

PREFACE

The development of this plan was guided by the Project Management Team (PMT), Technical Advisory Committee (TAC), and Public Advisory Committee (PAC). Each individual devoted a significant amount of time and effort to help develop and shape the Plan in a manner consistent with the community's vision and needs.

Project Management Team

| | |
|----------------|---|
| Nick Snead | City of Madras Community Development Director |
| Jeff Hurd | City of Madras Public Works Director |
| Gus Burrell | City of Madras City Manager |
| Michael Duncan | Associate Planner, ODOT Region 4 |

Technical Advisory Committee

| | |
|-------------------|--|
| Joel McCarroll | Traffic Manager, ODOT Region 4 |
| Bill Hilton | District Operations Coordinator, ODOT Region 4 |
| Jeff Rasmussen | Jefferson County Administrative Officer |
| Jefferson Spencer | Jefferson County Planning Director |
| Scott Edelman | Regional Representative, Oregon Department of Land Conservation and Development |
| Jackson Lester | Senior Transit Planner, Central Oregon Intergovernmental Council (Cascades East Transit) |
| Janet Brown | Madras Manager, Economic Development for Central Oregon |

Public Advisory Committee

| | |
|------------------|--|
| Tanner Stanfill | Chief of Police, Madras Police Department |
| Tom Brown | Madras City Council (former)/Planning Commission |
| Bill Montgomery | Madras City Council |
| Dallas Stovall | President, Bright Wood Corporation |
| Joel Hessel | Chair, Madras Planning Commission |
| Joe Krenowicz | Madras Planning Commission/Madras Chamber of Commerce |
| Rick Molitor | Superintendent (former), Jefferson County School District |
| Elaine Henderson | Cascades East Transit Regional Public Transit Advisory Committee |
| Stan Nowakowski | Bicycle and Pedestrian Advocate |
| Carolyn Harvey | Wellness Coordinator, Let's Talk Diversity Coalition |
| Lonny Macy | Community Planner, Confederated Tribes of Warm Springs |
| Bob Powers | Madras Resident |

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Shaniko Stages stop in Madras, c. 1910—Source: Wikimedia Commons

INTRODUCTION



Source: City of Madras Chamber of Commerce

INTRODUCTION

This Transportation System Plan (TSP) provides a vision to guide future transportation investments and policy decisions for the community of Madras. The plan has been developed through extensive coordination between local and state agencies, local and regional decision-making bodies, and the engagement of local residents and business owners. The TSP identifies and prioritizes the transportation system investments and policies needed to meet existing and future community needs. It also includes planning level costs for each of the identified projects and a recommended funding plan.

Also included are Concept Area Plans for three key growth areas within the city. The plans address the possibility of significant economic development in each area and transportation improvements needed to support future land use investments. These areas are:

- ▶ North Industrial Concept Area
- ▶ East Madras Concept Area
- ▶ South Madras Concept Area

Each area is discussed in greater detail in the Roadway and Intersection Improvement Plan.



Mt. Jefferson from Madras, source: Wikimedia Commons, User Jsayre64

>>>Background and TSP Process



The existing City TSP was adopted in 2006, and an update to the pedestrian and bicycle elements in 2012. The 2012 pedestrian and bicycle elements are incorporated into this update.

The development of this TSP was informed by a detailed technical analysis and public engagement activities that spanned nearly two years, including three public open houses and guidance from a technical and project advisory committee. The appendix contains several documents that led to the identification of the TSP projects and policies, including:

- ▶ Project Overview Memorandum
- ▶ Public Involvement Plan
- ▶ Methodology Memorandum
- ▶ Goals and Policies Memorandum
- ▶ Existing Conditions & Inventory Memorandum
- ▶ Future Conditions and Needs Memorandum
- ▶ Alternatives Analysis Memorandum
- ▶ Preferred Modal Plan Memorandum
- ▶ Public Open House Comment Report #1
- ▶ Public Open House Comment Report #2
- ▶ Public Open House Comment Report #3

>>>Plan Study Area

The TSP addresses the long-term transportation needs within the Madras Urban Growth Boundary (UGB). The UGB is shown in Figure 1.

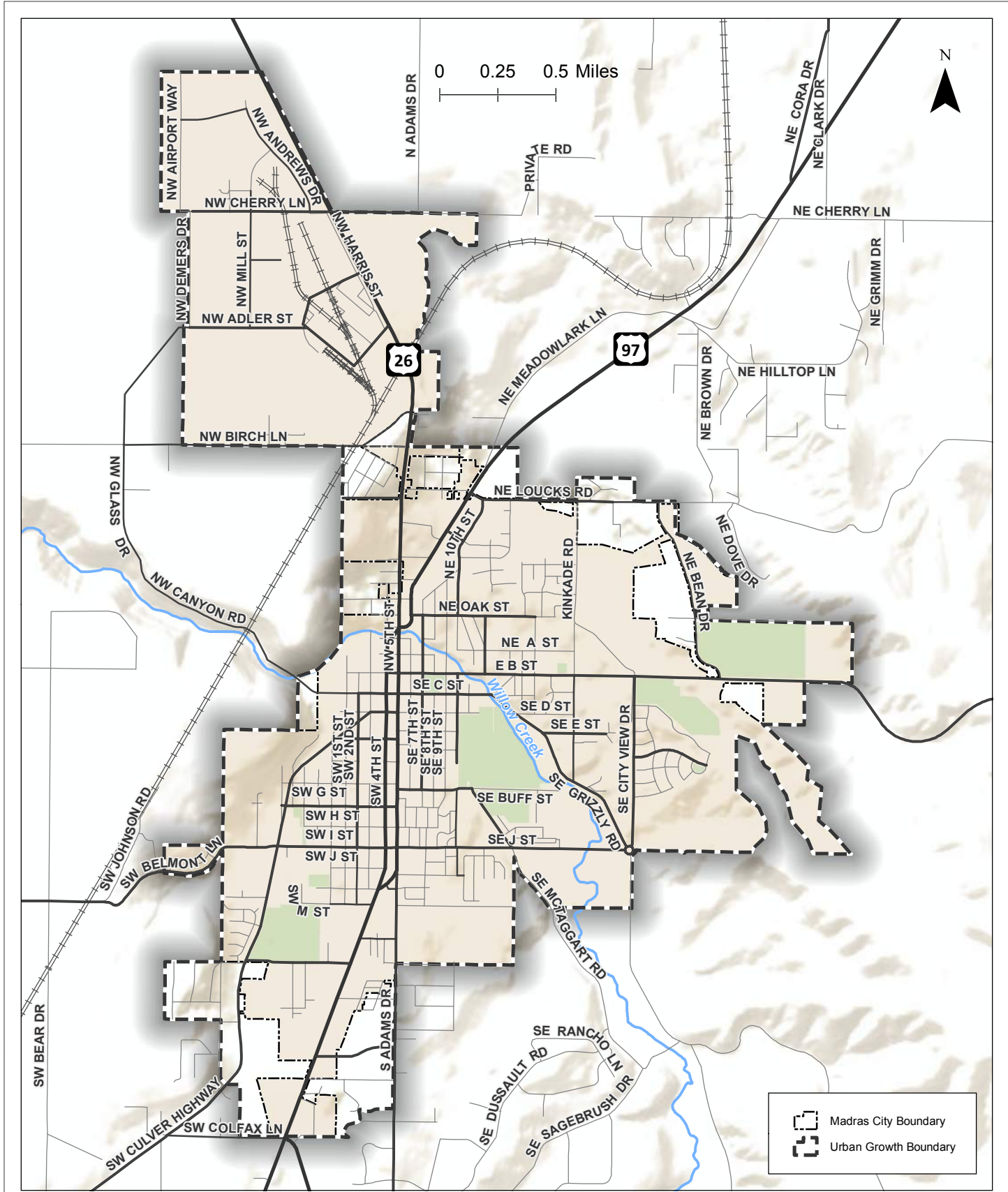
>>>Regulatory Context

The Oregon Revised Statutes require that the TSP be based on the current Comprehensive Plan land uses and that it provide for a transportation system that accommodates the expected growth in population and employment that will result from implementation of the land use plan. 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 subdivision 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.



The Erickson Aircraft Collection lands, Madras Municipal Airport, © 2014, Aircraft Owners and Pilots Association



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**Study Area
Madras, Oregon**

**Figure
1**





Public meeting, ©2016, Kittelson & Associates, Inc.

>>>Public Engagement

The planning process was guided by a Technical Advisory Committee (TAC) and Public Advisory Committee (PAC) composed of key stakeholder agencies and other community representatives. These included the following organizations:

- ▶ The local business community
- ▶ Madras City Council
- ▶ Madras City Planning Commission
- ▶ Jefferson County
- ▶ Madras Chamber of Commerce
- ▶ Jefferson County School District
- ▶ Economic Development for Central Oregon
- ▶ The local freight industry
- ▶ Jefferson County Parks and Recreation District
- ▶ Cascades East Transit (Central Oregon Intergovernmental Council)
- ▶ Bicycle and pedestrian advocates
- ▶ Confederated Tribes of Warm Springs
- ▶ Let's Talk Diversity Coalition

The TAC and PAC reviewed each of the technical memoranda and provided feedback and technical and policy direction over the course of six meetings throughout the development of the TSP.

In addition to the advisory committee meetings, three public open houses were held at key junctures in the process at the Central Oregon Community College Campus in Madras. The events were closely coordinated with the Let's Talk Diversity Coalition in Madras to ensure the forum and content were accessible to a wide range of community members. Specific effort was made to engage the Latino population, including targeted advertisement and Spanish language translations of open house materials.

Table 1: Masdras TSP Update Meetings

| Meeting | Date | Discussion Topics |
|-------------------------------|-------------------|---|
| TAC/PAC #1 | January 2016 | Goals & Objectives Plans & Policy Review |
| TAC/PAC #2 | March 2016 | Existing Conditions Inventory Existing Conditions Analysis |
| TAC/PAC #3 | May 2016 | Future Needs |
| Public Presentation #1 | June 2016 | Existing Conditions Review Future Needs Feedback |
| TAC/PAC #4 | January 2017 | Alternatives Analysis |
| Public Presentation #2 | March 2017 | Alternatives Analysis |
| TAC/PAC #5 | June 2017 | Preferred Modal Plans |
| TAC/PAC #6 | November 2017 | Draft TSP, Implementing Ordinances and Findings |
| Public Presentation #3 | Fall 2017 | Draft TSP, Implementing Ordinances and Findings |
| Adoption Hearings | Fall 2017 | Final TSP, Implementing Ordinances, and Findings |



Madras from the southeast, early 1900s—Source: Wikimedia Commons, User File Upload Bot (Magnus Maske)

PLAN & POLICY REVIEW

PLAN AND POLICY REVIEW

To ensure the Madras TSP is consistent with local, state, and federal transportation policies and standards, a number of documents related to transportation planning in Madras were reviewed. A list of reviewed documents and their relevance to the TSP are outlined in Table 2.

Table 2: Reviewed Documents and their Relevance to the TSP

| Document Name | Type |
|--|--|
| State Documents | |
| Oregon Highway Plan (OHP, with 2006 amendments) | <i>Projects, policies, and regulations proposed as part of the updated TSP reflect the policies of the Oregon Transportation Plan (OTP) and comply with or move in the direction of meeting the standards and targets established in the OHP related to safety, access, and mobility. State modal plans informed recommended improvements in the updated TSP; TSP recommendations are consistent with state policy and requirements.</i> |
| OAR chapter 734 division 051 (Access Management) | |
| Oregon Public Transportation Plan | |
| Oregon Rail Plan | |
| Oregon Bicycle/Pedestrian Plan | |
| Statewide Planning Goals (to include OAR chapter 660 division 012, known as the Transportation Planning Rule ("TPR") (including amendments adopted in December 2011) | |
| ODOT Highway Design Manual | |
| Statewide Transportation Improvement Program (STIP) | <i>The TSP update considers and includes projects that are programmed in the STIP.</i> |
| Regional Documents | |
| TRIP97 Draft Report and supporting materials | <i>This TSP includes an evaluation of the US 97 corridor based on the TRIP97 methodology. The outcomes of the TSP are not based on this analysis, but rather informed by the findings.</i> |
| ODOT Region 4 Park and Ride Lot Plan | <i>The TSP update integrates the regional transit plans and strategies identified by COIC.</i> |
| Cascades East Transit Regional Transportation Plan | |
| Central Oregon Strategic Transportation Options | |
| Central Oregon Rail Planning Summary Report | <i>This document helped inform the Madras Industrial Readiness Plan, whose outcomes were incorporated into this TSP.</i> |
| Jefferson County Coordinated Human Services Transportation Plan | <i>Jefferson County and the Confederated Tribes of Warm Springs were key partners in the development of this TSP. The proposed projects and policies were coordinated with each agency to ensure consistency and compatibility amongst the respective plans.</i> |
| Jefferson County Parks and Recreation Master Plan | |
| Jefferson County Comprehensive Plan | |
| Jefferson County TSP | |
| Jefferson County Budget | |
| Warm Springs Reservation | |
| Transportation Plan | |

CITY OF MADRAS >> TRANSPORTATION SYSTEM PLAN

| Document Name | Type |
|---|---|
| City Documents | |
| Madras Comprehensive Plan | <p><i>This TSP update considers existing City policies and planned projects as they relate to future transportation planning. Where standalone master plans exist (i.e., Madras Airport Master Plan), they are incorporated by reference into this TSP.</i></p> |
| Madras 2012 TSP | |
| Madras Airport Master Plan | |
| City of Madras Parks and Open Space Master Plan, 2009 | |
| City of Madras Urban Renewal Action Plan, 2006 | |
| City's Zoning Ordinance, No. 723 | |
| City's Subdivision Ordinance, No. 713 | |
| City's Public Improvement Design & Construction Standards, 2012 | |
| City of Madras Coordinated Population Forecast, 2006 | |
| City of Madras Urbanization Report, 2007 | |
| City of Madras Urban Reserve Report, 2008 | |
| Madras Municipal Budget – current and previous 4 years | |
| School District 509-J Facility Plan | |
| Madras Transportation TSP Methodology and Fee Schedule | |



Bicyclists near Madras, source: Travel Oregon [PHOTO NEEDS TO BE REPLACED]



The Deschutes River 12 miles below Madras, early 1900s, source: Wikimedia Commons, user: File Upload Bot (Magnus Manske)

GOALS & OBJECTIVES

GOALS AND OBJECTIVES

The following goals and objectives serve as the basis of future economic development and transportation policies and investments within Madras.



Goal 1: Mobility and Connectivity

Promote a transportation system that provides efficient connections for all users within Madras and meets existing and future mobility needs.

OBJECTIVES

- Identify the 20-year roadway system needs to accommodate developing or undeveloped areas without straining limited financial resources. Emphasis should be placed on maintenance, operations, management, and service improvements rather than large capital improvements.
- Promote a city road system that facilitates transportation for all users between various areas of the city and between principal highways.
- Promote a local road system that serves as access to commercial and residential areas.
- Preserve the function, operation, capacity, level of service, and safety of state highways and local roads in a manner consistent with adopted State of Oregon and local plans.
- Maintain roadway cross-section standards that balance the needs of all users with the primary purpose of the roadway.
- Coordinate with the Oregon Department of Transportation (ODOT) to identify and incorporate priority roadway improvements and maintenance needs.
- Improve traffic circulation within the city while considering the local character of each area.
- Update policies and standards that address street connectivity, spacing, and access management.

>>>Goal 2: Economic Development

Provide a transportation system that supports existing industry and encourages economic development and job creation in the City, especially within key development areas. Improve short- and long-term transportation infrastructure to support local and regional travel and livability.

OBJECTIVES

- Develop and promote a multimodal transportation network that supports existing industries and economic diversification in the future, especially in the downtown core.
- Identify the 20-year roadway system needs to accommodate developing or undeveloped areas without straining limited financial resources.
- Promote railroad freight service via the BNSF Railway.
- Prioritize improving and maintaining the key freight routes of US 26, US 97 and OR 361 through Madras.
- Support truck access to industrial sites, including turn and acceleration/deceleration lanes where appropriate.
- Promote and plan for future industrial, commercial, and residential growth areas.

>>>Goal 3: Safety

Provide a transportation system that improves safety and multimodal accessibility throughout the city and especially within the downtown core.

OBJECTIVES

- Promote a transportation system that facilitates safe multimodal corridors in Madras.
- Ensure existing roadways are designed, constructed, and maintained to an appropriate standard for their expected use, vehicle speeds, and vehicle traffic.
- Reduce incidence and severity of all crashes.
- Provide a transportation system that allows for adequate emergency vehicle access to all land uses.

>>>Goal 4: Multimodal Users

Provide a multimodal transportation system that permits the safe and efficient transport of people and goods through active modes.

OBJECTIVES

- Support the development of regional public transit opportunities.

- Consider bicycle and pedestrian facility needs during construction of new roads and during upgrades to existing roads.
- Review facilities for compliance with the Americans with Disabilities Act (ADA).
- Develop and promote an interconnected network of bicycle, pedestrian, and transit facilities within Madras.
- Examine the need for specific pedestrian crossing locations.

>>>Goal 5: Environment

Provide a transportation system that balances transportation services with the need to protect the environment.

OBJECTIVES

- Develop a multimodal transportation system that avoids reliance upon one form of transportation and that minimizes energy consumption and air quality impacts.
- Develop and upgrade transportation facilities in a manner consistent with the adopted OTP, the OHP, and the TPR, and ensure that valuable soil, water, scenic, historic, and cultural resources are not damaged or impaired.
- Comply with all applicable State and federal environmental regulations.

>>>Goal 6: Planning and Funding

Maintain the safety, physical integrity, and function of the City's multimodal transportation network.

OBJECTIVES

- Maintain long-term funding stability for transportation maintenance projects.
- Evaluate new, innovative funding sources for transportation improvements.
- Ensure that the existing transportation network is conserved and enhanced through maintenance and preservation.
- Continue and enhance relationships and improve coordination between the City, Jefferson County, ODOT, and the Federal Highway Administration (FHWA).
 - Cooperate with ODOT in the implementation of the STIP.
 - Encourage the improvement of state highways.
 - Encourage planning coordination between the City, the County, and the State by establishing cooperative transportation improvement programs, funding alternatives, and schedules.

- o Work with applicable jurisdictions to establish the right of way needed for new transportation facilities identified in the TSP.
- o Work with Cascades East Transit, ODOT, Jefferson County, and regional transit partners to enhance regional transit service.
- o Leverage federal and State transportation funding programs.
- o Encourage citizen involvement in identifying and solving local transportation issues.



Source: © Tom Lane

ROADWAY & INTERSECTION IMPROVEMENT PLAN

ROADWAY & INTERSECTION IMPROVEMENT PLAN

This section documents the following key projects and policies to support the TSP's roadway plan:

- ▶ Roadway improvement projects
- ▶ Intersection improvement projects
- ▶ Truck freight routes
- ▶ Roadway functional classification
- ▶ Access spacing and access management
- ▶ Mobility standards

Planned roadway and intersection improvement projects are shown in Table 2 and Table 3 as well as in Figure 3.

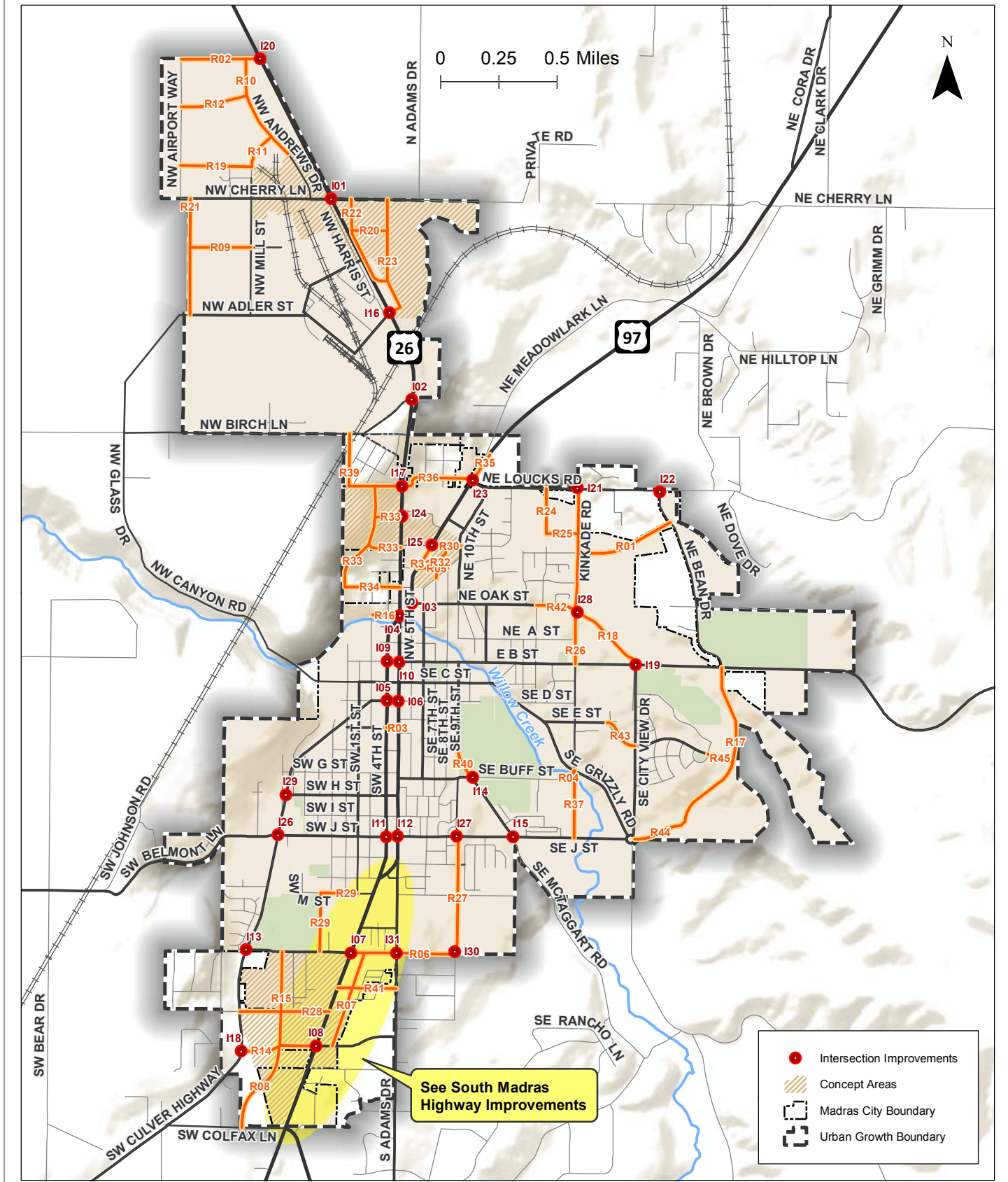
The needs analyses and public feedback revealed needs for improved connectivity within Madras, improved access to and from the highway system, and enhancements to intersections at key locations.

>>> Jefferson County Coordination

Many roadway, intersection, pedestrian, and bicycle projects identified near the edge of the Madras city limits were coordinated with Jefferson County to ensure the City and County systems are compatible and supportive of each other. Beyond city limits, the City of Madras supports Jefferson County transportation improvement projects that provide route choices for users and limit out-of-direction travel where possible. Most notably, the City supports Jefferson County's goal to provide a continuous roadway connection along the Cherry Lane corridor between US 26 and US 97.



Downtown Madras during the 2016 total solar eclipse, source: Ryan Brennecke, *The Bulletin*



Roadway and Intersection Improvement Projects
Madras, Oregon

Figure
2

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Table 3: Roadway Connection Improvement Projects

| ID | Location | Project Description | Notes | Priority | Planning Level Cost Estimate |
|-----|--|---|---|--------------------|------------------------------|
| R01 | Marigold Street Extension | Extend Marigold Street from Claremont Drive to Bean Drive | <ul style="list-style-type: none"> Improves east/west connectivity | Development Driven | \$2,000,000 |
| R02 | Future Industrial Extension | Road within Industrial Park | <ul style="list-style-type: none"> Part of Industrial Readiness Plan | Development Driven | \$1,500,000 |
| R03 | E Street Connection | Realign E Street in the vicinity of 4th Street and 5th Street to provide a continuous east/west connection | <ul style="list-style-type: none"> The location of this proposed realignment will need to be determined during project development, pending land availability and constraints | Medium | \$120,000 |
| R04 | Buff Street Extension | Extend Buff Street to Grizzly Road | <ul style="list-style-type: none"> Improves connectivity in east Madras | High | \$430,000 |
| R05 | Plum Street Extension | Extend Plum Street to Henry Street & 9th Street | <ul style="list-style-type: none"> Improves connections east of US 97 | Medium | \$590,000 |
| R06 | Fairgrounds Road Eastern Extension | Extend Fairgrounds Road to 10th Street extension | <ul style="list-style-type: none"> Enhances connectivity and route choice between US 97, Adams Drive, and 10th Street | High | \$2,300,000 |
| R07 | Hall Road to Fairgrounds Road Eastern N/S Connection | Construct new roadway between proposed Fairgrounds Road Extension (R06) and Hall Road | <ul style="list-style-type: none"> Increases north-south connectivity and provides alternative access options for businesses along US 97 | High | \$1,900,000 |
| R08 | Hall Road to Colfax Lane Connection | Construct new roadway between proposed Hall Road extension to Colfax Lane | <ul style="list-style-type: none"> Increases north-south connectivity and provides alternative access options for future development west of US 97 | Development Driven | \$2,100,000 |
| R09 | Paul Jasa Way Extension | Extend Paul Jasa Way to connect to Demers Drive | <ul style="list-style-type: none"> Timing and construction of extension will likely coincide with future development | Development Driven | \$1,100,000 |
| R10 | Andrews Drive Extension | Extend Andrews Drive to connect to future Industrial Road | <ul style="list-style-type: none"> Part of Industrial Readiness Plan | Development Driven | \$2,700,000 |
| R11 | Mill Street Extension | Extend Mill Street to connect to Andrews Drive Extension | <ul style="list-style-type: none"> Part of Industrial Readiness Plan | Development Driven | \$800,000 |
| R12 | Future Industrial Extension | Road within Industrial Park | <ul style="list-style-type: none"> Part of Industrial Readiness Plan | Development Driven | \$1,000,000 |
| R14 | Hall Road Extension | Extend Hall Rd to Culver Highway | <ul style="list-style-type: none"> Provides east-west connectivity through south Concept Area | Development Driven | \$1,700,000 |
| R15 | Hall Street-Fairgrounds Road Connection | Construct new roadway to connect Hall Rd Extension (R14) to Fairgrounds Rd | <ul style="list-style-type: none"> Provides north-south connectivity and through south Concept Area | Development Driven | \$2,100,000 |
| R16 | Maple Street Extension | Extend Maple Street west to 3rd Street extension (R10) | <ul style="list-style-type: none"> Improves connectivity around North Y intersection | High | \$260,000 |
| R17 | Southern Bean Drive Extension | Extend Bean Drive from B Street to Yarrow master plan area | <ul style="list-style-type: none"> The location of this proposed realignment will need to be determined during project development, pending review of topographical constraints and development activity in the area | Development Driven | \$4,000,000 |
| R18 | Claremont Drive Improvement | Improve Claremont Drive between B Street and future Claremont Drive/Oak Street intersection | <ul style="list-style-type: none"> Improves connectivity in east Madras | Medium | \$1,600,000 |
| R19 | Jersey Street Extension | Extend Jersey Street from Mill Street to the Wright Street Extension. Construct US 26 frontage roadway between Jersey St/Mill St intersection | <ul style="list-style-type: none"> Part of Industrial Readiness Plan | Development Driven | \$1,300,000 |
| R20 | E/W Minor Collector | Construct Minor Collector south of Cherry Lane and east of US 26 | <ul style="list-style-type: none"> Part of Industrial Readiness Plan | Development Driven | \$750,000 |
| R21 | Demers Drive Extension | Extend/improve Demers Drive between Adler St and Cherry Lane | <ul style="list-style-type: none"> Part of Industrial Readiness Plan | Development Driven | \$2,100,000 |
| R22 | Easterly US 26 Frontage Road | Construct US 26 frontage roadway between Cherry Lane and the proposed Easterly Early Street Extension | <ul style="list-style-type: none"> Timing and construction of frontage road will likely coincide with future development | Development Driven | \$1,600,000 |
| R23 | Easterly Earl Street Extension | Construct new roadway between Cherry Lane and Earl Street/US 26 intersection | <ul style="list-style-type: none"> Timing and construction of extension will likely coincide with future development | Development Driven | \$2,300,000 |
| R24 | 16th Street Extension | Extend 16th Street from Loucks Rd to Cedar Street Extension | <ul style="list-style-type: none"> Timing and construction of extension will likely coincide with future development | Development Driven | \$880,000 |

| ID | Location | Project Description | Notes | Priority | Planning Level Cost Estimate |
|-----|--|---|---|--------------------|------------------------------|
| R25 | E/W Minor Collector | New Minor Collector between Kinkade Road and 16th Street Extension | <ul style="list-style-type: none"> Timing and construction of extension will likely coincide with future development | Development Driven | \$500,000 |
| R26 | Kinkade Road/Claremont Drive Extension | Extend Kinkade Road/Claremont Drive from B Street to Loucks Drive | <ul style="list-style-type: none"> Improves north/south connectivity between Loucks Drive and J Street | High | \$2,400,000 |
| R27 | 10th Street Extension | Extend 10th Street to Fairground Road extension | <ul style="list-style-type: none"> Improves connectivity | High | \$2,200,000 |
| R28 | E/W connection between Fairgrounds Road and Hall Road | Create new E/W connection between Fairgrounds Road and Hall Road within the South Concept Area | <ul style="list-style-type: none"> The location of this proposed connection will need to be determined during project development, pending review of future development patterns Potential for providing access to US 97 and Culver Highway should be evaluated | Development Driven | \$2,000,000 |
| R29 | Fairgrounds Road to 2nd Street Connection | Construct a roadway connecting Fairgrounds Road and 2nd Street | <ul style="list-style-type: none"> Provides local street connection from South Concept Area to downtown Madras Provides highway alternative | Medium | \$1,300,000 |
| R30 | Cedar Street Western Extension | Connect Cedar Street from US 97 on the west to 10th Street on the east with a new major collector | <ul style="list-style-type: none"> Should be coordinated with improvements to the US 97/Cedar Street intersection (I25) | Medium | \$520,000 |
| R31 | US 97 Widening | Widen US 97 to 3-lane section south of Cedar Street to Plum Street | <ul style="list-style-type: none"> Provides a center turn lane to improve accessibility to local street system and businesses | High | \$300,000 |
| R32 | 8th Street Extension | Extend 8th Street to Cedar Street | <ul style="list-style-type: none"> Improves connectivity in central Concept Area | Medium | \$700,000 |
| R33 | Central Concept Area Connecting Roads | Construct roadways connecting Lee Street, US 26 and Poplar Street in the Central Concept Area | <ul style="list-style-type: none"> Improves connectivity and local access west of US 26 alignment | Development Driven | \$2,300,000 |
| R34 | Poplar Street Extension | Extend Poplar Street from 4th Street to the Central Concept Area Connecting Roads (R33) | <ul style="list-style-type: none"> Improves connectivity and local access west of US 26 alignment | Medium | \$950,000 |
| R35 | US 97 Traffic Calming | Implement speed treatments and advance warning signs on US 97 approaching Loucks Road | <ul style="list-style-type: none"> Addresses safety needs related to existing speed transition as vehicles enter Madras from north of US 97 | Medium | \$500,000 |
| R36 | Jefferson Street Realignment | Realign Jefferson Street to connect with Lee Street | <ul style="list-style-type: none"> Improves circulation between US 97 and US 26 north of the North Y Will require grade adjustment on the east side of US 26 to facilitate the realignment | Medium | \$2,000,000 |
| R37 | Kinkade Road Extension | Extend Kinkade Road from Grizzly Road to J Street | <ul style="list-style-type: none"> Improves connectivity and local access on the east side of Madras Requires crossing of Willow Creek | High | \$1,400,000 |
| R39 | Road extension from Lee Street to Birch Lane | Construct a roadway extension between Lee Street and Birch Lane and improve connectivity between central and north Madras | <ul style="list-style-type: none"> Improves local circulation and reduces highway reliance | High | \$2,000,000 |
| R40 | Realign 10th Street with McTaggart Road | Realign 10th Street to align with Buff Street/McTaggart Road intersection. A portion of the existing 10th Street alignment may be vacated or repurposed | <ul style="list-style-type: none"> Improves north/south connectivity through central Madras and consolidates intersections along Buff Street | High | \$750,000 |
| R41 | Upgrade Brush Lane to Minor Collector | Construct cross-section improvements to facility to conform with Minor Collector standard | <ul style="list-style-type: none"> Improves local circulation and reduces highway reliance | Medium | \$1,200,000 |
| R42 | Extend Oak Street from eastern terminus to Kinkade Road extension. | Construct road to Minor Collector standard | <ul style="list-style-type: none"> Improves east/west connectivity through Madras | Medium | \$600,000 |
| R43 | Extend E Street to City View Street/Yarrow Avenue | Construct road to Minor Collector standard | <ul style="list-style-type: none"> Improves east/west connectivity through Madras | Medium | \$800,000 |
| R44 | Extend J Street to Bean Drive extension. | Construct road to Major Collector standard | <ul style="list-style-type: none"> Improves connectivity within Yarrow Master Plan Area | Development Driven | \$2,000,000 |
| R45 | Extend Yarrow Avenue to Bean Drive extension. | Construct road to Major Collector standard | <ul style="list-style-type: none"> Improves connectivity within Yarrow Master Plan Area | Development Driven | \$400,000 |

Table 4: Intersection Improvement Projects

| ID | Location | Project Description | Notes | Priority | Planning Level Cost Estimate |
|-----|--|--|---|--------------------|------------------------------|
| I01 | US 26/Cherry Lane | Realign Cherry Lane to the east to eliminate intersection skew; capacity enhancements may be required in the future due to increased development east or west of the highway | <ul style="list-style-type: none"> Final design of intersection will be determined during project development phase; realignment of Cherry Lane east of US 26 may require modification to the UGB | High | \$500,000 |
| I02 | US 26/Depot Road | Upgrade intersection to address capacity needs | <ul style="list-style-type: none"> Timing and construction of intersection modifications will likely coincide with future development and potential for Depot Road extension to east | Development Driven | \$500,000 |
| I03 | US 97/Oak Street | Upgrade intersection to address capacity and safety needs | <ul style="list-style-type: none"> Timing and construction of intersection modifications will likely coincide with future development needs | Development Driven | \$500,000 |
| I04 | North Y Intersection Improvements | Upgrade intersection to address capacity and safety needs for Concept Area | <ul style="list-style-type: none"> Final decision should consider need for turn lanes from US 97 southbound to 4th Street as well as feasibility of construction of roundabout at this location | High | \$1,000,000 |
| I05 | D Street/4th Street | Upgrade intersection to address capacity and safety needs | <ul style="list-style-type: none"> Consider adding curb extensions and pedestrian countdown timers to improve pedestrian comfort, convenience and safety Capacity enhancements should focus on intersection efficiency, not intersection widening | High | \$300,000 |
| I06 | D Street/5th Street | Upgrade intersection to address capacity and safety needs | <ul style="list-style-type: none"> Final design should incorporate potential safety improvements based on crash history Capacity enhancements should focus on intersection efficiency, not intersection widening | High | \$300,000 |
| I07 | US 97/Fairgrounds | Construct intersection improvement to address capacity and safety needs for Concept Area | <ul style="list-style-type: none"> Included in South 97 Highway Alternatives | Development Driven | TBD |
| I08 | US 97/Hall Road | Construct intersection improvement to address capacity and geometric design needs for Concept Area | <ul style="list-style-type: none"> Included in South 97 Highway Alternatives | Development Driven | TBD |
| I09 | B Street/4th Street | Upgrade intersection to address safety needs | <ul style="list-style-type: none"> Final design should incorporate potential safety improvements based on crash history Capacity enhancements should focus on intersection efficiency, not intersection widening | High | \$300,000 |
| I10 | B Street/5th Street | Upgrade intersection to address safety needs | <ul style="list-style-type: none"> Final design should incorporate potential safety improvements based on crash history Capacity enhancements should focus on intersection efficiency, not intersection widening | High | \$300,000 |
| I11 | J Street/4th Street | <ul style="list-style-type: none"> Install signals at 4th Street (SB US 97) and J Street, and 5th Street (NB US 97) and J Street | <ul style="list-style-type: none"> Collectively these projects are Phase 2 of the US 97: J Street Intersection (Madras South Y) Project | High | \$1,125,000 |
| I12 | J Street/5th Street | <ul style="list-style-type: none"> Widen eastbound J Street west of SB US 97 to have sidewalk and full bike lane Construct new sidewalks and ADA ramps at the NW and SW corners of J Street and SB US 97 Reconstruct ADA ramps at the other intersection corners Construct sidewalks along west side of SB US 97 between J Street and K Street | | High | |
| I13 | Culver Highway/ Fairgrounds Road | Eliminate intersection skew angle | <ul style="list-style-type: none"> Would likely require right-of-way acquisition | Medium | \$500,000 |
| I14 | SE 10th Street, Buff Street/McTaggart Road | Construct intersection improvement that connects SE 10th Street, Buff Street and McTaggart Road | <ul style="list-style-type: none"> Consider the feasibility of a roundabout | Medium | \$1,500,000 |
| I15 | J Street/McTaggart Road | Construct intersection improvement at J Street and | <ul style="list-style-type: none"> Consider the feasibility of a roundabout | Medium | \$1,500,000 |

| ID | Location | Project Description | Notes | Priority | Planning Level Cost Estimate |
|------|---|---|--|--------------------|------------------------------|
| | | McTaggart Road | | | |
| I116 | US 26/Earl Street Concept Area Intersection Enhancements | Upgrade intersection to address capacity needs for Concept Area. Construct two parallel frontage roads between the railroad tracks and Earl Street. Current eastbound left-turn and northbound left-turn movements would be removed. A non-traversable median will be constructed on US 26 to prevent left-turns between US 26 and Earl Street. | <ul style="list-style-type: none"> Timing and construction of intersection modifications will likely coincide with future development needs | Development Driven | \$750,000 |
| I117 | US 26/Lee Street Concept Area Intersection Enhancements | Upgrade intersection to address capacity needs for Concept Area | <ul style="list-style-type: none"> Should be coordinated with Jefferson Street Realignment (R36) Significant grade issues | Development Driven | \$750,000 |
| I118 | Culver Highway/Hall Road Extension Concept Area Intersection Enhancements | Upgrade intersection to address capacity needs for Concept Area | <ul style="list-style-type: none"> Timing and construction of intersection modifications will likely coincide with future development needs | Development Driven | \$300,000 |
| I119 | City View Drive/B Street | Construct intersection improvement at City View Drive and B Street | <ul style="list-style-type: none"> Consider the feasibility of a roundabout | Medium | \$1,500,000 |
| I120 | US 26/New Industrial Road | Construct intersection improvement at future Industrial Road and US 26 | <ul style="list-style-type: none"> Location and design of future intersection to be determined with ODOT coordination | Development Driven | \$750,000 |
| I121 | Loucks Road/Claremont Drive | Construct intersection improvement at Loucks Road and Claremont Drive | <ul style="list-style-type: none"> Consider the feasibility of a roundabout | Medium | \$1,500,000 |
| I122 | Loucks Road/Bean Drive | Construct intersection improvement at Loucks Road and Bean Drive | <ul style="list-style-type: none"> Consider the feasibility of a roundabout | Medium | \$1,500,000 |
| I123 | US 97/Loucks Road Realignment | Reconfigure intersection to eliminate the existing alignment issue for vehicles westbound on Loucks Road | <ul style="list-style-type: none"> Final decision options should address driver expectation and potential for safety improvements | High | \$500,000 |
| I124 | US 26/Mazatlan Intersection | Add west leg to intersection and construct southbound right-turn lane | <ul style="list-style-type: none"> Need for improvement related to development. Mazatlán would only provide right-in-right-out movements at US 26 | Development Driven | \$250,000 |
| I125 | US 97/Cedar Street | Construct intersection for connection between US 97 and Cedar Street Eastern Extension | <ul style="list-style-type: none"> Should be coordinated with project R30 | High | \$500,000 |
| I126 | J Street/Culver Highway | Consider long-term capacity enhancements | <ul style="list-style-type: none"> Monitor need for improvements based on long-term growth needs | Development Driven | \$300,000 |
| I127 | J Street/10 th Street | Construct intersection improvement at J Street and 10 th Street | <ul style="list-style-type: none"> Consider the feasibility of a roundabout | Medium | \$1,500,000 |
| I128 | City View Drive/Kinkade Road | Construct intersection improvement at City View Drive and Kinkade Road | <ul style="list-style-type: none"> Consider the feasibility of a roundabout | Medium | \$1,500,000 |
| I129 | H Street/Culver Highway | Consider long-term capacity enhancements | <ul style="list-style-type: none"> Monitor need for improvements based on long-term growth needs | Development Driven | \$300,000 |

>>>Concept Areas

Three concept areas within Madras were identified for further refinement planning, given future development potential. These are shown in Figure 2. The roadway, intersection, bike, and pedestrian projects and policies needed to support growth in each of these areas are included in the respective modal plans.

NORTH INDUSTRIAL CONCEPT AREA

The North Industrial Concept Area is a partially developed area along US 26 north and west of the downtown Madras core. This area recently experienced increased industrial development and is part of the Madras Industrial Readiness Plan. Projects that support the Readiness Plan have been incorporated into the recommended modal plans based on draft documents from the Readiness Plan. Upon adoption of the Readiness Plan, the City should update the relevant projects contained in the TSP if needed.

Supporting development in this area will require improved connectivity both along and directly to US 26. The area relies primarily on the US 26/Cherry Lane intersection to provide access to the regional roadway system. As such, improvements included in the respective modal plans include:

- ▶ US 26/Cherry Lane – Realign eastern leg to eliminate existing intersection offset. This improvement may require modifications or exceptions to the Madras urban growth boundary.
- ▶ Extend Wright Street, including a connection to US 26.
- ▶ US 26/Earl Street – Improve intersection to provide access to existing and planned roadway network west and east of US 26.

Future roadway connections planned west of US 26 and within the existing industrial area are intended to facilitate additional development opportunities, and aid in future job creation for the community. To the east of US 26, it will likely be necessary to provide local access between Cherry Lane and the proposed Earl Street extension to support future development.

CENTRAL MADRAS CONCEPT AREA

The Central Madras Concept Area includes lands generally north of the North Y intersection and south of Jefferson Street. The improvements planned in this area are intended to improve circulation between US 26 and US 97, provide access options to the highways, and address existing safety concerns.

Key improvements included in the respective modal plans are:

Providing speed transition warnings for vehicles traveling southbound on US 97 towards Jefferson Street.

Realigning the eastern leg of the US 97/Jefferson Street intersection to eliminate existing intersection offset.

- ▶ Widening US 97 from Cedar Street to Plum Street to 3 lanes.
- ▶ Extending Cedar Street east of US 97 to improve local circulation and access to US 97 for businesses.
- ▶ Realigning Jefferson Street at US 26 to connect with Lee Street.

- ▶ Improving and expanding the local street system west of US 26 and east of US 97 to reduce reliance on the state highway system for local trips.

SOUTH MADRAS CONCEPT AREA

The South Madras Concept Area generally includes the lands south of J Street and between Culver Highway and US 97. Within the Concept Area, US 97 is generally three lanes without any signals or roundabouts at the city street intersections.

As this area develops in the future, the need for viable access to lands east and west of the highway will increasingly compete with the high travel demand along the highway itself. Potential strategies to achieve this balance in the long and short term are discussed in the following subsection.

South Madras Highway Alternatives

The long-term capacity needs for this section of highway will be addressed through further refinement, evaluation, and public input. This refinement plan will be led by both public engagement efforts and close coordination with ODOT, Jefferson County, and other local, state, and federal entities. This TSP update recommends such a refinement process.

Initial improvement alternatives for consideration include:

- ▶ Maintaining the existing 3-lane cross-section on US 97.
- ▶ Developing a 5-lane cross-section on US 97.
- ▶ Expanding the one-way couplet to the south through this area.
- ▶ Constructing the planned west side highway bypass.

An initial evaluation of these alternatives is included in the Future Conditions Memorandum and Alternatives Analysis Memorandum conducted for this TSP update. Both of these memos are contained within the appendices of the TSP.

Based on public and stakeholder input as well as the TSP goals and objectives, the refinement planning process should include strategies that address:

- ▶ Safety for all users.
- ▶ Positive Economic impacts/outcomes.
- ▶ Fundable and feasible infrastructure investments.
- ▶ Mobility for all traffic on US 97/US 26, with analysis of freight needs.
- ▶ Mobility/access for local traffic.
- ▶ Mobility for non-auto users, especially providing connections between the east and west sides of US 97.

Local System Improvements

These improvements are intended to reduce reliance on the highway for local trips. Specific improvements include:

- ▶ Improved local street connections between Fairgrounds Road north to the downtown area.
- ▶ Parallel road improvements east of US 97 and improved access east to 10th Street.
- ▶ Development of a local and collector street network within the area between Culver Highway, US 97, Fairgrounds Road, and Colfax Road.
- ▶ Improved access to Culver Highway.

The construction and timing of these local improvements may be managed by public agencies, by private developers, or through future public-private partnerships.

Near-Term Highway Improvement Options

To facilitate near-term economic development opportunities in Madras, interim highway improvements may be required before funding and construction of the long-term option developed as part of a future refinement plan. Based on the TSP technical analyses and stakeholder and public engagement feedback, any interim options for highway improvements should account for the following considerations.

The type, size and location of economic development opportunities being considered as well as their commensurate access and circulation needs. These needs should be balanced with the need to provide mobility for all US 97 users.

Fairgrounds Road and Hall Road serve as the primary connections for the land uses in this area to US 97. Each is discussed below.

- ▶ Today, Fairgrounds Road provides connectivity between Culver Highway and US 97. In the future, this road is planned to connect to a southerly extension of 10th Street. Given the existing development patterns and right-of-way constraints at the US 97/Fairgrounds Road intersection, the addition of travel lanes at this intersection will be challenging, unless considered within the context of broader US 97 corridor improvements.
- ▶ Hall Road connects east to Adams Drive. A future extension west to Culver Highway is planned to facilitate future development. Economic growth in this area may require intersection improvements at US 97 and Hall Road.

Examples of intersection improvements that could be considered in the short term at the US 97 intersections with Fairgrounds Road and at Hall Road include:

- ▶ **Roundabout:** A multilane roundabout would likely be required to serve through volumes on the highway. The long-term functionality of a roundabout versus another intersection-measure will be influenced by the type of economic development opportunities that arise. In addition to providing mobility benefits, roundabouts have been shown to reduce the severity of crashes and provide aesthetic benefits¹.
- ▶ **Innovative Left-turn Treatments:** Providing capacity for left-turn movements on and off the highway while continuing to supply service to through volumes on the highway can be supported through innovative designs. Such options can allow high capacity for vehicles, but

¹ <https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/>

may require additional right of way and have broader impacts to existing highway access near the improvement. Pedestrian and bicycle users should also be specifically considered. Some options for consideration and visual examples of each are shown below:

- *Jug Handle* – Restricts left-turns and usually minor street right-turn movements at an intersection to create an efficient, two-phase signalized intersection. Turning movements are served through “jug handles,” which provide right-turn only connections downstream of the traffic signal.
- *Median U-Turn* – Minor street and major street left-turn movements are restricted at the main intersection and served via a downstream U-turn intersection on the main road. Like a jug handle intersection, a U-turn option provides an efficient two-phase traffic signal.
- *Restricted Crossing U-Turn*: Similar to a Median U-turn, with the addition that minor street through movements are also restricted and directed to downstream U-turns and major street left-turns are provided at the main intersections. The main intersection can be signalized or unsignalized depending on travel demand characteristics.

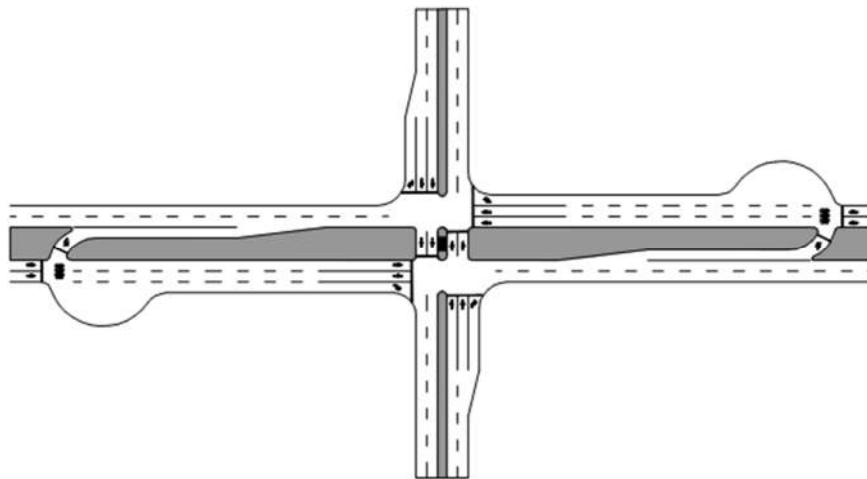
Jug Handle Example

Source: Google Maps



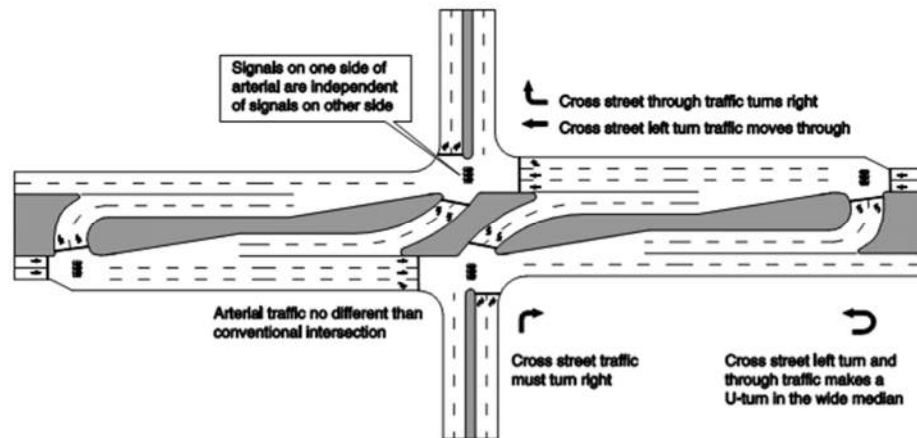
Median U-Turn Example

Source: FHWA Median U-Turn Information Guide



Restricted Crossing U-Turn Example

Source: FHWA
 Restricted Crossing U-Turn
 Information Guide



>>>Roadway Functional Classification and Cross-section Guidelines

All public streets in Madras, regardless of jurisdictional authority, are classified as Arterials, Major Collectors, Minor Collectors, or Local Streets, as described below.

Arterials within Madras generally have (or are planned to include) two or more vehicular travel lanes, sidewalks and planting strips, striped bicycle lanes, and raised median islands or two-way left turn lanes. All arterials are owned by ODOT.

Collector streets connect vehicles, pedestrians, and bikes from the interior of a neighborhood or employment area and deliver them to the nearest arterial street. Collectors are also designed to provide access to properties. They usually serve shorter trip lengths and have lower traffic volumes than arterial streets. Collector streets are important emergency response routes and are frequently transit routes. While the function of major and minor collectors is essentially the same, standards for minor collectors provide additional design flexibility to preserve the livability and character of residential areas.

- ▶ **Major collectors** can be found in residential, commercial and industrial areas. Typically, major collectors have greater right-of-way and paving widths, and wider traffic lanes than neighborhood collectors. Major collectors frequently have continuous left turn lanes and normally include sidewalks, planting strips, and striped bike lanes whereas provision for on-street parking varies by location. Major collectors may be designed with raised medians to reduce conflicts, provide a pedestrian refuge, restrict turning movements, limit land access, or to furnish an aesthetic separation between traffic lanes.
- ▶ **Minor collectors** provide a higher degree of access to individual properties. As a rule, both right-of-way and paving widths are narrower than for major collectors. Left-turn lanes are infrequently used on minor collectors, and then only at intersections with higher volume streets. Minor collector design affords a great deal of flexibility for on-street parking. On most neighborhood

collectors, bicycles share the travel lane with motor vehicles, eliminating the need for striped bicycle lanes. Exceptions to this can occur in situations where traffic volumes or speeds, roadway geometry, or other factors suggest that striped lanes will provide a safer design.

Industrial Roadways provide a function similar to that of collectors, but have different pavement characteristics to accommodate larger vehicles and trucks. These roadways exist in the Industrial Area of Madras, near the airport.

Local streets connect vehicles, pedestrians, and bicycles within neighborhoods. They are designed to provide for local access and tend to be short and lower speed. Typically, bicyclists share the road with vehicles and sidewalks on both sides of the road accommodate pedestrians. Standards for local streets offer flexibility to preserve the livability and character of residential areas.

Figure 3 shows the City's functional classification designations and proposed modifications to the adopted designations.

Design guidelines for each of the functional classifications within Madras are shown in Table 4. Specific standards are maintained in the City's Public Improvement Design and Construction Standards.

Table 5: Street Design Guidelines

| Classification | Cross-Section | Minimum ROW | Turn Lanes ¹ | Travel Lanes | Bike Lane | Sidewalk | On-Street Parking | Landscape Strip |
|----------------------|---------------|-------------|-------------------------|-----------------|-----------|-----------------------|-----------------------|-----------------------|
| Arterial | 2 Lanes | 80 ft. | Optional ³ | 11-12 ft. | Yes | Yes | No | Optional ³ |
| Major Collector | 2 Lanes | 70 ft. | Optional ³ | 11-12 ft. | Yes | Yes | No | Optional ³ |
| Minor Collector | 2 Lanes | 60 ft. | Optional ³ | 11-12 ft. | Opt. | Yes | Optional ³ | Optional ³ |
| Local Street | 2 Lanes | 55 ft. | No | 32' paved width | No | Yes | Yes | Optional ³ |
| Industrial Roadway | 2 Lanes | 60 ft. | Optional ³ | 11-12 ft. | No | Optional ³ | Optional ³ | Optional ³ |
| Public/Private Alley | n/a | 20 f. | No | 15' paved width | No | No | No | No |
| Multi-Use Path | n/a | 30 ft. | n/a | 10' paved width | n/a | n/a | n/a | n/a |

Highlighted classifications require coordination with ODOT

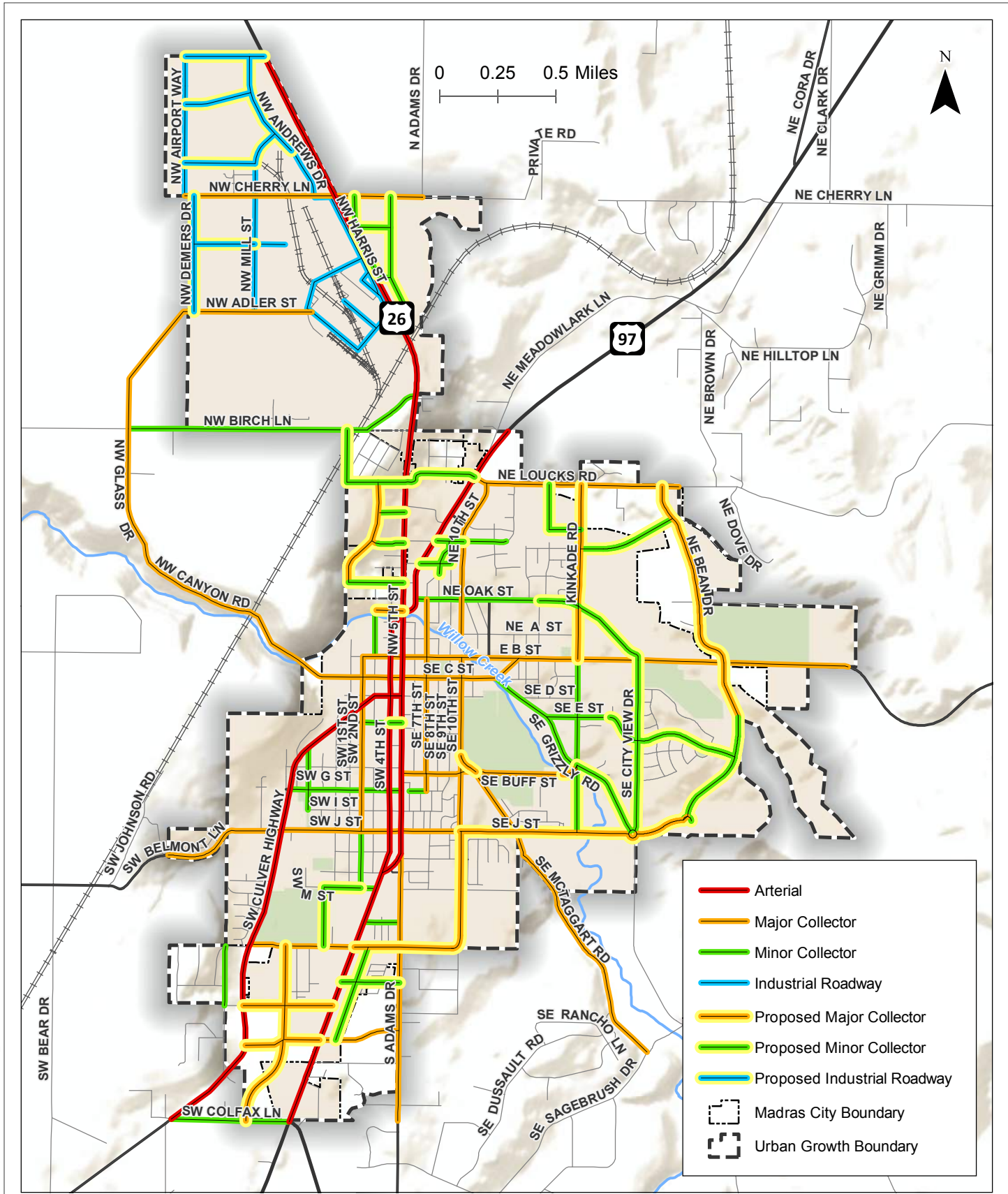
ROW = Right-of-way

n/a = Not applicable

¹**Minimum width = 14 feet**

²**Bicycle and pedestrian traffic are to be accommodated by a 12-foot multi-use path**

³**Refer to City's Public Improvement Design and Construction Standards to determine when required.**



**Madras Functional Roadway Classifications
Madras, Oregon**

**Figure
3**

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Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Oregon Department of Transportation, The City of Madras

>>>Truck Freight Routes

US 97 and US 26 are part of the State Highway Freight System and are federally designated Truck Routes. US 97 is also designated a strategic corridor in the *Oregon Freight Plan*. Madras has no designated local freight routes. Freight routes in Madras are shown in Figure 4.

MADRAS TRUCK ROUTE

The City of Madras completed a Truck Bypass Alternatives analysis in 2006 that documented the need for truck traffic to be reduced in downtown Madras and created alternatives for an east side Truck Bypass that would utilize some of the Culver Highway alignment. The truck route is intended to serve Madras and the statewide movement of freight.

The preferred alignment of the Madras Truck route is shown on Figure 4. This alignment would connect to the eastern extent of the north US 97/US 26 intersection and travel along 1st Street to Culver Highway. The southern connection would occur at the southern US 97/US 26 intersection. Intersection improvements, including the potential construction of new interchanges, would be necessary at both terminus points.

The City of Madras and ODOT plan to advance this alternative through a more detailed planning effort that will likely require a National Environmental Policy Act (NEPA) analysis and ODOT Facility Plan.

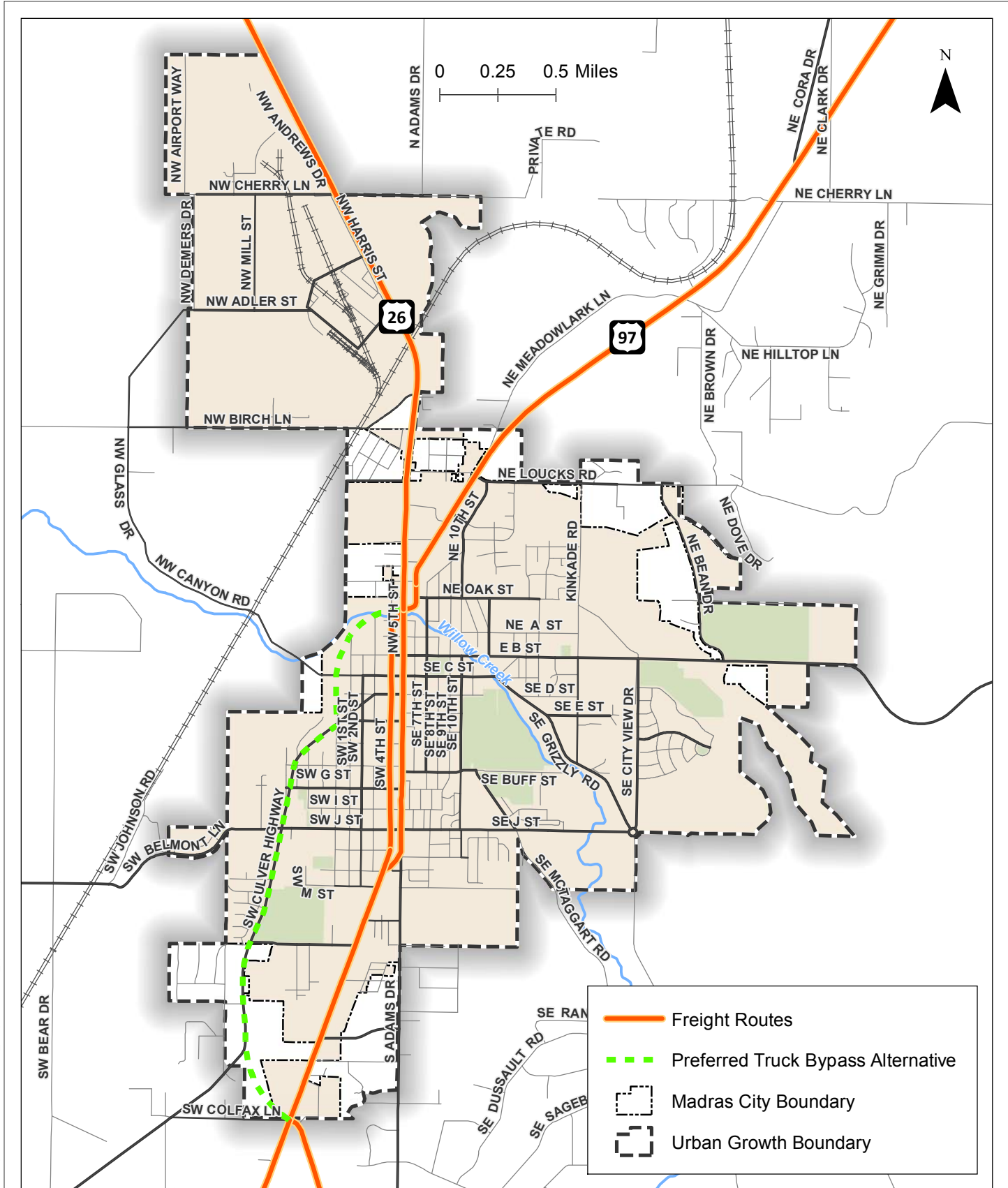
The Madras Truck Bypass Alternatives analysis is included in the appendix of this TSP.

INTERMODAL FREIGHT TRANSPORTATION

Freight is a key component of the regional economy in Madras. Goods and services are transported via freight routes into, out of, and within the City. The major freight hub in Madras is the industrial area in the northwest quadrant of the city near the airport. This area supports economic growth for both the city and Central Oregon and is the subject of the Readiness Plan. This area provides an interface with the rail system serving additional needs for freight integration.

Source: Wikimedia Commons, author Arne Hückelheim, used by permission.





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**Freight Routes
Madras, Oregon**

**Figure
4**



>>> Access Spacing and Access Management

Access management describes the practice of managing the number, placement, and movements of intersections and driveways that provide access to adjacent land uses. The recommended roadway plan considers these access points in the context of traffic flow, safety, capacity, and speed on the surrounding street system. In developed areas, access management measures may include shared or consolidated access points, restrictions on access point movements (medians, channelized movements), or closing access points. Access management offers several potential benefits, such as reducing crashes and crash rates and increasing capacity on arterial and collector streets by maintaining vehicle flows and travel time.

Well-deployed access management measures can also improve travel conditions for pedestrians and bicyclists. Eliminating the number of access points on streets reduces the number of potential interruptions and conflict points between pedestrians, bicyclists, transit, and cars.

Access management is adopted typically as a policy in development guidelines. It can be extremely difficult to implement an access management program once properties have been developed along a corridor. Cooperation among and involvement of relevant agencies, business owners, land developers, and the public is necessary to establish access management measures that benefit all street users and businesses.

The *Oregon Highway Plan* (OHP) should be referenced for state highway access requirements. Table 5 illustrates the State of Oregon's requirements for facilities within the Madras UGB. These standards are based on the 2014 AADT (Annual Average Daily Traffic volume), posted speed limit, proximity to urban areas, and functional classification.

Table 6: ODOT Access Management Spacing Standards for Highway Segments

| Route Name | Facility Extents | Facility Designation | 2014 ADT | Posted Speed Limit (mph) | Access Spacing Standard (feet) |
|------------|-----------------------------------|----------------------|----------|--------------------------|--------------------------------|
| US 26 | Entire Section within City Limits | Statewide Highway | >5,000 | 35/45/50 | 500/800/1100 |
| US 97 | Entire Section within City Limits | Statewide Highway | >5,000 | 25/30/35/45 | 350/500/500/800 |
| OR 361 | West of 5th S/US 97/US 26 | District Highway | <5,000 | 25/35/45/50 | 150/250/360/425 |

AADT = Average Annual Daily Traffic

MPH = miles per hour

Source: Oregon Highway Plan, Appendix C Revisions to Address Senate Bill 264 (2011) Table 13

Table 6 shows the minimum intersection spacing standards for the streets owned and operated by the City.

Table 7: Madras Minimum Intersection Spacing Standards¹

| Functional Classifications | Public Street (feet) | Private Access Drive (feet) |
|----------------------------|----------------------|-----------------------------|
| Arterial | 600 | 300 |
| Major Collector | 300 | 100 |
| Minor Collector | 200 | 50 |
| Local | 150 | 30 |

¹ See Madras Design Standards for additional details on access spacing standards

In cases where physical constraints or site characteristics limit the ability for the access spacing standards listed in Table 6 to be met, the City of Madras retains the right to approve an access spacing variance. County facilities within the Madras UGB should be planned and constructed with these street design standards.

US 97 “J” Street Access Management Strategy

As part of the US 97 “J” Street project, ODOT developed an access management strategy for properties in the vicinity. This strategy included a public process and identified recommended modifications to access points for individual properties. The final access management strategy, including the access modification recommendations, is included in the appendix of this TSP.

>>> Access Spacing Variances

Access spacing variances and deviations may be allowed for parcels whose street frontage, topography, or location preclude their ability to meet spacing standards. These parcels either have no reasonable access or are unable to obtain reasonable alternate access to the public road system. The variance or deviation can carry a condition that the access may be closed if reasonable access becomes available to a public street. The approval condition might also require a given land owner to work in cooperation with adjacent land owners to provide joint access points, front and rear cross-over easements, or rear access upon future redevelopment.

The requirements for obtaining a deviation from ODOT’s access management spacing standards are documented in OAR 734-051-3050.

The City may approve a variance to the access spacing standards for streets under its jurisdiction at the discretion of the Public Works Director if one or more of the following conditions exist:

- ▶ Joint access driveways and cross access easements are provided in accordance with the standards
- ▶ The site plan incorporates a unified access and circulation system in accordance with the standards

- ▶ The property owner enters into a written agreement with the City that preexisting connections on the site will be closed and eliminated after construction of each side of the joint use driveway
- ▶ The proposed access plan for redevelopment properties moves in the direction of the spacing standards

The Public Works Director may modify or waive the access spacing standards for streets under the City's jurisdiction where the physical site characteristics or layout of abutting properties would make development of a unified or shared access and circulation system impractical, subject to the following considerations:

Unless modified, application of the access standard will degrade the operational and safety integrity of the transportation system

The approval of the variance shall meet the purpose and intent of these standards and shall not be considered until every feasible option for meeting access standards is explored

Applicants for variance from these standards must provide proof of unique or special conditions that make strict application of the standards impractical. Applicants shall include proof that:

- ▶ Indirect or restricted access cannot be obtained;
- ▶ No engineering or construction solutions can be applied to mitigate the condition; and,
- ▶ No alternative access is available from a road with a lower functional classification than the primary roadway.

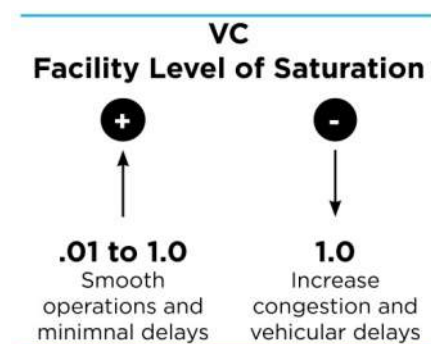
No variance shall be approved where such hardship is self-created

>>>Mobility Targets and Level of Service

The City uses motor vehicle level of service (LOS) and volume to capacity (V/C) standards to evaluate acceptable vehicular performance on its local, collector and arterial streets. ODOT uses mobility targets based on volume to capacity (V/C) ratios to evaluate acceptable vehicular performance on State facilities.

V/C represents a facility's level of saturation (i.e., what proportion of capacity is being used), with values ranging from 0.01 to 1.00. A lower ratio indicates smooth vehicular operations and minimal delays. As the ratio approaches 1.00, congestion and vehicular delays increase. At a ratio of 1.00, the intersection, travel lane, or automotive movement is saturated, resulting in longer queues and delays.

LOS is a performance measure that is similar to a "report card" rating based on average vehicle delay. LOS A, B, and C indicate conditions where traffic moves without significant delays. LOS D and E indicate progressively worse operating conditions and more delay. LOS F represents conditions where average vehicle delay has become excessive and demand is near capacity. This condition is typically evidenced by long queues and delays, with intersection delays that may be difficult to measure because congestion may extend into and be affected by adjacent intersections.



These standards and targets are used to:

- ▶ Identify vehicular capacity deficiencies on the roadway system;
- ▶ Evaluate the effects of amendments to transportation plans, acknowledged comprehensive plans and land use regulations pursuant to the Transportation Planning Rule (TPR; Oregon Administrative Rules [OAR] 660-12-0060) on City and State roadways;
- ▶ Evaluate the traffic impacts of development applications for consistency with land use regulations.

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.

ODOT'S mobility targets are listed in the Oregon Highway Plan.
The City's standards are:

- ▶ Signalized intersections: LOS "D" with a volume-to-capacity ratio of 0.95 or less
- ▶ Unsignalized intersections: LOS "E" with a volume-to-capacity ratio of 0.95 or less on the critical side street approach (applicable when 50 vehicles or more per hour are recorded on the approach)
- ▶ Roundabout intersections: 0.85 volume-to-capacity ratio on the critical approach



Source: Travel Oregon

PEDESTRIAN, BICYCLE & MULTI-USE PATH PLANS

PEDESTRIAN, BICYCLE, AND MULTI-USE PATH PLANS

The City of Madras updated its Pedestrian, Bicycle, and Multi-Use Path Plans during a focused planning effort in 2012. This TSP incorporates the outcomes of that planning process with the following additions based on input from City staff, partner agencies, the advisory committee, and the general public.

- ▶ Need for crossing improvement at US 97 adjacent to the Kids Club
- ▶ Need for crossing improvement at J Street and Turner Street
- ▶ Need for sidewalks on both sides of McTaggart Road between J Street and Buff Street
- ▶ Need for sidewalks along Loucks Drive, Bean Drive, and Belmont Lane

Figure 5 and Figure 6 show the Pedestrian and Bicycle Plans, respectively. The individual modal plans are described in the following subsections.

Cost estimates included in this chapter reflect 2012 estimates.

>>>Planned Pedestrian System

Planned pedestrian system projects include sidewalks, multi-use paths, and improved intersection crossings. Sidewalk projects range in size from filling relatively short gaps on one side of a road to constructing new sidewalks on both sides of a longer section of road. A range of pedestrian crossing improvement options are also included.

CROSSING IMPROVEMENTS

The range of crossing improvement types identified in the modal plans are described below. Figure 5 includes a map showing each planned crossing improvement location and the tables that follow provide project details that reference the maps.

Crosswalk Striping/Signage – Installation of 10-foot wide staggered continental crosswalk striping and/or an advance warning crossing sign may be considered at unsignalized pedestrian crossings. The estimated cost to implement these treatments at each intersection where they are expected to be valuable is \$1,500, assuming average sign cost of \$500 each and striping costs averaging \$500 per intersection.

Enhanced Crossing Treatments – The treatments range from geometric improvements aimed at “narrowing” the roadway to reduce speeds, installing markings, and Intelligent Transportation Systems.

Pedestrian Activated Crossings– At specific unsignalized or mid-block pedestrian crossings on US 97, where pedestrians cross frequently, an “active when present” traffic control device is expected to provide the greatest motorist compliance. More recently, these devices have been used in Central Oregon on US 20 and US 97 in Bend and research locally has documented their effectiveness. The cost of each implementation is anticipated to average \$30,000, including supporting signage, striping, and design.

Raised Pedestrian Crosswalks – This treatment can be constructed to increase pedestrian visibility and reduce vehicle speeds.

SIDEWALK PROJECTS

Sidewalk projects are shown in Figure 5. Sidewalk projects assume 6-foot wide concrete sidewalk (8-foot downtown) at an estimated cost of \$30 per lineal foot (\$40/foot downtown). Where curb and gutter are not currently provided, an additional cost of \$20 per linear foot is assumed. A 30-percent contingency factor is assumed and no right of way costs are included in the estimates.

Sidewalk connectivity is a critical component of the Madras transportation system. The proposed sidewalks are intended to provide infill projects to achieve a connected system. Though proposed sidewalks are not shown on every street, sidewalks are assumed to be part of all new roadway projects and can be installed as needed to address local pedestrian connectivity issues.

>>>Planned Bicycle System

The planned bicycle system map (Figure 7) illustrates the location of planned bicycle projects. Bicycle project types include: new bike lanes; signed and/or marked bike routes; and, shared-use paths. Components and construction costs of each type of bicycle project are described below.

Bike Lane – A striped portion on the outside of the roadway that denotes an area specifically for bicycles. Bike lane projects are suggested where the existing roadway cross-section is sufficient for two 6-foot bike lanes and two 12-foot travel lanes. Costs assume \$0.40 per linear foot for continuous stripe and bike symbols every 1,000 feet.

Bike Lane with Pavement Widening - Pavement widening is included in bike lane projects where the existing roadway cross-section is not expected to be wide enough to support the addition of two 5-foot bike lanes. Costs assume \$0.40 per linear foot for striping and \$5 per square foot to provide a 34-foot-wide asphalt roadway.

Signs and Markings – On those roadways where bicyclists and motorists use the same travel lanes (shared roadways) or bicyclists travel on a narrow shoulder (shoulder bikeways), signage and markings may remind motorists to share the road with bicyclists. Signage on rural roads could include a bike warning sign with the supplemental plaque “ON ROADWAY” for short segments, adding “NEXT XX MILES” if it is a continuous condition. On residential or other low-volume roads, markings could include “sharrows” indicating that bikes may be on the road with motor vehicles.

The cost of these improvements will vary based on the number of pavement markings applied and/or the number of signs installed. Cost estimates assume \$0.40 per linear foot, which can be allocated to signage and/or markings.



Exhibit 1: Example of a “sharrow” pavement marking on a residential street.

OTHER BICYCLE TREATMENTS

New bicycle treatments often arise within the transportation design field. Since the 2012 TSP update, several new treatments have become more commonplace and are included for reference below. These and other new treatments should be considered to enhance the bicycle network within Madras:

- ▶ Advisory bicycle lanes
- ▶ Neighborhood greenways
- ▶ Protected bicycle lanes

>>>Shared-use Paths

Shared-use paths will help facilitate cycling and walking around the city. Locations of planned shared-use paths are shown in both Figure 5 and Figure 6. Shared-use path projects are estimated to cost \$65 per lineal foot of path for lighting, design, and construction. An additional cost of \$150,000 is assumed for each bridge required. These cost estimates are based on construction costs for shared-use paths recently added in Madras.

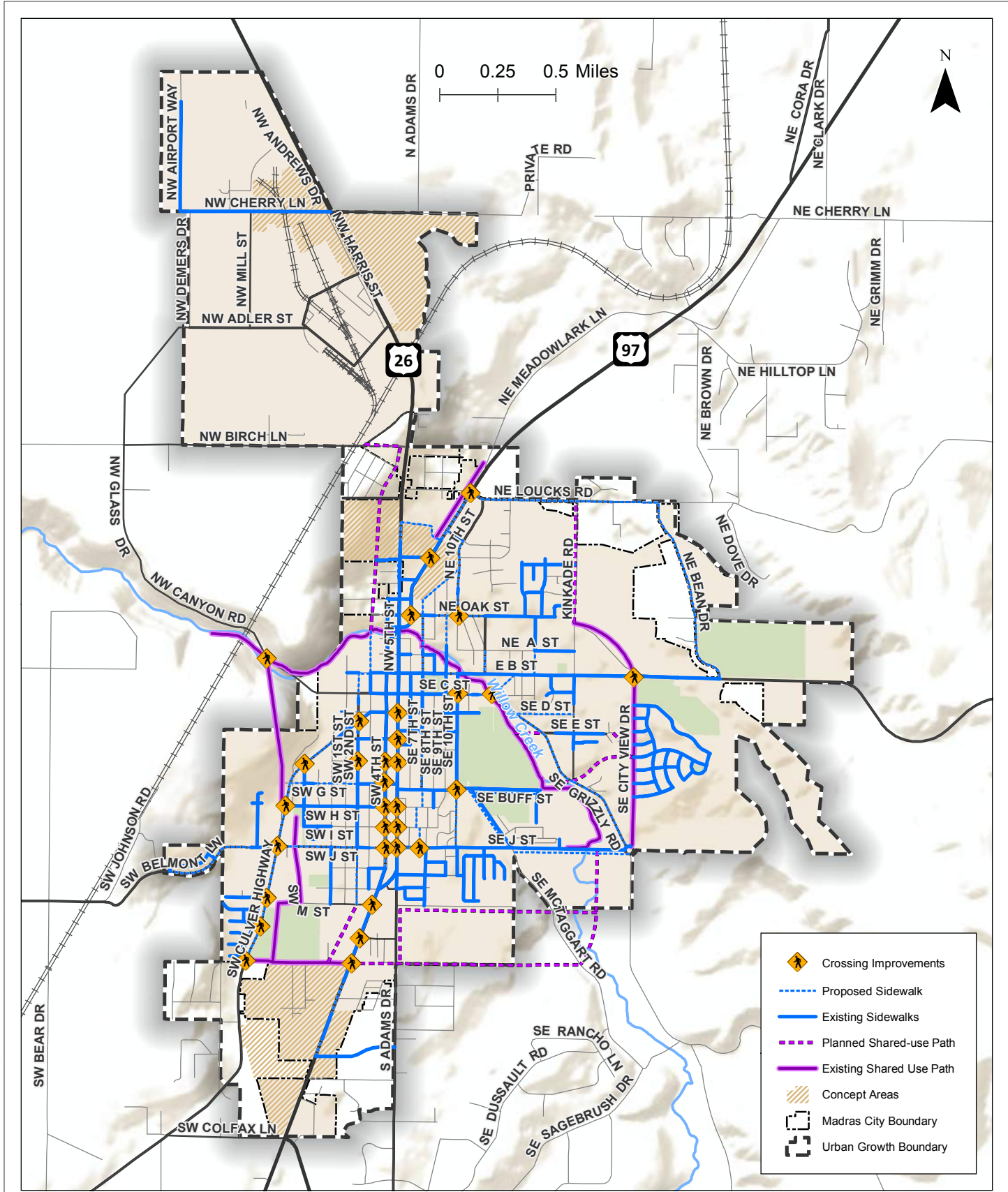
>>>Safe Routes to School

The City of Madras has worked with the Jefferson County 509-J School District to identify where sidewalk, curb, bus stop improvements, or gap filling projects are needed within 1 mile of area school. These projects are shown in Figure 6 and are also listed in the appendix of this TSP. The total cost of these projects is estimate at \$42 million.

Figure 6 also shows six projects that have been identified by the City of Madras and the school district as high priority projects to enhance access to area schools. These projects are described in Table 8. The total cost of these project is estimated at \$9.92 million.

Table 8: High Priority Safe Routes to School Projects

| Project | Project | Description | Cost Estimate |
|---------|------------------------------|--|---------------|
| 1 | Northwest Townsite to School | Construct sidewalk infill, improve ADA ramps, add street lighting, improve crosswalk striping, and construct flashing beacon at J Street/4 th Street. Improvements along J Street, Turner Street, and Buff Street | \$2,300,000 |
| 2 | Strawberry Heights to School | Construct sidewalk infill, improve ADA ramps, add street lighting, and improve crosswalk striping. Improvements along J Street and McTaggart. | \$800,000 |
| 3 | Bus Stop Improvements | Improve bus stops at Fairground/Marie, J Street/McTaggart, Madison/K Street, 1 st Street/D Street, 1 st Street/B Street, and Yarrow community | \$220,000 |
| 4 | RR Plat to School | Construct sidewalk infill, improve ADA ramps, add street lighting, and improve crosswalk striping. Improvements along B Street, 7 th Street, and D Street. | \$2,400,000 |
| 5 | Madras Town Center to School | Construct sidewalk infill, curb infill, improve ADA ramps, add street lighting, and improve crosswalk striping. Improvements along B Street, Ashwood Road, C Street, 11 th Street, and D Street | \$2,600,000 |
| 6 | Bone Subdivision to School | Construct sidewalk infill, improve ADA ramps, add street lighting, and improve crosswalk striping. Improvements along Oak Street and 16 th Street | \$1,600,000 |
| Total: | | | \$9,920,000 |

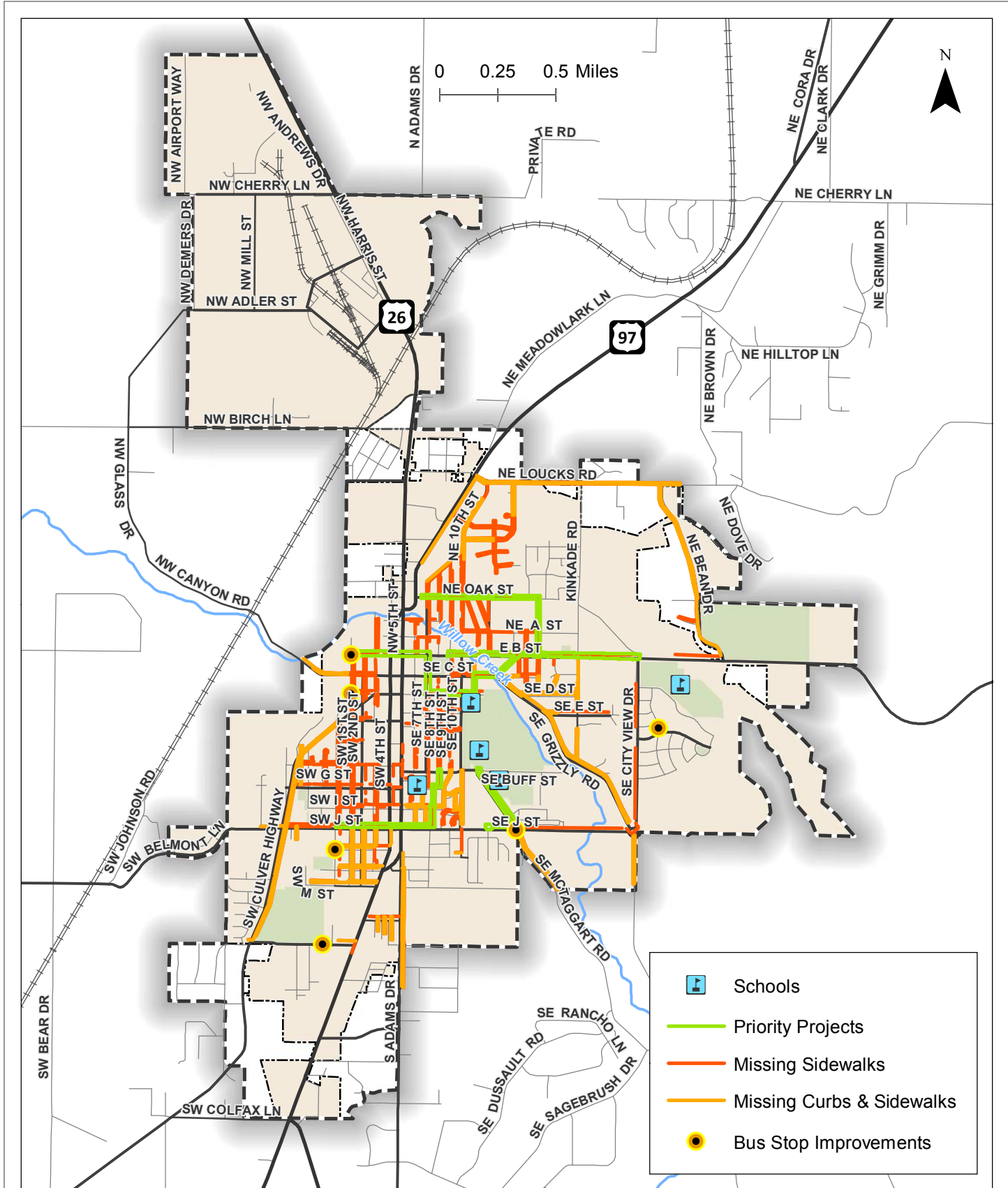


**Pedestrian Projects and Plans
Madras, Oregon**

**Figure
5**

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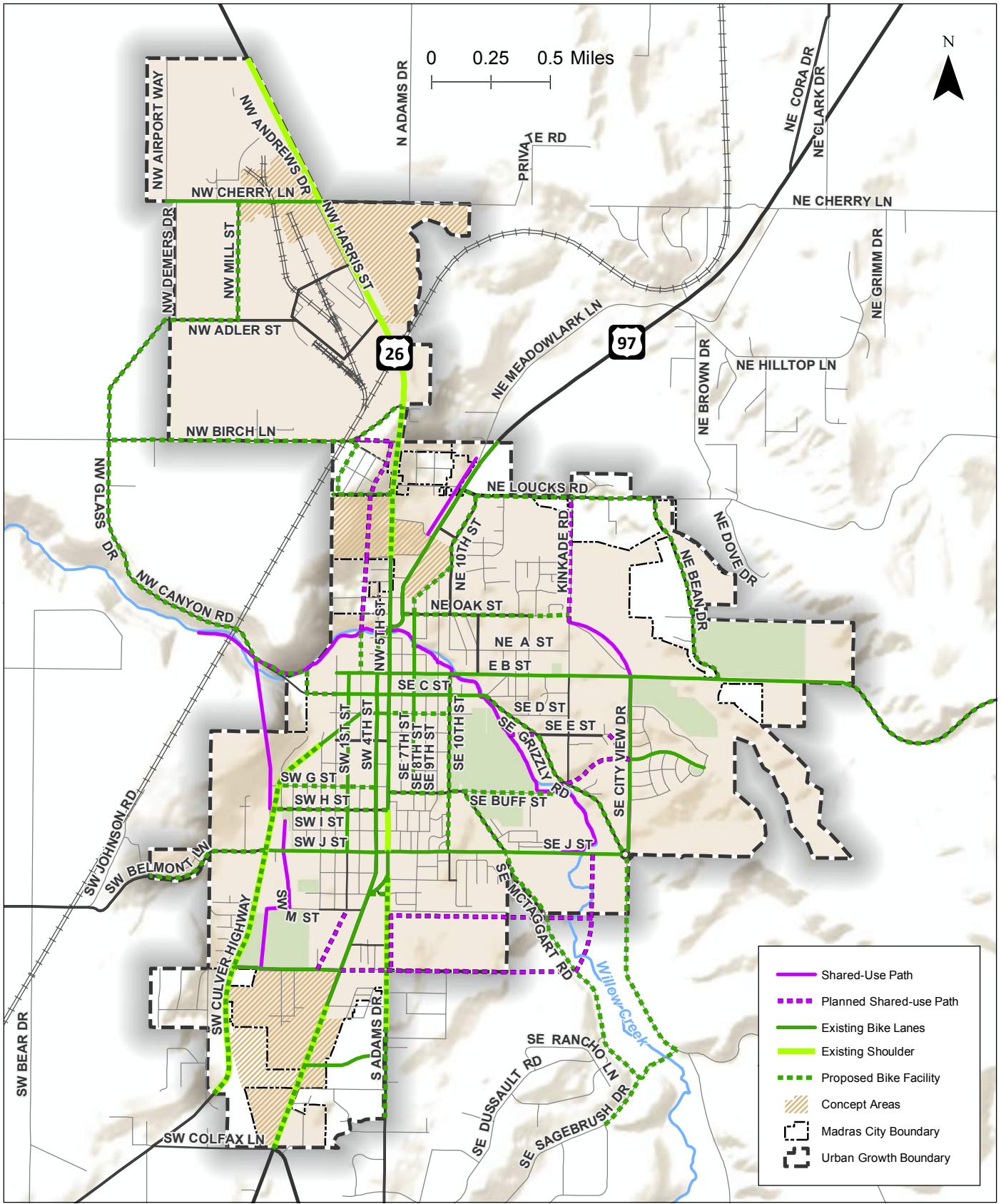


**Safe Routes to School Projects
Madras, Oregon**

**Figure
6**

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**Bicycle Projects and Plans
Madras, Oregon**

**Figure
7**

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Cascades East Transit, Source: Oregon Department of Transportation

TRANSIT PLAN



Source: Commute Options, Katy Bryce.

TRANSIT PLAN

Public Transportation in Madras consists of a “dial-a-ride” demand response service. This service is funded through the Federal Transit Administration and ODOT Rail and Public Transit Division, with service provided through a contract with Cascades East Transit (CET). This dial-a-ride service provides the general public with curb-to-curb service from Monday through Friday to any destination within Madras. The CET Community Connector Service, also available Monday through Friday, provides connections to Warm Springs, Culver, Metolius, and Redmond. Service to additional areas (Bend, Sisters, Prineville, Mt. Bachelor, and La Pine) is available through Community Connector connections in Redmond. Transit-supportive infrastructure in Madras includes a bus shelter at SW 3rd and SW E Street, where the Community Connector service stops.

Other public transportation services available in Madras include the Central Oregon Breeze, which operates a fixed route inter-city service between Bend and Portland, serving Redmond, Terrebonne, Madras, Warm Springs, Government Camp, and several Portland-area destinations on a daily basis.

Transit enhancements that improve overall mobility for users within Madras include improvements to the Community Connector Service, including the following. Specific improvements are included in Table 9.

- ▶ Increased weekday frequency
- ▶ Additional time of day service
- ▶ Additional route stops within the community
- ▶ Expansion of the current deviated fixed-route service
- ▶ Additional trips to the Portland metro area.
- ▶ These improvements should be considered and prioritized in coordination with CET.
- ▶ Better connectivity to other surrounding towns such as Metolius, Culver, and Crooked River Ranch.

Table 9: Transit Projects & Services

| Project | Project | Description | Cost Estimate |
|---------|---|--|--------------------|
| 1T | Site and Construct New Transit Center | Identify the location and construct a new transit center in downtown Madras. It assumed this facility will be within the City core and near supporting land uses. | \$500,000 |
| 2T | Site & Construct New Medical District Transit Hub | Identify the location for a new transit hub on A Street for St. Charles Madras Hospital, Madras Medical Group, Jefferson County Public Health, Mosaic Medical, Madras Chiropractic, and Madras Dental Center | \$80,000 |
| 3T | Intra-City Transit | Provide enhanced intra-city for those who are mobility impaired for reasons related to, but not limited to, Seniors, socioeconomic status, or disability. The enhanced services will likely require services tailored to the specific needs of each demographic. The additional services may be fulfilled by one transit service or several separate services depending on the needs of each demographic. The enhanced service will provide transit for the mobility impaired to increase access for employment, local and regional medical services, education (k-12 & higher education), and retail (groceries, pharmacies, etc.). | \$20,000-\$300,000 |
| Total: | | | \$600,000-900,000 |



Madras Municipal Airport, source: Wikimedia Commons, User: Tedder

AIR, MARINE, RAIL, BRIDGE & PIPELINE PLANS

AIR, MARINE, RAIL, BRIDGE & PIPELINE PLANS

>>>Air Plan

The City of Madras owns and operates Madras Municipal Airport, a general aviation airport located about five miles north of the city. The airport has two asphalt paved runways – one 5,089 by 75 feet and the other 2,701 by 50 feet. The facility is designated Category IV (Local General Aviation Airport) according to the *Oregon Aviation Plan*. As described in the *Oregon Aviation Plan*, a Category IV primarily supports single-engine aviation aircraft, but is also capable of accommodating smaller twin-engine general aviation aircraft. Category IV airports support local air transportation needs and special use aviation activities. The airport is governed by its own master plan. Recommendations for improvements are documented and maintained within that plan and are included in this TSP by reference.

>>>Marine Plan

Madras is landlocked with no access to major waterways. As such, marine transportation is not a component of the TSP Update.

>>>Rail Plan

The rail system in Madras is a significant driver of economic opportunity for the community. This system interfaces with the Madras community within the industrial area near the airport and is a subject of the Readiness Plan. The findings and recommendation of the Plan will be incorporated into the Madras TSP through reference and specific projects added as applicable.

Existing railroad facilities in the Madras UGB are shown in Figure 8.

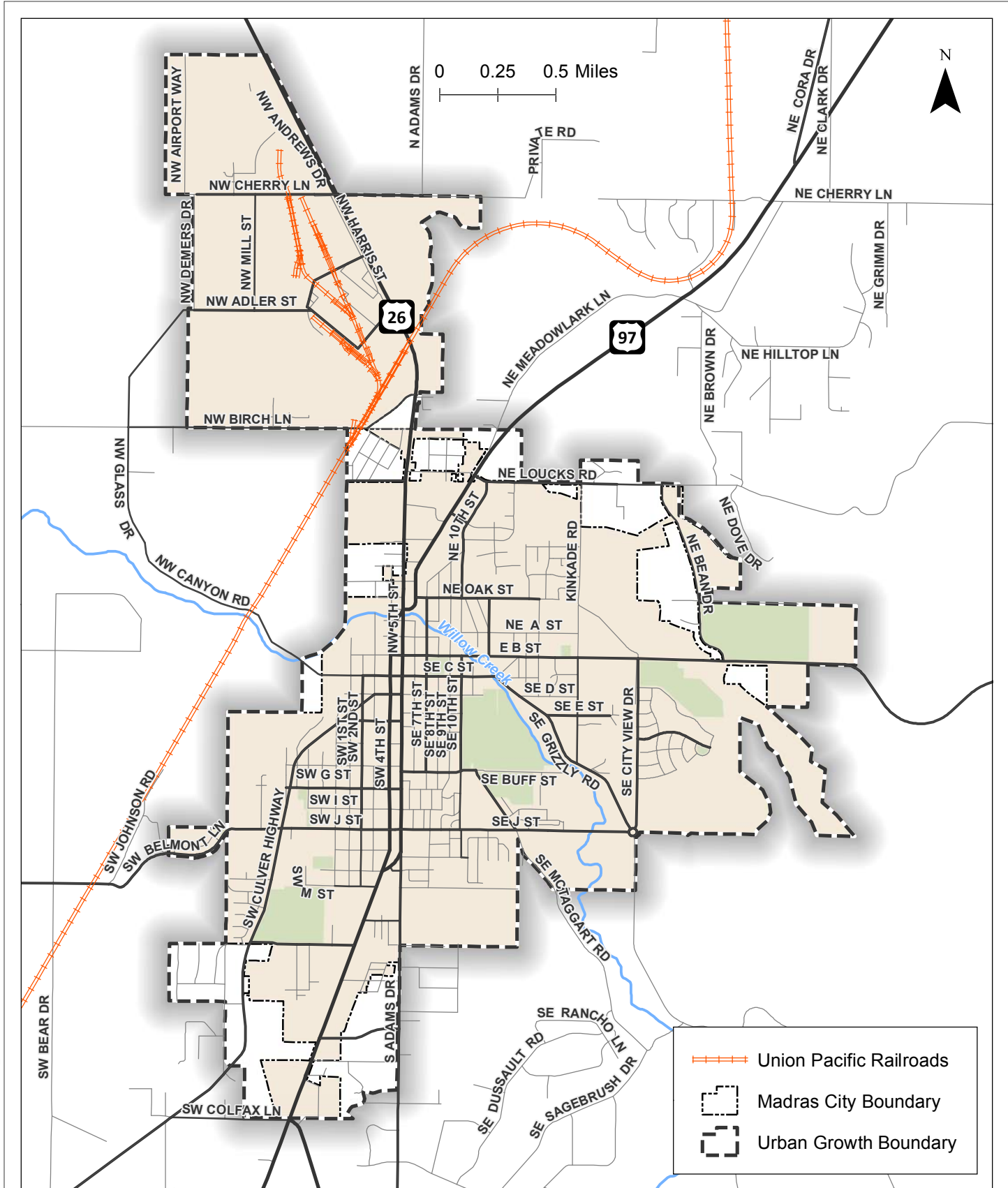
>>>Bridge Plan

ODOT maintains an inventory of bridge conditions within the state. Sufficiency rating is a measure between 0 and 100 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 allocation of funds for bridge repairs. In general, bridges with a sufficiency rating of less than 50 are given priority. The sufficiency rating is used to identify deficiencies, which may include structural issues or functional issues. For example, older bridges may be narrow and not designed to the same width or height clearances as today's standards. Therefore, a sufficiency rating does not necessarily indicate a structural issue.

According to the 2015 ODOT *Bridge Condition Report*, there are no bridges in the Madras UGB that have a sufficiency rating below 50, or classified as "structurally deficient/distressed."

>>>Pipeline Plan

Major pipelines are not known to traverse Madras. However, several utilities, including PPL Electric, BendBroadBand, and CenturyLink, have a series of utility lines in the community.



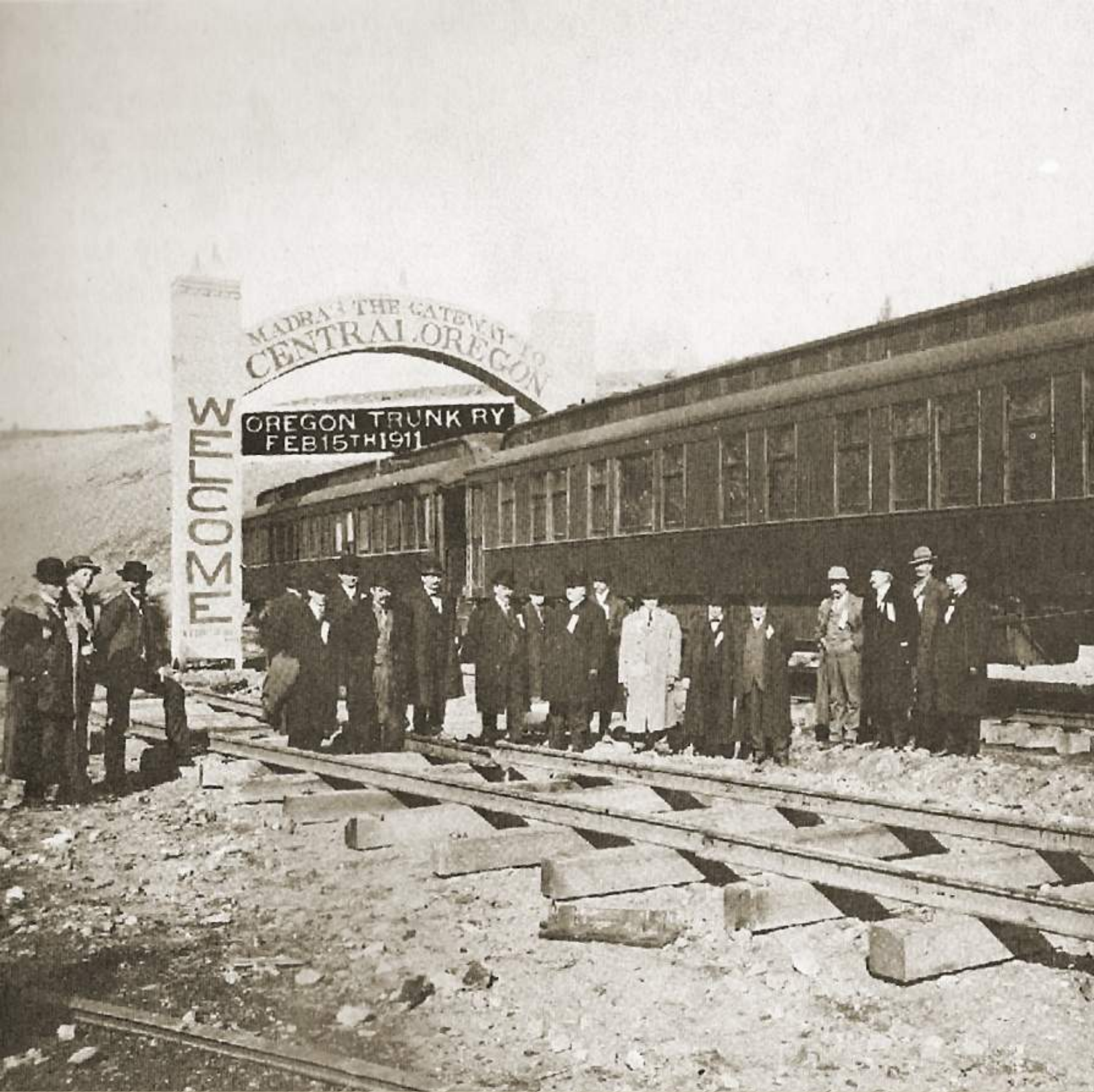
**Railroad Facilities
Madras, Oregon**

**Figure
8**

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Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Int
Data Source: Oregon Department of Transportation



Madras welcomes the Oregon Trunk Line Incorporated, 1911, source: Mike Falconi

TRANSPORTATION FUNDING

TRANSPORTATION FUNDING

The City of Madras approves funding for the transportation system through its annual budget. The City uses a five-year Capital Improvement Plan and a pavement management system to inform the budget process. The primary funds used to finance the transportation system are the Street Fund and the Transportation System Development Charge (SDC) Fund.

STREET FUND

The Street Fund is a special revenue account that includes revenue from several sources. It is primarily used to maintain city streets but is sometimes used to finance capital improvements when the City is able to obtain grant funding for specific projects. For example, the Street Fund is currently backing up the SDC Street Improvement Fund, which was pledged to finance a \$1 million local obligation to build the “J” Street project. Local franchise fees, State gas tax, revenue sharing, and liquor allotment (STP) comprise the majority of the Fund’s revenue. Other revenue sources include grants and service charges.

Table 10 shows the Fund’s performance since 2012. Fund outlays exceeded revenues during this time frame because of transfers to the SDC Improvement Fund to cover debt service obligations. Those transfer payments, which have been about \$176,000 per year, will be reversed when SDC revenues increase. A recent report commissioned by the City found, however, that the amount of revenue needed to maintain the City’s transportation assets is expected to increase significantly in the future and repayment of Fund transfers is unlikely to cover these costs. The report recommends strategies to stabilize maintenance funding with a combination of new revenue sources. Reducing the level of maintenance investment is not feasible without further compromising system assets and increasing the cost of necessary improvements.

Table 10: Street Fund Performance: 2012 – 2015

| | 2012 | 2013 | 2014 | 2015 |
|------------------|-------------|---------------|-------------|-----------|
| Begin Balance | \$271,900 | \$227,200 | \$226,000 | \$500 |
| Revenues | \$1,223,700 | \$1,277,700 | \$987,000 | \$858,600 |
| Expenditures | \$1,278,500 | \$1,278,900 | \$1,158,700 | \$818,100 |
| End Balance | \$227,200 | \$226,000 | \$500 | \$900 |
| Net Income(loss) | \$(44,800) | \$(1,172,000) | \$(171,700) | \$400 |

Source: TUF Report, FCS Group, 2016; differences due to rounding

The implication of this trend is that without additional revenue, the Street Fund is not a viable source for capital projects funding. Potential new sources of revenue could include a local gas tax, an increase in franchise fee rates, a monthly transportation utility service fee, or a bond measure. These could stabilize funding for maintenance and provide funding for capital projects.

TRANSPORTATION SDC FUNDS

System Development Charges (SDCs) are one-time fees charged to development projects to address off-site impacts the development imposes on public infrastructure systems, including transportation. The

Madras Transportation SDC uses a cost per trip generated by new development to pay for the cost to upgrade the transportation system.

There are two parts to the fee. A reimbursement fee recovers investment that the City has made in the transportation system to add capacity that serves additional development. The second component of the fee is an improvement fee, which is intended to cover the cost of new infrastructure needed to serve new development. Residential uses pay a flat amount per dwelling. Other developments pay an amount that varies based on the project's trip generating characteristics. SDC proceeds in general are used to finance growth-related capital improvements. The TSP informs the selection of projects and establishes the percentage of project costs that may be funded by SDCs.

Madras accounts for reimbursement and improvement fee revenue in separate funds per state law. The SDC fee split is 12% reimbursement and 88% improvement. Table 11 shows the performance for the Street Improvement Fund since 2012. During that time, SDC income has been below forecasts and has relied on inter-fund transfers to meet debt service payment obligations. This is the result of lingering problems in the local economy. Conditions are improving, albeit slowly. It will be some time before the two funds return to a stable condition.

Table 11: SDC Street Improvement Fund: 2012 – 2015

| | 2012 | 2013 | 2014 | 2015 |
|--------------------|-----------|-----------|-----------|-----------|
| Begin Balance | \$12,900 | \$1,000 | \$10,200 | \$10,600 |
| Revenue | \$31,200 | \$89,100 | \$112,800 | \$107,500 |
| Expenditure | \$179,200 | \$178,000 | \$176,400 | \$175,200 |
| Transfers In (Out) | \$162,000 | \$98,000 | \$64,000 | \$67,000 |
| End Balance | \$1,000 | \$10,200 | \$10,600 | \$10,000 |

MADRAS URBAN RENEWAL PLAN AND INVESTMENT PROGRAM

Madras adopted an urban renewal district in June 2003 that is overseen by the Madras Redevelopment Commission. The district generates revenue from property taxes that are diverted to the district. The tax revenue is used to finance tax increment bonds, which are used to pay for a variety of public improvements in the district in accordance with an adopted Urban Renewal Plan. Maximum indebtedness for the district is \$14.0 million.

The plan's focus is remediating blighted conditions downtown. Proceeds may be spent in a variety of ways, from improvements to business storefronts to streetscape furnishings to business assistance. A number of transportation-related improvements are outlined in the plan. While the district is an important source of financing for the City, its focus is on alleviating blighted conditions and enhancing economic development along the US 97 corridor and especially downtown. The district is not expected to play a major role in financing transportation system improvements, but it will help improve safety and the appearance of streets in downtown and at key locations along the US 97 corridor.

TRANSIT FUNDING

Cascade East Transit (CET) is financed by various federal and State grants that are used to underwrite capital purchases and operations. The Confederated Tribes of Warm Springs and CET coordinate their operations regarding the Tribe's shuttle service from Warm Springs to Madras. There have been regional

discussions about augmenting operating revenues with local funds to enhance transit service. CET expects to continue its reliance on federal transfer payments to finance most of its operation.

ODOT STIP

ODOT's Statewide Transportation Improvement Program (STIP) is a document the Oregon Transportation Commission (OTC) adopts every other year committing available state funding to a variety of programs and specific projects.

STIP programming is very important to Madras. US 97, US 26, and OR 361 are vital transportation routes. Funding to improve the capacity, alignment, design features, and operating systems of these roads is programmed through the STIP. All of the major projects identified in the TSP that affect these roads need to secure State approval and funding commitments through the STIP process.

FUNDING FORECAST

As documented in the previous sections, transportation funding in Madras for capital improvement projects is uncertain for the following reasons:

The SDC program has paid out approximately \$175,000 a year, mostly to finance a \$1 million local obligation to build the "J" Street project. SDC revenues have not covered this expense and have been heavily supplemented by the Street Fund. Future funds from the SDC program will go to repay the Street Fund, though even with that additional revenue the Street Fund's ability to keep up with ongoing maintenance costs is uncertain. Because of this funding uncertainty, the City will need to rely heavily on outside funding sources, including the ODOT STIP, to fund future capital improvement projects.



Mt. Jefferson and Carrot Field west of Madras Municipal Airport, by Tom Brown.