Sandy Transit Master Plan

Sandy Area Metro Transit (SAM) plays an important role in providing transportation within Sandy and as a link in the regional multimodal transportation network. The connections to TriMet, Mountain Express, and bicycle and pedestrian networks allow for an increased level of mobility for people in and around Sandy, whether they are traveling to jobs, school, shopping, parks, or social and recreational events. Sandy Transit services also help support a growing local economy, providing easy access to Sandy businesses for both workers and shoppers.

An effective transit system places emphasis on providing mobility and independence for people who rely on transit to meet their basic travel needs. Transit-dependent individuals often include people with disabilities, youth, elderly, and people with low-incomes. Providing effective service ensures that transit-dependent and other individuals are able to get to the places they need to go. However, in order for transit to effectively reduce automobile trips and the overall demand on the transportation system, Sandy Transit must also provide a service that is an attractive alternative to driving.

The Sandy Transit Master Plan (TMP)\(^1\), completed in September 2009 and adopted by the City Council on September 9, 2009 as Ordinance 2009-02, represents the transit element of Sandy’s TSP. As with the TSP, it is a long-term community vision and blueprint for transit development in the City over the next twenty years.

Motor Vehicle System Plan

The Motor Vehicle System Plan provides direction for the management and expansion of the roadway network to meet the City’s needs through the year 2029. The plan elements provide an array of strategies to achieve local transportation goals by improving system capacity, efficiency, safety, and connectivity. An analysis of the motor vehicle system under existing (2009) and future (2029) conditions, as well as documentation of all alternatives considered, can be referenced in the appendices.

Transportation System Management

Transportation System Management (TSM) focuses on low-cost strategies to enhance the operational performance of the transportation system by seeking solutions that better manage facilities and treat all modes of travel as a coordinated system rather than relying on the construction of additional capacity through new roadways. TSM strategies are often easier to implement because of the lower capital investment required and they extend the functional life of existing and future facilities by optimizing their ability to move traffic in a safe and efficient manner.

\(^1\) Sandy Transit Master Plan, CPH Planning, September 2009.
Roadway Functional Classification
The functional classification system provides direction for the management and design of streets in the City of Sandy. The roadway functional classification map is shown in Figure 4, with management objectives and design criteria described below.
Figure 5
Roadway Functional Classification

City of Sandy
TRANSPORTATION SYSTEM PLAN

Roadway Functional Classification

Future* Existing

Major Arterial
Minor Arterial
Residential Minor Arterial
Collector
Local Streets
County Arterial/Collectors

Parcels
City Limits
Urban Growth Boundary
Urban Reserve Area

*Note: Alignments are conceptual only, and will be refined based on topographic, environmental, and other constraints.
Functional Classification Management Objectives

Major Arterial
Major arterials are typically three to five-lane highways that operate as two-way streets or as a one-way couplet. These roads are intended to handle high volumes of traffic, typically 16,000 ADT (Average Daily Traffic) or more. Major arterials provide greater regional mobility, are managed to favor through traffic capacity and safety over direct access, and should generally be spaced approximately one mile apart. Private driveway access, on-street parking, and traffic calming measures are typically discouraged along major arterial routes and the provision of bike lanes or shoulders is required.

Minor Arterial
Minor arterials are high-volume, intra-city streets providing connectivity and parallel features and should generally be spaced approximately one mile apart. These roads have a typical capacity between 8,000 and 16,000 ADT. Minor arterials are generally the most critical classification for circulation in the urban areas of Sandy and are intended to serve longer local trips. Private driveway access is discouraged where access to facilities of lower classification is available and traffic calming measures and on-street parking should be avoided. The provision of bike lanes is required.

Residential Minor Arterial
Residential minor arterials are a hybrid between minor arterial and collector type streets that allows for moderate to high traffic volumes on streets where over 90% of the fronting lots are residential. These roads have similar typical capacity to minor arterials, 6,000 to 10,000 ADT. They are intended to provide some relief to the strained arterial system while ensuring a safe residential environment. Residential minor arterials may include on-street parking and traffic calming measures may be applied. Direct access to properties is managed in a manner similar to collector streets. The provision of bike lanes is required.

Collector
Collector streets provide both access and circulation within and between residential and commercial areas. These roads have a typical capacity between 2,000 and 6,000 ADT. Collectors differ from arterials in that they provide more of a citywide circulation function, do not require as extensive control of access (compared to arterials), and penetrate residential neighborhoods, distributing trips from the local street system to minor and major arterials. Collectors may provide on-street parking, may incorporate traffic calming measures, and should be spaced approximately one-half mile apart. Bike lanes are required on collectors.

Local Street
Local streets have the sole function of providing immediate access to adjacent land. These streets have a typical capacity between 800 and 1,000 ADT. Service to through traffic movements on local streets is deliberately discouraged by design. All other City streets in the City of Sandy that are not designated as arterial streets or collector streets are considered to be local streets. Local streets may allow on-street parking and may incorporate traffic calming measures. Bike lanes are not required.
Roadway Design Standards
The design characteristics of Sandy’s streets are defined in Section 17.100.110 of the SMC, and were developed by the City to meet the function and demand for each facility type. Because the actual design of a roadway can vary from segment to segment due to adjacent land uses, demands or topography and resources, the objective was to define a system that allows for standardization of key characteristics to provide consistency, but also to provide criteria for application that provides some flexibility.

Figures 5 through 12 illustrate the City of Sandy’s typical roadway standards. While roadways under State or County jurisdiction will be subject to the design standards of those agencies, typical cross-sections for US 26 and OR 211 are provided that comply with ODOT’s design standards or an approved design exception. These standards are to be used to identify right-of-way needs and typical roadway design features to be included in the construction of new roadways or significant modifications to existing roadways. The adoption of these standards does not create a requirement to upgrade existing facilities. The appropriate application of elements identified as optional is guided by the functional classification management objectives for each type of facility.

Future improvements to the section of OR 211 from the urban growth boundary to US 26 may be faced with a number of environmental and topographical challenges. Key opportunities and constraints related to future modernization of the OR 211 corridor are noted below:

Constraints
- Limited right-of-way to chase cut/fill sections (varies 80’-120’)
- Potential Federal Highway Administration Sections 4F/6F environmental impacts for widening adjacent to No Name Creek
- Potential residential impacts on the east side of OR 211 north of Dubarko Road
- Potential riparian impacts at Tickle Creek crossing
- Fish passage improvements/culvert replacement needed at Tickle Creek crossing
- Wetland impacts at Tickle Creek crossing
- Floodplain impacts at Tickle Creek crossing
- Environmental Assessment/Environmental Impact Statement (EA/EIS) likely required with use of federal funds

Opportunities and Design Strategies
- Can limit right-of-way slope and riparian impacts with walls
- Reduce planter strip width in constrained areas.
- Eliminate turn lane or reduce median width in constrained sections where there is no demand for left turn.
- Design planters in a manner to satisfy water quality treatment requirements
- Consider a range of options to accommodate bicycle and pedestrian access along the corridor such as non-standard design features and creation/utilization of alternate (non-highway) routes.
Figure 6

TYPICAL SECTIONS

55 MPH POSTED/70 MPH DESIGN SPEEDS

CLEAR ZONE

LANDSCAPED MEDIAN OR STRIPED MEDIAN/TURN LANE

CLEAR ZONE

TRAVEL LAKES 24' 20'

24'-36' MIN.

136'-140' R.O.W. (May Erode Existing R.O.W.)

45 MPH POSTED/55 MPH DESIGN SPEED

CLEAR ZONE

LANDSCAPED MEDIAN OR STRIPED MEDIAN/TURN LANE

CLEAR ZONE

CENTER LANE

28'-30' MIN.

16' 12.5' = 12.7' R.O.W.

40 MPH POSTED/45 MPH DESIGN SPEED

CLEAR ZONE

LANDSCAPED MEDIAN OR STRIPED MEDIAN/TURN LANE

CLEAR ZONE

CENTER LANE

22'-24' MIN.

16' 10.5' - 11' R.O.W.

25 MPH POSTED/30 MPH DESIGN SPEED

CLEAR ZONE

LANDSCAPED MEDIAN OR STRIPED MEDIAN/TURN LANE

CLEAR ZONE

CENTER LANE

18' MIN.

9' P.O.W.

Option A

MIN. CLEAR ZONE

R.O.W.

TREE WALKWAY BUFFER (varies)

6' STRIP

MIN.

R.O.W. (varies)

Sidewalk location may vary with available right of way.

Option B

MIN. CLEAR ZONE

R.O.W.

WALKWAY EASEMENT

P.O.W. (varies)

(Walkway in P.O.W. if easement is not available)

(Not applicable within the Special Transportation Area along Pioneer and Proctor Boulevards.)

City of Sandy
TRANSPORTATION SYSTEM PLAN

US 26 ROADWAY STANDARDS
(Not applicable within the Special Transportation Area along Pioneer and Proctor Boulevards.)
Figure 8

City of Sandy
TRANSPORTATION SYSTEM PLAN

US 26 ROADWAY STANDARDS
Special Conditions

(Not applicable within the Special Transportation Area along Pioneer and Proctor Boulevards.)
OR 211 - Between Arletha Ct. and Dubarko Rd.

OR 211 - Between Dubarko Rd. and US 26

Source: City of Sandy Bornsted Village Plan

OR 211 ROADWAY STANDARDS
**Minor Arterial/Residential Minor Arterial**

- **Travel Lane**: 11’
- **Bike Lane**: 11’
- **Sidewalk**: 6’
- **Planter Strip**: 5’
- **Parking**: 8’
- **Row**: 62’-82’

**Collector**

- **Travel Lane**: 11’
- **Bike Lane**: 11’
- **Sidewalk**: 6’
- **Planter Strip**: 5’
- **Parking**: 8’
- **Row**: 44’-78’

**Pioneer and Proctor Boulevards (US 26) Within the Special Transportation Area**

- **Travel Lane**: 11’
- **Bike Lane**: 11’
- **Sidewalk**: 8’
- **Planter Strip**: 5’
- **Parking**: 4’
- **Row**: 58’ (Minimum 42’ Curb to Curb)
Green Street Option - 52 ft. ROW
Swale on One Side

Green Street Option - 55 ft. ROW
Swale on Both Sides

Source: City of Sandy Development Code, Section 17.100.110
Minor Residential Arterial allows on-street parking.

- On-street Parking Lane (except at intersections)

LEGEND

NEIGHBORHOOD STREET

ROADWAY STANDARDS

Figure 12

NEIGHBORHOOD STREET ROADWAY STANDARDS

Source: City of Sandy Development Code, Section 17.100.110
Minor Residential Arterial allows on-street parking.

- Optional

Travel lane width is the bi-directional total (Queuing required for 14-17' lane widths).

Green Street Option - 55 ft. ROW
- Swale on Both Sides
- 2% grade

Source: City of Sandy Municipal Code, Section 17.100.120 (D)
Access Management

Access Management is a broad set of techniques that balance the need to provide efficient, safe, and timely travel with the ability to allow access to individual destinations. It involves the control or limiting of access to arterial and collector facilities to maximize their capacity and preserve their functional integrity.

New development and roadway projects involving City street facilities are required to meet the access spacing standards in Section 17.84.50, 17.98.80 and 17.100.110 of the SMC as shown in Table 3. In cases where physical constraints or unique site characteristics limit the ability to meet these spacing standards an exception may be granted under Section 17.84.50(H).

<table>
<thead>
<tr>
<th>Functional Classification</th>
<th>Distance between Public Streets</th>
<th>Distance between Private Accesses and other Private Access or Public Streets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Arterial*</td>
<td>5,280 feet (1-mile)</td>
<td>See Table 4</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>5,280 feet (1-mile)</td>
<td>300 feet</td>
</tr>
<tr>
<td>Residential Minor Arterial and Collector</td>
<td>2,640 feet (.5-mile)</td>
<td>150 feet</td>
</tr>
<tr>
<td>Local Street</td>
<td>400 - 660 feet</td>
<td>20 feet</td>
</tr>
</tbody>
</table>

Notes: *All major arterials in the City of Sandy are ODOT facilities.

In addition to these access spacing standards, requirements for joint access points, inter-parcel circulation, and crossover easements are covered in Section 17.90 and Table 2 of Section 17.100.90 of the SMC. To review adequacy of access designs, the City of Sandy may require a Traffic Analysis Letter\(^2\), or Traffic Impact Analysis for new access points proposed to serve new developments. The City reviews the development design to determine that there are no inherent safety issues. Consideration of the need for a Traffic Analysis Letter or Traffic Impact Analysis is triggered by land use actions such as land division, conditional use, and design review.

All access to State facilities must be approved by ODOT. The 1999 Oregon Highway Plan identifies access management objectives for all classifications of roadways under state jurisdiction. US 26 (classified a Statewide Highway) and OR 211 (classified a District Highway) both maintain management objectives that balance the needs of through traffic movement with direct property access. Based on these objectives, the Oregon Highway Plan (OHP) establishes access spacing standards for all highway classifications that vary with proximity to urbanized areas and changes in posted speeds. OHP Table 4 identifies the ODOT access spacing standards for Statewide and District Highways applicable within the Sandy urban growth boundary. Note that the spacing standards below are only to be applied to approaches on the same side of the highway.

---

\(^2\) City of Sandy Traffic Analysis Letter Guidelines
### Table 4: Minimum ODOT Access Spacing Standards

<table>
<thead>
<tr>
<th>Posted Speed (mph)</th>
<th>Statewide Highway (US 26)</th>
<th>District Highway (OR 211)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban Expressway</td>
<td>Urban</td>
</tr>
<tr>
<td>&gt; 55</td>
<td>2,640 feet</td>
<td>1,320 feet</td>
</tr>
<tr>
<td>50</td>
<td>2,640 feet</td>
<td>1,100 feet</td>
</tr>
<tr>
<td>40 &amp; 45</td>
<td>2,640 feet</td>
<td>990 feet</td>
</tr>
<tr>
<td>30 &amp; 35</td>
<td>720 feet</td>
<td>*</td>
</tr>
<tr>
<td>≤ 25</td>
<td>520 feet</td>
<td>*</td>
</tr>
</tbody>
</table>

Notes: All measurements in feet, taken from center to center of approaches on the same side of the highway only.

* Minimum access management spacing for public road approaches is the existing city block spacing or the city block spacing as identified in the local comprehensive plan. Public road connections are preferred over private driveways and in STAs driveways are discouraged. However, where driveways are allowed and where land use patterns permit, the minimum access management spacing for driveways is 175 feet (55 meters) or mid-block if the current city block is less than 350 feet (110 meters).

ODOT’s access management requirements are implemented through OAR 734-051. These rules outline the criteria and procedures for approach permitting, including the application process, conditions under which deviations from established access spacing standards can be allowed, and procedures for appealing decisions.

Clackamas County also maintains access spacing standards for facilities under County jurisdiction in Sandy’s Urban Reserve Area. County access spacing standards call for distances between public streets and driveways of 1,000 feet on major arterials, 600 feet on minor arterials, and 150 feet on collectors (no requirement on local roads).

**Local Street Connectivity**

By providing connectivity between neighborhoods, out-of-direction travel and vehicle miles traveled (VMT) can be reduced, the attractiveness of various travel modes enhanced, traffic levels can be balanced between various streets, and public safety response time is reduced. In the City of Sandy, several important new roadway connections will be needed within developed areas to reduce out of direction travel for vehicles, pedestrians and bicyclists. New connections will be most critical in areas where a significant amount of new development is possible.

Figure 13 shows the Local Street Connectivity Plan for Sandy. In most cases, the connector alignments are not specific and are aimed at reducing potential neighborhood traffic impacts by better balancing traffic flows on local streets. The arrows shown in the figures represent potential connections and the general direction for the placement of the connection. In each case, the specific alignments and design should be determined as part of development review, with consideration being given to the built environment, topography, and environmental conditions.
Figure 14

Local Street Connectivity

existing streets

Future Streets

- Arterial/Collector
- Local Streets
- Parcels
- City Limits
- Urban Growth Boundary
- Urban Reserve Area

*Note: Alignments are conceptual only, and will be refined based on topographic, environmental, and other constraints.
Should new cul-de-sacs be created, bicycle and pedestrian accessways to provide a connection to the surrounding transportation system from the cul-de-sac shall be required per Section 17.100.120(D) of the SMC.

To protect existing neighborhoods from the potential traffic impacts caused by extending stub end streets, the City may require appropriate traffic calming measures be incorporated into the design and construction of new street extensions. In addition, when a development constructs stub streets, the City may require the installation of signs indicating the potential for future connectivity to increase residents’ awareness. Additionally, new developments that construct new streets or street extensions are required by Section 17.100.100(F) of the SMC to provide a proposed street map that:

- Provides full street connections with spacing of no more than 400 feet between connections except where prevented by barriers or access management standards on higher classified facilities
- Provides bike and pedestrian accessways through the middle of the block when block lengths exceed 600 feet
- Limits use of cul-de-sacs and other closed-end street systems to situations where existing barriers prevent full street connections
- Includes no cul-de-sacs or close-end street longer than 400 feet. Those longer than 400 feet, or developments with only one access point, may be required to provide an alternative access for emergency vehicle use only
- Includes street cross-sections showing dimensions of right-of-way improvements, with streets designed for posted or expected speed limits which meet City design standards (or ODOT standards for state highways)

**Neighborhood Traffic Management**

Neighborhood Traffic Management (NTM) strategies are commonly used to slow down or reduce automotive traffic with the intent of improving safety for pedestrians and bicyclists. Such strategies are not suited for arterial and collector streets, including US 26 and OR 211. However, NTM strategies can be applied to local streets. Sandy has a NTM program that outlines the process for identifying, prioritizing, and mitigating problems related to traffic speeds and volumes on local streets.

To initiate the Sandy Neighborhood Traffic Management Program process, a citizen request accompanied by a petition with signatures of at least 50% of the residents in the project area must be submitted to the City. Each request will be evaluated, and those that pass this process will be reviewed for a range of possible traffic calming device (Table 5) solutions.
Table 5: Traffic Calming Devices

<table>
<thead>
<tr>
<th>Device</th>
<th>Safety</th>
<th>Speed Reduction</th>
<th>Traffic Diversion</th>
<th>Fuel Consumption, Pollution</th>
<th>Emergency Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicanes</td>
<td>Possible Improvement</td>
<td>Possible</td>
<td>Possible</td>
<td>Small Increase</td>
<td>Possible Problems</td>
</tr>
<tr>
<td>Curb Extensions</td>
<td>Improved Ped. Crossing</td>
<td>Possible</td>
<td>No Effect</td>
<td>No Change</td>
<td>Possible Problems</td>
</tr>
<tr>
<td>Diverters</td>
<td>Possible Improvement</td>
<td>Mixed Results</td>
<td>Yes</td>
<td>No Change</td>
<td>Possible Problems</td>
</tr>
<tr>
<td>Entrance Treatments</td>
<td>Possible Improvement</td>
<td>Unlikely</td>
<td>Mixed Results</td>
<td>No Change</td>
<td>Possible Problems</td>
</tr>
<tr>
<td>Forced Turn Channelization</td>
<td>Possible Improvement</td>
<td>No</td>
<td>Yes</td>
<td>Small Increase</td>
<td>Possible Problems</td>
</tr>
<tr>
<td>Median Barriers</td>
<td>Possible Improvement</td>
<td>No</td>
<td>Possible</td>
<td>No Change</td>
<td>Possible Problems</td>
</tr>
<tr>
<td>Radar Speed Feedback Signs</td>
<td>Possible Improvement</td>
<td>Yes</td>
<td>No Effect</td>
<td>No Change</td>
<td>No Effect</td>
</tr>
<tr>
<td>Rumble Strips</td>
<td>Possible Improvement</td>
<td>Possible</td>
<td>No Effect</td>
<td>No Change</td>
<td>No Effect</td>
</tr>
<tr>
<td>Speed Humps</td>
<td>Unknown</td>
<td>Yes</td>
<td>Possible</td>
<td>Small Increase</td>
<td>Possible Problems</td>
</tr>
<tr>
<td>Traffic Circles</td>
<td>Improved</td>
<td>Yes</td>
<td>Possible</td>
<td>No Change</td>
<td>Possible Problems</td>
</tr>
</tbody>
</table>

Source: Sandy Traffic Management Program

**Mobility Standards**

Mobility standards are established to delineate the maximum level of congestion that will be accepted on a given facility or within a specified area. The road authority – City, State or County – sets and applies specific standards for their facilities.

The City of Sandy mobility standard requires a minimum level of service (LOS) D for signalized, as well as unsignalized intersections. Level of service shall be based on the most recent edition of the Transportation Research Board’s Highway Capacity Manual.

ODOT mobility standards are given as volume to capacity (V/C) ratios and are based on roadway classification, land use designations, and posted speed limits. There are two types of mobility standards for state facilities that are used for different purposes. Those contained in the 1999 Oregon Highway Plan are applied to the review of development proposals, to address Transportation Planning Rule compliance, and for the help determination of needed infrastructure improvements necessary to address land development. However, the mobility standards in the ODOT Highway Design Manual are to
be applied to the evaluation of all alternatives considered for roadway improvements through public investments. ODOT mobility standards applicable within the City of Sandy are shown in Table 6.

Through the process of updating the City of Sandy’s TSP, it was found that, even with full build-out of the recommended transportation system, ODOT’s mobility standards for US 26 could not be met. In response, ODOT and the City have worked together to develop alternate mobility standards for US 26 in the Orient Drive to Ten Eyck Road section. These alternate mobility standards shall be adopted in the Sandy TSP, but will not be in force until ODOT, through action by the Oregon Transportation Commission, adopts the alternate mobility standards in an amendment to the 1999 Oregon Highway Plan.

The new mobility standards are to be applied to the average annual weekday peak hour of traffic rather than the 30th highest annual hour of traffic, and will allow volume to capacity ratios as high as 0.85.

At unsignalized intersections and road approaches, the volume to capacity ratios shall not be exceeded for either of the state highway approaches that are not stopped. Approaches at which traffic must stop, or otherwise yield the right of way, shall be operated to maintain safe operation of the intersection and all of its approaches and shall not exceed the volume capacity ratios for District/Local Interest Roads in Table 6 within the urban growth boundary.
## Table 6: ODOT Mobility Standards within Sandy

<table>
<thead>
<tr>
<th>Highway Category and Segment</th>
<th>Inside Urban Growth Boundary</th>
<th>Outside Urban Growth Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STA</td>
<td>Non-MPO outside of STA’s where non-freeway speed ≤ 35 mph</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Oregon Highway Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applied to the review of development proposals, comprehensive plan text and map amendments and for the determination of needed infrastructure improvements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 26 from Orient Dr. to Ten Eyck Rd.* (Statewide Expressway NHS Freight Route)</td>
<td>0.85</td>
<td>0.85</td>
</tr>
<tr>
<td>US 26 from east of Ten Eyck Rd. to the east (Statewide NHS Freight Route)</td>
<td>-</td>
<td>0.80</td>
</tr>
<tr>
<td>OR 211 (District/Local Interest Roads)</td>
<td>0.95</td>
<td>0.90</td>
</tr>
<tr>
<td>Highway Design Manual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applied to the evaluation of all alternatives considered for roadway improvements through public investments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 26 from west to MP 22.66 west of 362nd Dr. (Statewide Expressway NHS Freight Route)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>US 26 from MP 22.66 west of 362nd Dr. to east (Statewide NHS Freight Route)</td>
<td>0.85</td>
<td>0.70</td>
</tr>
<tr>
<td>OR 211 (District/Local Interest Roads)</td>
<td>0.95</td>
<td>0.80</td>
</tr>
</tbody>
</table>

Notes: *The alternate mobility standard for this area is to be applied to the average annual weekday peak hour of traffic rather than the 30th highest annual hour of traffic.
Motor Vehicle System Projects
The motor vehicle system projects were developed to address existing and long-range needs for network capacity and safety. These projects, listed in Tables 7 and 8 and shown in Figure 14, represent the motor vehicle component of the “Preferred Plan”, which consists of all transportation improvements identified to support growth through the year 2029. Projects assumed for “Near Term” implementation, which represent a subset of the Preferred Plan that aligns with anticipated funding, are listed in Chapter 4.

Operations at key roadway network intersections in the City were analyzed under future (year 2029) conditions with and without the Preferred Plan motor vehicle system projects in place. The results are provided in Table 9. As shown, all intersections under City jurisdiction will operate within adopted mobility standards with the Preferred Plan improvements in place. On the state highways, the recommended improvement projects coupled with the adoption of alternate mobility standards from Orient Drive to Ten Eyck Road will be essential for accommodating future growth. While this will mitigate intersection operations in most areas, the unsignalized intersections on US 26 east of the downtown (at Langensand Road, Vista Loop Drive West, and Vista Loop Drive East) are still projected to fail to meet mobility standards in the future.

At these locations, minor street delays can be long due to the conflict with high highway traffic volumes. However, the forecasted demand for the minor street movements remains too low to warrant the installation of traffic signals at any one intersection. This low demand results in part from the fact that most trips are oriented to and from the west and that there are other roadways available to serve that demand. Because the attractiveness of alternate routes to and from the west will be affected by the recommended improvement projects in this plan, the actual demand experienced at the US 26 intersections east of the downtown could be influenced by the timing of those improvements relative to development growth. Therefore, continued monitoring of operations and safety at these intersections as growth occurs is recommended.
<table>
<thead>
<tr>
<th>Project ID</th>
<th>Location</th>
<th>Improvement(s) Description</th>
<th>Project Cost (2009 Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>City of Sandy Intersection Improvements</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| M1 | 362nd Dr./ Industrial Way (West) | • Realign Industrial Way East to connect into the intersection of Industrial Way west  
• Construct a single lane roundabout | $3,390,000 |
| M2 | 362nd Dr./ Dubarko Rd. | • Construct a single-lane roundabout | $1,165,000 |
| **ODOT Intersection Improvements** | | | |
| M3 | US 26/ 362nd Dr. | • Construct a second westbound left turn lane  
• Construct an acceptance lane for second westbound left turn lane to drop at southern access to Fred Meyer property  
• Construct a northbound through lane  
• Construct southbound through, right turn and left turn lanes | $5,350,000 |
| M4 | US 26/ Industrial Way | • Change southbound approach to dual left turn lanes and a shared through/right lane  
• Construct a northbound left turn lane | $780,000 |
| M5 | US 26/ Ruben Ln. | • Change southbound approach to dual left turn lanes and a shared through/right lane  
• Change northbound approach to left turn lane, and shared through/right lane | $770,000 |
| M6 | OR 211/ Proctor Blvd. (US 26) | • Construct a northbound left turn lane (restriping only) | $5,000 |
| M7 | US 26 | • US 26 Adaptive Signal Timing | $400,000 |
| M8 | US 26/ Ten Eyck Rd./ Wolf Dr. | • Construct a northbound left turn lane  
• Construct a southbound left turn lane | $1,220,000 |
| M9 | OR 211/ Dubarko Rd. | • Construct a northbound right turn lane  
• Construct a southbound left turn lane  
• Construct a northbound left turn lane  
• Construct a traffic signal | $10,150,000 |
| M10 | OR 211/ Bornstedt Rd. | • Prohibit left turns out of Bornstedt Rd.* | $16,000 |
| M11 | OR 211/ Arletha Ct. | • Realign Arletha Ct. approach from the south | $2,570,000 |
| **Total Project Costs (Intersection Improvements)** | | | $25,816,000 |

Notes: *Project would be necessary only if mobility standard is not met. Potential alternative projects are available.
Table 8: Roadway Improvement Projects and Costs – Preferred Plan

<table>
<thead>
<tr>
<th>Project ID</th>
<th>Roadway Segment</th>
<th>Project Cost (2009 Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12</td>
<td>Industrial Way extension to Jarl Rd./ US 26</td>
<td>$10,800,000</td>
</tr>
<tr>
<td>M13</td>
<td>Dubarko Rd. connection to Champion Way</td>
<td>$6,105,000</td>
</tr>
<tr>
<td>M14*</td>
<td>Extend Bell St. to Orient Dr.</td>
<td>$50,905,000</td>
</tr>
<tr>
<td>M15*</td>
<td>Extend 362nd Dr. to Kelso Rd.</td>
<td>$26,620,000</td>
</tr>
<tr>
<td>M16</td>
<td>Extend Kate Schmidt Ave. from US 26 to the proposed Bell St. extension</td>
<td>$7,345,000</td>
</tr>
<tr>
<td>M17</td>
<td>Extend Industrial Way north to Bell St. extension</td>
<td>$3,820,000</td>
</tr>
<tr>
<td>M18*</td>
<td>Extend Olson Rd. from 362nd Dr. to Jewelberry Ave.</td>
<td>$12,890,000</td>
</tr>
<tr>
<td>M19</td>
<td>Extend Agnes St. to Jewelberry Ave.</td>
<td>$4,870,000</td>
</tr>
<tr>
<td>M20</td>
<td>Extend Dubarko Rd. to US 26 opposite Vista Loop Dr. (West)</td>
<td>$3,200,000</td>
</tr>
<tr>
<td>M21*</td>
<td>Gunderson Rd., 370th Ave., Cascade Village Dr., Cascade Village Blvd., New Collector</td>
<td>$20,000,000</td>
</tr>
<tr>
<td>M22*</td>
<td>New road extension from Dubarko Rd. to US 26 opposite Vista Loop Dr. (East)</td>
<td>$16,390,000</td>
</tr>
<tr>
<td>M23</td>
<td>Bornstedt Rd. Vertical Realignment</td>
<td>$790,000</td>
</tr>
<tr>
<td>M24</td>
<td>Shelley Ave Realignment</td>
<td>$2,000,000</td>
</tr>
<tr>
<td></td>
<td>Sub-total (inside UGB)</td>
<td>$103,602,850</td>
</tr>
<tr>
<td></td>
<td>Sub-total (outside UGB)</td>
<td>$62,132,150</td>
</tr>
<tr>
<td></td>
<td>Total Cost</td>
<td>$165,735,000</td>
</tr>
</tbody>
</table>

Notes: *Sections of these projects are outside the City’s urban growth boundary, but inside the urban reserve area.
Figure 15
Motor Vehicle System Plan

Roadway Functional Classification

Recommended
- Major Arterial
- Minor Arterial
- Residential Minor Arterial
- Collector
- Local Streets
- County Arterial/Collectors

Existing
- Parcels
- City Limits
- Urban Growth Boundary
- Urban Reserve Area

Project ID (See Tables 7 and 8)

*Note: Alignments are conceptual only, and will be refined based on topographic, environmental, and other constraints.

City of Sandy
TRANSPORTATION SYSTEM PLAN

0 1,000 2,000 3,000 4,000 Feet

0 500 1,000 2,000 3,000 4,000 Feet

Figure 15
Motor Vehicle System Plan

Recommended*  Existing
- Major Arterial
- Minor Arterial
- Residential Minor Arterial
- Collector
- Local Streets
- County Arterial/Collectors

Existing
- Parcels
- City Limits
- Urban Growth Boundary
- Urban Reserve Area

*Note: Alignments are conceptual only, and will be refined based on topographic, environmental, and other constraints.
## Table 9: 2029 Intersection Operations

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Mobility Standard (LOS or V/C)</th>
<th>2029 No-Build System</th>
<th>2029 Preferred Plan System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Delay (sec)</td>
<td>Level of Service (LOS)</td>
<td>volume/capacity ratio (V/C)</td>
</tr>
<tr>
<td>City of Sandy Intersections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Way Stop Controlled Intersections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kelso Rd./ Bluff Rd.</td>
<td>D</td>
<td>16.0</td>
<td>A/C</td>
</tr>
<tr>
<td>Green Mountain St./ Bluff Rd.</td>
<td>D</td>
<td>13.3</td>
<td>A/B</td>
</tr>
<tr>
<td>Industrial Way East/ 362nd Dr.</td>
<td>D</td>
<td>21.8</td>
<td>A/C</td>
</tr>
<tr>
<td>Industrial Way West/ 362nd Dr.</td>
<td>D</td>
<td>40.2</td>
<td>E</td>
</tr>
<tr>
<td>Dubarko Rd./ 362nd Dr.*</td>
<td>D</td>
<td>37.8</td>
<td>B/E</td>
</tr>
<tr>
<td>Dubarko Rd./ Ruben Ln.</td>
<td>D</td>
<td>15.0</td>
<td>A/B</td>
</tr>
<tr>
<td>Dubarko Rd./ Tupper Rd.</td>
<td>D</td>
<td>10.6</td>
<td>A/B</td>
</tr>
<tr>
<td>Dubarko Rd./ Jacoby Rd.</td>
<td>D</td>
<td>11.4</td>
<td>A/B</td>
</tr>
<tr>
<td>Dubarko Rd./ Langensand Rd.</td>
<td>D</td>
<td>11.3</td>
<td>A/B</td>
</tr>
<tr>
<td>Cascadia Village Dr./ Bornstedt Rd.</td>
<td>D</td>
<td>13.3</td>
<td>A/B</td>
</tr>
<tr>
<td>ODOT Intersections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signal Controlled Intersections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 26/ Orient Dr.</td>
<td>0.60 / 0.85 **</td>
<td>&gt;80.0</td>
<td>F</td>
</tr>
<tr>
<td>US 26/ 362nd Dr.</td>
<td>0.70 / 0.85 **</td>
<td>&gt;80.0</td>
<td>F</td>
</tr>
<tr>
<td>US 26/ Industrial Way</td>
<td>0.70 / 0.85 **</td>
<td>&gt;80.0</td>
<td>F</td>
</tr>
<tr>
<td>US 26/ Ruben Ln.</td>
<td>0.70 / 0.85 **</td>
<td>&gt;80.0</td>
<td>F</td>
</tr>
<tr>
<td>US 26/ Bluff Rd.</td>
<td>0.85 / 0.85 **</td>
<td>&gt;80.0</td>
<td>F</td>
</tr>
<tr>
<td>OR 211/ Proctor Blvd. (US 26)</td>
<td>0.85 / 0.85 **</td>
<td>&gt;80.0</td>
<td>F</td>
</tr>
<tr>
<td>OR 211/ Pioneer Blvd. (US 26)</td>
<td>0.85 / 0.85 **</td>
<td>&gt;80.0</td>
<td>F</td>
</tr>
<tr>
<td>US 26/ Ten Eyck Rd. - Wolf Dr.</td>
<td>0.85 / 0.85 **</td>
<td>&gt;80.0</td>
<td>F</td>
</tr>
<tr>
<td>OR 211/ Dubarko Rd.</td>
<td>0.75 / 0.80</td>
<td>&gt;80.0</td>
<td>A/F</td>
</tr>
</tbody>
</table>
Table 9: 2029 Intersection Operations (continued)

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Mobility Standard (LOS or V/C)</th>
<th>2029 No-Build System</th>
<th>2029 Preferred Plan System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Delay (sec)</td>
<td>Level of Service (LOS)</td>
<td>volume/capacity ratio (V/C)</td>
</tr>
<tr>
<td>ODOT Intersections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Way Stop Controlled Intersections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 26/ Champion Way</td>
<td>0.65 / 0.80</td>
<td>34.8</td>
<td>A/D</td>
</tr>
<tr>
<td>US 26/ Langensand Rd.</td>
<td>0.70 / 0.85</td>
<td>&gt;80.0</td>
<td>A/F</td>
</tr>
<tr>
<td>US 26/ Vista Loop Dr. West</td>
<td>0.70 / 0.80</td>
<td>&gt;80.0</td>
<td>A/F</td>
</tr>
<tr>
<td>US 26/ Vista Loop Dr. East</td>
<td>0.70 / 0.80</td>
<td>&gt;80.0</td>
<td>C/F</td>
</tr>
<tr>
<td>OR 211/ Bornstedt Rd.</td>
<td>0.75 / 0.80</td>
<td>40.4</td>
<td>A/E</td>
</tr>
</tbody>
</table>

Notes:
- Shaded cells indicate mobility standard is not met
- (HDM/OHP) mobility standards shown for ODOT intersections
- ODOT mobility standards for stopped approaches are shown for unsignalized intersections
- (A/A) = major street LOS/minor street LOS
- Signalized and all-way stop delay = average vehicle delay in seconds for entire intersection
- Unsignalized delay = highest minor street approach delay
- * Roundabout as proposed improvement
- ** Alternate OHP mobility standard to be applied to average annual weekday peak hour
- *** Improvement realigns Industrial Way East to connect into the intersection of 362nd Drive and Industrial Way West

Potential Conflicts with Goal 5 Resources

Oregon’s Statewide Planning Goals & Guidelines Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces (OAR 660-015-0000(5)) states that, “Local governments shall adopt programs that will protect natural resources and conserve scenic, historic, and open space resources for present and future generations.” Resources addressed under Goal 5 include:

- Riparian corridors (including water and riparian areas and fish habitat)
- Natural areas
- Wetlands
- Wilderness areas
- Wildlife habitat
- Mineral and aggregate
- Federal wild and scenic rivers
- Energy sources
- State scenic waterways
- Cultural areas
- Groundwater resources
- Historic resources
- Approved Oregon recreation trails
- Open space
- Scenic views and sites
- Scenic views and sites
Preferred Plan projects including new streets, sidewalks, trails, and bike lanes were reviewed for conflicts with known or possible Goal 5 resources within the City of Sandy urban area. Several potential conflicts are identified in Table 10. It should be noted that although the proposed alignments currently show the potential for conflict with the City’s Goal 5 resources, the actual alignment of each project will be refined in the future to mitigate or minimize impacts.

Table 10: Potential Preferred Plan Goal 5 Impacts

<table>
<thead>
<tr>
<th>Project ID</th>
<th>Roadway</th>
<th>Location</th>
<th>Potential Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>M14 / M15</td>
<td>362nd Dr.</td>
<td>Intersection at Bell St. and North of Bell St.</td>
<td>Wetland Riparian Corridor</td>
</tr>
<tr>
<td>P1 / B1</td>
<td>362nd Dr.</td>
<td>Between Dubarko Rd. and the southern UGB</td>
<td>Wetland Riparian Corridor</td>
</tr>
<tr>
<td>P27 / B11</td>
<td>OR 211</td>
<td>Between Dubarko Rd. and Bornstedt Rd., South of Tupper Rd.</td>
<td>Wetland Riparian Corridor</td>
</tr>
<tr>
<td>P5 / B3</td>
<td>Bornstedt Rd.</td>
<td>South of Redwood St.</td>
<td>Wetland</td>
</tr>
</tbody>
</table>

**Freight Mobility**

ODOT has designated US 26 as a State Freight Route and Federal Truck Route in the Oregon Highway Plan. The ODOT Motor Carrier Transportation Division has identified both US 26 and OR 211 as routes for freight movement through the City of Sandy. There are several restrictions associated with each highway, with Table 11 showing a matrix identifying the differences in allowed freight movement.

Table 11: Motor Carrier Freight Route Restrictions

<table>
<thead>
<tr>
<th>Route</th>
<th>Highway Group Number*</th>
<th>Route for Over-Width Loads</th>
<th>Route for Over-Height Loads (up to 14'-06&quot;)</th>
<th>COVP Road Authority</th>
<th>Route for &quot;Triples&quot; Combinations</th>
<th>Route for Mobile Homes (12’ to 14’ Wide)</th>
<th>Route for Over-Length Loads</th>
<th>Route with Use Restricted Bridges</th>
<th>Route for Loads Up to 14’ Wide</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 26</td>
<td>Group 1</td>
<td>Yes</td>
<td>Yes*2</td>
<td>Clackamas</td>
<td>Yes*3</td>
<td>Yes*4</td>
<td>Yes*5</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>OR 211</td>
<td>Group 1</td>
<td>Yes*1</td>
<td>No</td>
<td>Clackamas</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>None</td>
<td>No</td>
</tr>
</tbody>
</table>

Notes: *The Motor Carrier Division has classified highways into three groups (1-3) to indicate general length, size, and weight requirements of freight vehicles: Group 1 is the least restrictive, and Group 3 has the most restrictions on the permitted vehicle and load dimensions.  
*1Permit required for over width operations  
*2Permit required for heights over 14’  
*3Holiday restrictions apply east of Sandy  
*4Route not authorized for continuous movement east of Sandy  
*5Permit required for over-length loads  
COPV - Continuous Operation Variance Permits  

As can be seen in this table, there are fewer restrictions for freight movement on US 26 than on OR 211. It also is a more direct route between the freight generators in the Portland Metro region and
destinations to the east. Therefore, the management of congestion through the US 26 corridor will be critical to maintain efficient and reliable movement of freight through the City.

Off of the US 26 corridor, the following City streets serve industrial areas.

- Industrial Way (including proposed Jarl Road connection to US 26)
- Champion Way
- 362nd Drive between US 26 and Champion Way/ Dubarko Road

Transportation Demand Management

Transportation Demand Management (TDM) is the general term used to describe any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods. TDM focuses on reducing vehicle miles traveled (VMT) and promoting alternative modes of travel. By shifting peak travel demands on roadways, the roadway capacity can be used more efficiently, and the City may avoid or delay building new or wider roadways.

A wide variety of TDM strategies exist, however many are tailored to larger urban areas. Strategies for rural or smaller communities require special development and planning and should focus on increasing travel options and creating an environment that is supportive for walking and cycling. The most effective TDM measures for the City of Sandy may include strategies to increase parking management in the downtown (parking time limits and pricing), carpool, increase transit services and improve facilities for non-vehicular modes of travel (walking, bicycling, and transit).

Table 12 lists several strategies that could be applicable to large employers within the City of Sandy. Additional strategies that could be implemented by the City through its Comprehensive Plan and development code include continued support of pedestrian, bicycle, and transit projects, consideration of trip caps and other transportation demand management strategies as part of development review, and to continue to provide the opportunity for compact, mixed land-uses to reduce citywide VMT.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
<th>Potential Trip Reduction</th>
</tr>
</thead>
</table>
| Telecommuting          | Employees perform regular work duties at home or at a work center closer to home, rather than commuting from home to work. This can be full time or on selected workdays. This can require computer equipment to be most effective. | 82-91% (Full Time)  
14-36% (1-2 day/wk.) |
| Compressed Work Week   | Schedule where employees work their regular scheduled number of hours in fewer days per week. | 7-9%  
16-18%  
32-36% (9 day/80 hr.)  
(4 day/40 hr.)  
(3 day/36 hr.) |
| Alternative Mode Subsidy | For employees that commute to work by modes other than driving alone, the employer provides a monetary bonus to the employee. | 21-34% (full subsidy of cost, high alternative modes)  
2-4% (half subsidy of cost, medium alternative modes) |
Table 12 (continued): Transportation Demand Management Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
<th>Potential Trip Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle Program</td>
<td>Employers provide support services to those employees that bicycle to work. Examples include: safe/secure bicycle storage, shower facilities and subsidy of commute bicycle purchase.</td>
<td>0-10%</td>
</tr>
<tr>
<td>On-site Rideshare Matching</td>
<td>Employees who are interested in carpooling or vanpooling provide information to a transportation coordinator regarding their work hours, availability of a vehicle and place of residence. The coordinator then matches employees who can reasonably rideshare together.</td>
<td>1-2%</td>
</tr>
</tbody>
</table>
| Provide Vanpools               | Employees that live near each other are organized into a vanpool for their trip to work. The employer may subsidize the cost of operation and maintaining the van.                                                | 15-25% (company provided van with fee)  
                                                                                                                                           | 30-40% (subsidized van)         |
| Gift/Awards for Alternative Mode Use | Employees are offered the opportunity to receive a gift or an award for using modes other than driving alone.                                                                                   | 0-3%                           |
| Walking Program                | Provide support services for those who walk to work. This could include buying walking shoes or providing lockers and showers.                                                                          | 0-3%                           |
| Company Cars for Business Travel | Employees are allowed to use company cars for business-related travel during the day                                                                                                                    | 0-1%                           |
| Guaranteed Ride Home Program   | A company owned or leased vehicle is provided in the case of an emergency for employees that use alternative modes.                                                                                     | 1-3%                           |
| Time off with Pay for Alternative Mode Use | Employees are offered time off with pay as an incentive to use alternative modes.                                                                                                                        | 1-2%                           |

Source: Guidance for Estimating Trip Reductions from Commute Options, Oregon Department of Environmental Quality, August 1996.

Other Transportation Modes

Other modes of transportation considered as part of the Sandy TSP include air, water, rail, and pipeline transport. At the present time, the City of Sandy is not directly served by any of these modes, but residents and businesses can access them from the surrounding region, typically by driving.

Air

Regional, national, and international freight and passenger air travel are provided at the Portland International Airport (PDX), located approximately 25 miles west of the city. PDX is accessible via transit by taking SAM to the Gresham Transit Center, transferring to the MAX Blue Line, and transferring again to the MAX Red Line at the Gateway Transit Center. Private, corporate, and light aircraft transport are also available at the Troutdale Airport (approximately 15 miles west of the city). Furthermore, five small privately held landing strips (McKinnon Enterprises, Sandy River landing strip, County Squire Airpark, Eagle Nest Ranch, and Krueger) are located within a five-mile radius of the city.
Rail
Regional, national, and international freight and passenger rail service are available for the residents and businesses of Sandy at several locations in the Portland Metro Region. Freight rail services are available from three national carriers (Burlington Northern Santa Fe Railroad, Union Pacific Railroad, and Southern Pacific Railroad), as well as several other short line freight rail companies. Long-haul passenger rail service is available from Amtrak.

Freight rail services are also available in Hood River through the Union Pacific Railroad line in the Columbia River Gorge, but there are no intermodal facilities of significance in the area for transferring goods.

Water
Regional, national, and international freight water transport is currently available at the Port of Portland. Tourist-oriented passenger water transport service is also available in the Portland Metro Region and the Gorge.

Pipeline/ Transmission Line
Natural gas service is available in the City of Sandy through feeder lines, but no major transmission pipelines for natural gas, oil, or any other commodity are currently available in the city.