on project scale?	Return on investment – high costs and potentially low rate of return. Individual tenants are needed to fill spots.
Process description and duration	Less than 1 year



Funding

Can the Airport fund the project in its current state?	☒ Yes ☐ No
Fiscal impact of project on immediate and ongoing Airport finances.	There is risk in finding tenants for new facilities.
How competitive is the improvement for discretionary funding?	Very low
How competitive is the project for FAA priority compared to other Airport CIP projects?	Very low

Operation and Maintenance

Potential impact on airport operating costs?	Increase airport surfaces therefore increased workload for administrative staff.
Are additional staff needed?	No additional staff needed.



APPENDIX E:

COORDINATION AND OUTREACH SUMMARY



APPENDIX E: COORDINATION AND PUBLIC OUTREACH SUMMARY

This appendix documents the coordination and outreach efforts utilized throughout the Master Plan process. Organizations involved, dates of meetings and general feedback are noted below.

PLANNING ADVISORY COMMITTEE (PAC)

A Planning Advisory Committee (PAC) was setup to engage the input and review on working papers, materials and alternatives early in the planning process. The PAC consisted of members from the following organizations:

- ✓ Mayor of the City of Redmond
- ✓ United States Forest Service – Redmond Air Center
- ✓ Redmond Municipal Airport - Fixed Base Operators
- ✓ City of Redmond – Engineering Department
- ✓ City of Redmond – Community Development Director
- ✓ City of Bend – Business Advocate
- ✓ City of Bend – Assistant City Manager
- ✓ Prineville Airport
- ✓ Redmond Economic Development, Inc.
- ✓ Deschutes County – Emergency Services
- ✓ Deschutes County – Planning Department
- ✓ Central Oregon Visitors Association



PAC MEETINGS AND DATES

The following PAC meetings were held:

- ✓ **PAC Meeting #1:** Airport Administration Offices – November 9th, 2016
- ✓ **PAC Meeting #2:** Airport Administration Offices – February 8th, 2017
- ✓ **PAC Meeting #3:** Airport Administration Offices – June 22nd, 2017
- ✓ **PAC Meeting #4:** Airport Administration Offices – October 18th, 2017
- ✓ **PAC Meeting #5:** Airport Administration Offices – March 14th, 2018

PUBLIC OPEN HOUSES

Members of the public were invited to contribute to the planning process at two open house opportunities:

PAC MEETINGS AND DATES

The following public open houses were held:

- ✓ **Public Meeting #1:** Redmond City Hall – October 18th, 2017
- ✓ **Public Meeting #2:** Redmond City Hall – March 14th, 2018

Public Meeting #2 - March 14th, 2018



Public Meeting #2 - March 14th, 2018



ADVERTISEMENTS FOR PUBLIC OPEN HOUSES

The following public postings are examples of the advertisements used to publicize the open houses.

The screenshot shows a Facebook post from the page **RDMRedmondAirport**. The post is titled "Airport to Present Master Plan Concepts for Public Feedback" and was added 45 minutes before the screenshot. The post details a Public Open House on October 18, 2017, from 4:30 to 6:30 p.m. at Redmond City Hall, Second Floor Conference Room (411 SW 9th Street, Redmond). The purpose is to share thoughts about the airport's future. The post includes a detailed description of the open house, a call to action to stop in during the two-hour event, and contact information for the airport. Below the text is a photograph of a twin-engine propeller aircraft flying over a snow-capped mountain. At the bottom of the post, there is a calendar widget showing the event on October 18th at 4:30 PM.

RDMRedmondAirport added an event 45 mins · 🌐

Airport to Present Master Plan Concepts for Public Feedback

WHAT: Public Open House
 WHEN: October 18, 2017 4:30 to 6:30 p.m.
 WHERE: Redmond City Hall, Second Floor Conference Room
 411 SW 9th Street, Redmond
 WHY: Share your thoughts about our Airport's future!

The City of Redmond and the staff of the Redmond Airport invite you to attend a Public Open House to discuss the Airport Master Plan. The Master Plan will address proposed airport development over the next 20 years. Airport staff and planning consultants will be available to discuss aviation forecasts, needed airport facilities, and ideas for improvements that will help the Airport serve Central Oregon for years to come.

We look forward to sharing our ideas with you, and we would appreciate the opportunity to learn what you think about our community's airport and its future!

Please stop in any time during the two-hour open house. For more information, call the Airport, at (541) 504-3499, or visit the Airport's website at: <http://www.flyrdm.com/?Airport-Publications--Policies>

D OREGON AIRPORT PROUDLY SERVING CENTRAL

OCT 18 **Airport to Present Master Plan Con...**
 Wed 4:30 PM · City of Redmond, Oregon · ...
 Causes ★ Interested



THE REDMOND MUNICIPAL AIRPORT CORDIALLY INVITES YOU TO

== AIRPORT MASTER PLAN OPEN HOUSE ==

OCTOBER 18, 2017

4:30 P.M. TO 6:30 P.M.

REDMOND CITY HALL

The Airport Master Plan guides airport development over the next 20 years. Airport staff and planning consultants will be available to discuss aviation forecasts, needed airport facilities, and ideas for improvements that will help the Airport serve Central Oregon for years to come. We look forward to sharing our ideas with you, and learning what YOUR thoughts are for the future of the Redmond Municipal Airport.



FLY REDMOND

QUESTIONS ABOUT THE MASTER PLAN PROCESS? VISIT WWW.FLYRDM.COM FOR MORE INFORMATION

THE REDMOND MUNICIPAL AIRPORT CORDIALLY INVITES YOU TO

== AIRPORT MASTER PLAN OPEN HOUSE ==

MARCH 14, 2018

5:00 P.M. TO 7:00 P.M.

REDMOND CITY HALL

The Airport Master Plan guides airport development over the next 20 years. Airport staff and planning consultants will be available to discuss aviation forecasts, needed airport facilities, and ideas for improvements that will help the Airport serve Central Oregon for years to come. We look forward to sharing our ideas with you, and learning what YOUR thoughts are for the future of the Redmond Municipal Airport.



FLY REDMOND

QUESTIONS ABOUT THE MASTER PLAN PROCESS? VISIT WWW.FLYRDM.COM FOR MORE INFORMATION



APPENDIX F:

LANDSIDE DEVELOPMENT



APPENDIX F: LANDSIDE DEVELOPMENT AND OTHER SUPPORT FACILITIES

The research and analysis in this appendix identifies the facility requirements for non-aviation businesses that complement the airport operations or are appropriate for the Redmond market, given local economic conditions. Subareas described in this appendix can be viewed on Figure 3-19, contained in Chapter 3 of this Master Plan.

TARGET INDUSTRY SECTORS

Based on an analysis of the Redmond economy, several market sectors were identified as target industries for the area near the airport.

FACTORS INFLUENCING SELECTION OF TARGET INDUSTRIES

The following considerations were used in identifying target industries:

- ✓ **Existing Business Clusters.** Businesses have already agglomerated in Redmond and in the vicinity of the airport based on the collective competitive advantages of the community and sites near the airport. Existing business concentrations were inventoried and evaluated in the socioeconomic analysis in **Chapter 2**.
- ✓ **Growth Outlook.** The socioeconomic analysis further identified industries and subsectors likely to experience strong growth over the next ten years. This information was derived from Oregon Employment Department data, as well as the third-party data service *Moody's Analytics*.
- ✓ **Suitability of Site/Land Inventory.** This assessment considered the suitability of available land among airport area properties to accommodate potential uses.
- ✓ **Anecdotal Input/Stakeholder Feedback.** The proposed land use determination considered the economic development goals and objectives of the City of Redmond and the airport, input from stakeholders, and professional insights from the consultant team.



TARGET INDUSTRY SECTORS

Based on the factors identified above, the following target industries have been identified for the airport area:

- ✓ **Accommodation and Food Services.** Both anecdotal and empirical inputs suggest the “airport district” (loosely defined here as land south of OR 126 and east of US 97) would benefit from expanded support services, specifically full-service restaurants serving daytime employment and potentially an airport-oriented hotel. The district has a daytime population of almost 3,000 people (not including airport passenger throughput) and is served by only a handful of full-service restaurants.
- ✓ **Speculative Light Industrial Buildings.** The City of Redmond is almost devoid of speculative industrial space suitable to accommodate small- to medium-sized emerging businesses. Speculative industrial development would face a positive real estate climate and serve a growing need in the market. However, the extent to which this use type could be achievable with a ground lease option is less certain (many businesses would prefer to own their land).
- ✓ **Construction.** Construction is a predominant industry in Central Oregon and is expected to exhibit considerable growth over the next decade. The airport district has had success attracting construction firms. There are at least 20 construction firms in the airport district. Construction firms are also a potentially compatible use for ground lease options, as their permanent capital needs are less intensive than other industrial uses.
- ✓ **Manufacturing.** The airport district has a competitive advantage in attracting manufacturing uses interested in co-locating near Central Oregon Community College and capitalizing on the steady supply of workers coming out of its Redmond campus programs. Specifically, metals, equipment, and transportation equipment manufacturers may find opportunities. These are also uses with an established presence in the district. Food and beverage manufacturing is also a high-growth sector that has a measurable presence east of US 97.
- ✓ **Wholesalers and Warehousing.** Wholesaling is an attractive use for the airport district, given the transportation advantages in Redmond and the airport district—nearly 40 wholesaling firms are already in the airport district. Wholesalers commonly require limited investment in real property, often a simple steel or concrete tilt structure. Wholesalers also typically operate on low margins. Combined, these are factors that may make a ground lease option more attractive for this sector.
- ✓ **Public Administration.** The airport district has a clear agglomeration of institutional and public administrative uses (e.g., U.S. Forest Service). Public entities are solid targets for ground leases due to their creditworthiness, long-term functions/holding periods, and (sometimes) least-cost location selection.
- ✓ **Gas Station and Convenience Store.** Per the City of Redmond request, a gas station and convenience store is desirable to serve customers utilizing the airport, including rental car returns.



LAND USE CHARACTERISTICS OF TARGET INDUSTRY SECTORS

This section describes the range of typical building and site sizes and outlines the parking requirements for the target industry sectors.

Typical Building and Site Sizes for Target Industry Sectors

Table 1 below shows an approximate range of building and site sizes for the target industry sectors listed above. This information was derived based on the sizes of similar existing uses in the Redmond and Bend areas. Hotels generally require large buildings on lots of 2 or 3 acres to accommodate parking. The size needs of food services vary widely depending on the restaurant and building type; restaurants in strip malls, for instance, generally require less space than what is shown below for stand-alone restaurants. Large lots are typically not required for food services. Speculative light industrial buildings for emerging small- or medium-sized businesses would generally require smaller spaces than the other industrial uses, though some light industrial uses in the area require large buildings and lots of over an acre. Warehouse, wholesale, and manufacturing uses require large buildings, ranging from just over 10,000 square feet to upwards of 100,000 square feet or more in some cases, though the average size for available properties in the Redmond/Bend area falls between 10,000 and 20,000 square feet. These industrial uses require site sizes ranging from several acres to over 100 acres for large regional warehouses, distribution centers, and heavy industrial manufacturing. Public administration size requirements also vary widely depending on the use. Some public administrative uses do not require large buildings or lots, but institutional campuses may require large buildings on multi-acre properties.

Table J-1. Target Industry Typical Building and Site Sizes		
Target Industry	Typical Building Size (square feet)	Typical Lot Size (acres)
Accommodation (hotels)	30,000-50,000	2-3
Food Services (stand-alone)	2,000-8,000	0.1-0.25
Speculative Light Industrial Buildings	8,000-16,000	0.5 - 1.5
Construction	4,000-15,000	1-2
Manufacturing	10,000-30,000	3-100+
Wholesalers and Warehousing	10,000-170,000	2-100+
Public Administration	4,000-50,000	0.3-2
Gas Station & Convenience Store	800-2,400	0.5-1.5

Automobile Parking for Target Industry Sectors

Parking requirements are established in the City of Redmond Development Code section 8.0500. The City requires developments to provide minimum parking spaces based on land use. **Table J-2** summarizes parking requirements for land uses that fall within the target industry sectors. Note that some land uses demand more parking than the code minimum to meet operational needs.



Table J-2. City of Redmond Parking Requirements	
Land Use	Minimum Parking Ratio
Commercial Service and Repair	1 space per 600 square feet (sf) retail floor area
Contractor's Yard	1 space per employee or 1 space per 200 sf of office area
Eating and Drinking Establishment	1 space per 100 sf of net floor area
Equipment Rental, Sales, and Service	1 space per 600 sf of retail floor area
Espresso Stand or Booth	1 space per employee
Industrial, General, or Service Related	1 space per 800 sf
Manufacturing and Assembly	1 space per 600 sf
Motel, Hotel	1 space per room, plus 1 space for manager
Office	1 space per 300 sf net office floor area
Retail, General	1 space per 200 sf of retail floor area
Utility Facility	1 space (regardless of facility size)
Warehouse	1 space per 1,000 sf

TRANSPORTATION NEEDS FOR TARGET INDUSTRY SECTORS

All of the target industries need to provide adequate transportation access for passenger vehicles and to varying intensities of truck traffic. Efficient routes to the highway system are necessary to support freight movement associated with the target industries. The existing street network within the study area includes several minor arterial and major collector streets that provide access to the highway system. Turn lanes are generally present at major intersections, but additional turn lanes on major streets may be necessary to serve future development, and local streets may need to be widened to accommodate trucks (see Recommended Upgrades section).

UTILITY DEMANDS FOR TARGET INDUSTRY SECTORS

The target industries listed above comprise a wide range of demands on the utility systems. **Tables J-3** through **J-7** summarize minimum recommended available utility service to support industrial development.



Table J-3. Water Service Requirements for Target Industries				
Target Industry	Main Line Size¹	Fire Line Size	High Pressure Dependency	Flow Rate²
Accommodation and Food Services	6"	6"	Not Required	1200 GPD / acre
Speculative Light Industrial Buildings	6"	8"	Not Required	1500 GPD / acre
Construction	6"	6"	Not Required	500 GPD / acre
Manufacturing³	6"	10"	Not Required	1850 GPD / acre
Wholesalers and Warehousing	6"	8"	Not Required	500 GPD / acre
Public Administration	6"	6"	Not Required	1200 GPD / acre
Gas Station & Convenience Store	6"	8" ⁴	Not Required	500 GPD / acre
¹ Minimum recommended main size for domestic or process use. Utility providers typically do not install water mains smaller than 6" diameter. ² GPD / acre: Gallons per day per acre, based on gross property area ³ Excludes high water users such as food processors, etc. ⁴ Small-footprint buildings often do not include fire sprinklers. The fire line size listed applies to on-site hydrant service.				

Table J-4. Sewer Service Requirements for Target Industries		
Target Industry	Main Line Size¹	Flow Rate²
Accommodation and Food Services	8"	1200 GPD / acre
Speculative Light Industrial Buildings	8"	1500 GPD / acre
Construction	8"	500 GPD / acre
Manufacturing³	8"	1850 GPD / acre
Wholesalers and Warehousing	8"	500 GPD / acre
Public Administration	8"	1200 GPD / acre
Gas Station & Convenience Store	8"	500 GPD / acre
¹ Minimum recommended main size for sanitary sewer. Utility providers typically do not install sewer mains smaller than 8" diameter, so this is the smallest recommended line size. ² GPD / acre: Gallons per day per acre, based on gross property area ³ Excludes high water users such as food processors, etc.		

Table J-5. Telecommunications Service Requirements for Target Industries		
Target Industry	Major Communications Dependency	Fiber Optic Dependency
Accommodation and Food Services	Preferred	Preferred
Speculative Light Industrial Buildings	Preferred	Required
Construction	Preferred	Not Required
Manufacturing	Required	Preferred
Wholesalers and Warehousing	Preferred	Preferred
Public Administration	Preferred	Preferred
Gas Station & Convenience Store	Preferred	Preferred



Table J-6. Natural Gas Service Requirements for Target Industries

Target Industry	Main Line Size
Accommodation and Food Services	2"
Speculative Light Industrial Buildings	4"
Construction	2"
Manufacturing	4"
Wholesalers and Warehousing	2"
Public Administration	2"
Gas Station & Convenience Store	2"

Table J-7. Electrical Service Requirements for Target Industries

Target Industry	Minimum Service Demand ¹	Close Proximity to Substation	Redundancy Dependency
Accommodation and Food Services	0.5 MW	Preferred	Not Required
Speculative Light Industrial Buildings	0.5 MW	Preferred	Not Required
Construction	0.5 MW	Not Required	Not Required
Manufacturing	0.5 MW	Preferred	Not Required
Wholesalers and Warehousing	1 MW	Not Required	Not Required
Public Administration	0.5 MW	Preferred	Not Required
Gas Station & Convenience Store	0.2 MW	Not Required	Not Required

¹ MW: Megawatts

Stormwater at the Redmond Airport is generally managed and contained on site. Swales and ditches are generally used to direct runoff to localized low spots or subsurface infiltration galleries to be discharged via infiltration to the soil. Based on nearby existing facilities and development, we do not expect any issues for the proposed developments. All development will need to meet City of Redmond stormwater treatment regulations and Oregon Department of Environmental Quality requirements for underground injection control discharge, as applicable.

EVALUATION OF LAND SUPPLY FOR TARGET INDUSTRIES

This section assesses each landside development subarea to determine whether the existing zoning permits some or all of the target industries; characterizes parcel sizes for developable land; and identifies FAA leasehold restrictions. All subareas are depicted on **Figure 1-15** in **Chapter 1** of this Master Plan.

In all affected subareas, sites with leasehold restrictions may be less attractive to developers who prefer to own their own sites or who require a long-term lease for financing.¹ Those subareas closest to the runway are also subject to FAA Part 77 height and use restrictions that could affect future development.

¹ According to Redmond Planning Division staff, parcels denoted as having leasehold restrictions are those acquired by the City and/or County from the FAA that may not be sold. Therefore, any third-party users would need to lease the property.



North Development Parcel Subarea

The North Development Parcel Subarea consists of 134 developable acres of City-owned land, including 17 acres zoned Light Industrial (M1) land, 60 acres zoned Tourist Commercial (C5) accessible from OR 126, and 57 acres zoned Open Space Park Reserve (OSPR) at the southern end. The entire subarea is subject to leasehold restrictions. As noted above, ground leases may be viable options for wholesalers and warehouse uses, as well as construction firms. The M1 zone allows both of these uses, but light industrial users may be disinclined to develop a property that can only be leased, not purchased. The C5 and M1 areas, especially off OR 126, could be developed as restaurants (sit-down or drive-through), cafes, or diners. Brew pubs are allowed outright in C5 areas, but other bars and taverns would be a conditional use. Hotels and motels are allowed outright in the C5 zone and would be well-suited to these areas due to proximity to the highway and airport. Options are limited for the large area of OSPR land, but public facilities are permitted outright in this zone when approved in the comprehensive plan or other public facilities plans for this zone. The City has had preliminary conversations with emergency response agencies regarding use of this area for a future emergency training facility.

North Business Park Subarea

This subarea consists of 94 developable acres, with 44 acres zoned Light Industrial (M1), 17.2 acres zoned Tourist Commercial (C5), and 57 acres zoned Open Space Park Reserve (OSPR). The same potential uses would apply for the North Business Park Subarea as the North Development Parcel Subarea above. The entire subarea is subject to leasehold restrictions, so some industrial uses such as wholesale and warehouse might be viable options, while light industrial users may be less inclined to develop these properties through a ground lease. Construction firms could be a viable use for the M1 zones. Food services could be developed on M1 and C5 lots, though bars and taverns would be a conditional use in the C5 zone. As with the North Development Parcel Subarea, accommodation would be well-suited for the C5 areas because of convenient access to the highway and airport. Development options are limited in the OSPR zone, but there may be potential for public facilities in these areas. The southern portion of this subarea is being contemplated for future airport-compatible development (possible corporate, executive, and general aviation facilities) with the northern portion by OR 126 targeted for future commercial development due to its Tourist Commercial (C5) zoning designation.

South Apron Subarea

The South Apron Subarea contains 19 acres zoned Airport, and 5.8 acres zoned Light Industrial (M1), with approximately 25 acres of developed land excluding right-of-way. Twenty-three acres of this subarea, including both Airport and M1 zoned land, is part of a much larger lot owned by the City and subject to leasehold restrictions. A two-acre lot at the southwest corner of the subarea, privately owned and zoned M1, could be used for speculative Light Industrial, Warehouse, or Manufacturing that do not require large lot sizes, or food services uses, though the site is currently developed. In the Airport zone, development options are limited to uses that support and complement the airport.



West Business Park Subarea

The West Business Park contains 225 acres of land, including 193 acres zoned Light Industrial (M1), 24 acres zoned Public Facility, and 8 acres zoned Park. There are approximately 93 acres of developable land, including several vacant M1 parcels, and several acres of vacant area in the Park and Public Facility zoned lots. Most of the City-owned property is subject to leasehold restrictions (33 acres), while the remaining 8 acres is the Park-zoned property home to two City water storage tanks. There are several large vacant privately-owned Light Industrial (M1) zoned lots that could be potential sites for speculative light industrial, wholesale, warehouse, or manufacturing. Portions of these sites could also be used for accommodation, food services, or construction-related business. The PF-zoned lot along the eastern edge of the subarea could be suitable for public administration uses.

Airport Way Subarea

The Airport Way Subarea area contains 55 acres zoned Light Industrial (M1), including approximately 9 acres of developed land (City-owned but leased to Peterson Caterpillar) and 46 acres of developable land owned by the City. The City-owned property is subject to leasehold restrictions. Four of the vacant city-owned lots are over 8 acres and could be ideal spaces for wholesale warehouse uses or large construction firms that could operate under a ground lease. With several relatively large vacant lots adjacent or in close proximity to each other, this subarea could also be an opportunity for a regional warehouse distribution facility. Proximity to the railroad and surrounding industrial uses makes this area unappealing for accommodations such as hotels. Food services could be a viable option to serve employment in the area, as the area currently lacks food options, if it could be demonstrated that sufficient demand exists.

Fairgrounds Industrial Subarea

The Fairgrounds Industrial Subarea consists of 56 acres zoned Light Industrial (M1), including 41 developable acres. There are several privately-owned vacant lots of approximately 1-2 acres in size that could be used for small light industrial uses, construction firms, or food services uses to support the surrounding area. At the north end of the site is a larger vacant privately-owned site (8.8 acres) which, due to its size and zoning could be appealing for use as light industrial, wholesale warehouse, or manufacturing. The southernmost lot in this subarea is an 8-acre City-owned lot subject to leasehold restrictions. Wholesale and warehousing could be viable options for this relatively large site with a ground lease option.



DESCRIPTION OF EXISTING UTILITIES AND ROADWAYS SERVING LANDSIDE SUBAREAS

This section evaluates the existing public utilities and transportation network serving each subarea. Illustrations of existing utilities are found in ____.

North Development Parcel Subarea

- ✓ Water: This subarea is currently served by a 10-inch main along the northern boundary in Lake Road, and by a 12-inch main along the southern boundary in Veterans Way. Public mains do not traverse the interior of the subarea.
- ✓ Sewer: This subarea is currently served by an 8-inch main which transitions to a 10-inch main within Lake Road to the north, and an 8-inch main within Veterans Way to the south. Public mains do not traverse the interior of the subarea.
- ✓ Transportation: This subarea currently has no existing transportation infrastructure within its boundaries. Although OR 126 runs along a portion of the subarea, no existing connections are present. No connections to Veterans Way south of the subarea exist. To accommodate the Airport Runway Extension, plans to relocate the Airport Way/Veterans Way intersection and realign several network streets are under development by the City. These plans currently show a realignment of Veterans Way into the subarea and an extension of 9th Street southward from OR 126 through the subarea to connect with Airport Way. The 9th Street extension will be a minor arterial street that should include a three-lane cross section. Veterans Way will remain a major collector and should have a two-lane cross section with possible turn lanes at major intersections.

North Business Park Subarea

- ✓ Water: This subarea is currently served by an 18-inch main within OR 126 to the east, and within Veterans Way to the south. Public mains do not traverse the interior of the subarea.
- ✓ Sewer: This subarea is currently served by an 8-inch main within Veterans Way to the south, and a 12-inch main within OR 126 to the north.
- ✓ Transportation: This subarea is bisected by Veterans Way, which connects to OR 126 on the northern border of the subarea and US 97 to the west. Veterans Way is a major collector between Airport Way and OR 126. It has two travel lanes with a shoulder bike lane west of the intersection with Sisters Avenue, but no paved shoulders northeast of that intersection. No turn lanes are present on any portion of Veterans Way between Airport Way and OR 126. The subarea also includes local street connections to OR 126 with 10th Avenue connecting on the west side, and Sisters Avenue to Ochoco Way connecting on the east side. None of these local streets has been improved beyond a narrow two-lane paved section.



South Apron Subarea

- ✓ Water: This subarea is currently served by a 12-inch main within Airport Way, and a 10-inch main connecting to the terminal loop.
- ✓ Sewer: This subarea is served by 8-inch mains within Airport Way and the on-site access roads.
- ✓ Transportation: This subarea is served by Salmon Avenue, which connects to Airport Way. Salmon Avenue is a two-lane local street with no sidewalks, with the exception of one short segment. This site has direct access to the airport taxiways.

West Business Park Subarea

- ✓ Water: This subarea houses the existing water reservoirs at the north end of 6th Street. These reservoirs supply mains ranging from 10 to 18 inches within the subarea.
- ✓ Sewer: This subarea is served by 8-inch mains within the streets throughout the subarea.
- ✓ Transportation: This subarea has minor arterial streets along its northern boundary (Veterans Way) and eastern boundary (Airport Way). Veterans Way connects to both US 97 and OR 126 and has been constructed with a two-lane cross section that includes bike lanes but almost no sidewalks. It has no left-turn lanes at any of the local street intersections into the subarea. Airport Way connects to US 97 and has been constructed primarily with a two-lane cross section augmented with left-turn and right-turn lanes at intersecting streets. Bike lanes are part of the roadway, but pedestrian facilities only exist along some developed parcels. This subarea also includes Salmon Street, a major collector, and a local street network that serves existing development. To accommodate the Airport Runway Extension, plans to relocate the Airport Way/Veterans Way intersection and realign several network streets are under development by the City. A railroad spur from the BNSF tracks extends to the western boundary of this subarea.



Airport Way Subarea

- ✓ Water: This subarea is currently served by an 18-inch main within Airport Way.
- ✓ Sewer: This subarea is currently served by a 12-inch main within Airport Way to the east and south. Sewer flows from this subarea appear to be split between two separate main lines running north and west from the site.
- ✓ Transportation: This subarea is served by Airport Way, a minor arterial that connects southward to US 97 and northward to Veterans Way and OR 126. Airport Way has been constructed with a three-lane cross section (including bike lanes) with right-turn lanes at some intersections, but sidewalks are present on only some segments. Mt. Hood Drive was constructed as a four-lane local street eastward from Airport Way to the Fairgrounds but does not currently extend to the west, although a street stub has been constructed. The intersection of Wickiup Avenue (a local street) at Airport Way has been constructed, but no existing roadway connects to the intersection. The BNSF railroad tracks run along the western boundary, but has no existing rail spurs in this subarea.

Fairgrounds Industrial Subarea

- ✓ Water: This subarea is currently served by a 12-inch main within 19th Street, and 8-inch mains elsewhere throughout the subarea.
- ✓ Sewer: This subarea is currently served by a 12-inch main within 19th Street, and 8-inch mains elsewhere within the subarea.
- ✓ Transportation: This subarea is currently served by 19th Street, a minor arterial that connects to Airport Way approximately one-quarter mile from US 97. 19th Street has been fully constructed with a three-lane cross section, with sidewalks and bike lanes on both sides from Airport Way to Elkhorn Avenue. A network of new local streets west of 19th Street serve existing development. The BNSF railroad tracks run along the western boundary, but BNSF has no existing rail spurs in this subarea.

RECOMMENDED UPGRADES

The following recommendations are offered based on a comparison of the existing utility and transportation facilities and the corresponding demands of the target industries. In all subareas, sewer lines would need to be extended from nearby mains and stormwater management facilities would need to be constructed in conjunction with site development. Local streets should be constructed to the local industrial street standard (40-foot paved width with sidewalks) to accommodate necessary truck access for most of the target industry sectors. Improved access to OR 126 will eventually be required to accommodate future growth with any of the target industry sectors and will likely include added turn lanes and traffic signals. Turn lanes at major intersections may also be needed to serve future development.



Necessary improvements would be identified with the preparation of traffic impact studies for specific development proposals.

Specific upgrade requirements for each subarea are noted below.

- ✓ North Development Parcel Subarea: The existing water lines between Lake Road and Veterans Way are not well-connected. We recommend installing a loop system throughout the subarea to maintain necessary flows for high-demand industrial users. This subarea currently has no existing transportation infrastructure and will need to rely on the construction of new streets. Transportation improvements associated with the Airport Runway Extension will eventually provide access through the subarea. Local streets that provide direct site access will need to be constructed to the local industrial standard (40-foot paved width with sidewalks).
- ✓ North Business Park Subarea: The existing water lines between Veterans Way and OR 126 are not well-connected. We recommend installing a loop system to supply necessary flows for high-demand users. The local streets (10th Street, Sisters Avenue, Ochoco Way) need to be upgraded to the current local industrial standard (40-foot paved width with sidewalks). Veterans Way needs to be upgraded to meet the major collector standard (36-foot paved width with sidewalks). At the Veterans Way intersection with OR 126, an eastbound right-turn deceleration lane on OR 126 may be necessary as volumes increase, and separate left- and right-turn lanes may be necessary on the Veterans Way approach. Left-turn lanes on Veterans Way at other intersecting roadways may also be needed.
- ✓ South Apron Subarea: Salmon Avenue needs sidewalks on the north side of the street.
- ✓ West Business Park Subarea: Airport Way and Veterans Way need sidewalk infill, primarily along undeveloped property.
- ✓ Airport Way Subarea: Airport Way needs sidewalk infill on both sides of the street. Mt. Hood Drive needs sidewalks along both sides of the street. Wickiup Avenue needs to be constructed/upgraded to the current local industrial standard (40-foot paved width with sidewalks).
- ✓ Fairgrounds Industrial Subarea: Airport Way needs sidewalks on the south side of the street.



APPENDIX G:

NOISE INPUTS



NOISE INPUT APPENDIX

Existing (2016) and Future (2036) noise contours were generated with the FAA's Aviation Environmental Design Tool (AEDT) version 2d. Inputs were obtained from a variety of sources including, Chapter 2 *Aviation Activity Forecasts* of this Master Plan, Airport personnel, Air Traffic Control Tower personnel, published instrument procedures and traffic patterns and institutional knowledge.

The following information formed the basis of the noise contour development.

Table G-1 Activity Table 2016		
Itinerant Operations		
Category	Modeled Aircraft	Modeled Operations
Air Carrier	Q400	5,688
	CRJ-700	506
Commuter / Air Taxi	CRJ-200	4,556
Air Cargo and Forest Service	Beech 99	965
	Cessna Caravan 208	965
	BAE 146	250
	Ayres T34 Thrush	250
General Aviation	Citation II	330
	Citation V	330
	GLF6	330
	Pilatus PC-12	330
	Cessna Conquest	330
	CJ1	330
	Piaggio Avanti	330
	TBM850	330
	Lancair	2,087
	Lancair Turbine	2,087
	GASEPV	2,087
	GASEPF	2,087
Helicopter	SH-60	500
	R22	0
Military	P-3	114
	King Air 90	114
	C-130	114
TOTAL ITINERANT OPERATIONS		25,010



Local (touch-and-go) Operations		
Category	Modeled Aircraft	Modeled Operations
General Aviation		
	C-172	5,267
	Piper Seminole	5,267
	King Air 90	5,267
	Lancair	2,104
	Lancair Turbine	2,104
	GASEPV	2,104
	GASEPF	2,104
Helicopter		
	R22	4,200
Military		
	P-3	90
	King Air 90	83
	C-230	83
TOTAL TOUCH-AND-GO OPS		28,673
TOTAL AIRPORT OPERATIONS*		82,356
*Airport operations include a 2x multiplier for touch-and-go operations as one touch-and-go represents two operations for counting purposes		



Table G-2 Activity Table 2036		
Itinerant Operations		
Category	Modeled Aircraft	Modeled Operations
Air Carrier	Q400	1,000
	E175	1,000
	CRJ-900	1,000
	MRJ-90	2,400
	737-700A319	4,350
	737-700	1,800
	737-800	750
	737-900	300
	CRJ-700	0
Commuter / Air Taxi	CRJ-200	0
Air Cargo and Forest Service	Beech 99	1,050
	Cessna Caravan 208	1,050
	BAE 146	250
	Ayres T34 Thrush	250
General Aviation	Citation II	420
	Citation V	420
	GLF6	420
	Pilatus PC-12	420
	Cessna Conquest	420
	CJ1	420
	Piaggio Avanti	420
	TBM850	420
	Lancair	2,660
	Lancair Turbine	2,660
	GASEPV	2,660
	GASEPF	2,660
	SH-60	1,000
Helicopter	R22	0
	P-3	100
Military	King Air 90	100
	C-130	100
TOTAL ITINERANT OPERATIONS		30,500



Local (touch-and-go) Operations		
Category	Modeled Aircraft	Modeled Operations
General Aviation	C-172	5,330
	Piper Seminole	5,330
	King Air 90	5,330
	Lancair	2,363
	Lancair Turbine	2,363
	GASEPV	2,363
	GASEPF	2,363
Helicopter	R22	4,250
Military	P-3	83
	King Air 90	83
	C-230	83
TOTAL TOUCH-AND-GO OPS		29,939
TOTAL AIRPORT OPERATIONS*		90,377
*Airport operations include a 2x multiplier for touch-and-go operations as one touch-and-go represents two operations for counting purposes		

Table G-3 Time of Day	
Air Carrier	
Day	Night
82%	18%
Commuter / Air Taxi	
Day	Night
82%	18%
Air Cargo	
Day	Night
50%	50%
Forest Service	
Day	Night
100%	0%
General Aviation - Itinerant	
Day	Night
93%	7%
General Aviation - Local	
Day	Night
95%	5%
Helicopter	
Day	Night
100%	0%
Military	
Day	Night
95%	5%



Table G-4 Runway Use Distribution			
Commercial Arrivals			
Runway			
11	29	5	23
5%	5%	30%	60%
Commercial Departures			
Runway			
11	29	5	23
5%	5%	60%	30%
General Aviation Arrivals			
Runway			
11	29	5	23
60%	30%	5%	5%
General Aviation Departures			
Runway			
11	29	5	23
60%	30%	5%	5%

