A Snapshot of Transportation Planning: Oregon Department of Transportation (ODOT)

June 2014

TMIP

Better Methods. Better Outcomes.

U.S. Department of Transportation
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1.0 Introduction—Report Objective

The Federal Highway Administration's (FHWA) Travel Model Improvement Program (TMIP) works with agencies and other members of the transportation planning and modeling community to improve information sharing and support the best available tools and methods. TMIP seeks to innovate, educate, and advocate for best practices by sponsoring its Web Knowledge and Information Exchange, Peer Review Program, ongoing research activities, and the use of web-based technologies to connect and collaborate with its user community.

With the new emphasis on performance measurement and prediction under the Moving Ahead for Progress in the 21st Century Act (MAP-21), one of the efforts undertaken by TMIP involves developing a series of Agency Snapshot reports to highlight state and local agencies that support effective performance-based transportation planning and exemplify best practices. For each participating agency, the reports in this series identify available data, methods used to share data within and across the agency, tools employed for analysis, and the planning processes for which these data and analysis tools are utilized. Examples of snapshot reports that were produced as part of this series are available from the TMIP website (http://www.fhwa.dot.gov/planning/tmip/publications/other_reports/).

It is important to note that the purpose of this Agency Snapshot report series is not to recommend a single analysis tool—or even a set of tools. Rather, this report series seeks to highlight agency successes and provide information and examples that may help other agencies identify appropriate tools and methods for their own analytical needs. Specifically, the objective of this report series is to be a reference for transportation planning practitioners and agencies seeking to understand how their peer agencies and professional colleagues select and apply analytical tools and methods to support data-driven, performance-based transportation planning.

The focus of the current report is the practice undertaken by the Oregon Department of Transportation (ODOT). This report contains six sections in addition to this introduction:

- Section 2.0 presents selected background information on ODOT.
- Section 3.0 presents transportation planning services at ODOT.
- Section 4.0 presents tools and methods used by ODOT to support planning.
- Section 5.0 presents data used by ODOT to support planning.
- Section 6.0 presents selected performance measures applied by ODOT.
- Section 7.0 presents challenges and emerging issues faced by ODOT.

2.0 Background

2.1 Oregon Overview

Geography

Oregon is located in the Pacific Northwest region of the United States. Oregon's neighboring states include Washington to the north, Idaho to the east, and Nevada and California to the south. The state has 36 counties and covers a land area of 95,988 square miles. It is the ninth-largest state in the nation and the 27th most populated.

Population

Oregon's population in 2012 was 3.9 million, or about 39.9 persons per square mile. According to the US Census Bureau, Oregon's population is expected to reach 4.3 million by 2020—a growth rate of 1.3 percent per year, which is significantly higher than the national average growth rate of 0.9 percent. More than 70 percent of Oregon's population and employment is located in the 120-mile-long Willamette Valley, which includes nine counties in the northern part of the state between the Coast Range and Cascade Range mountains.

Employment

Oregon's total non-farm employment in 2013 was 1,673,700. The following table presents overall employment, by industry category, in Oregon.

Table 2-1: Oregon Employment Industries

Oregon Employment Industries (2013)	Total Employment
Mining and logging	7,600
Construction	73,700
Manufacturing	174,900
Trade, transportation and utilities	318,600
Information	43,900
Financial activities	91,200
Professional and business services	208,800
Educational and health services	242,600
Leisure and hospitality	176,700
Other services	58,300
Federal government	27,600
State government	81,000
Local government	180,600

Source: Oregon Labor Market Information System: olmis.org

Exports

Oregon's trade with other states far exceeds foreign exports. Oregon, however, is one of the most trade-dependent states in the nation and exported $18.6 billion of goods in 2013. Oregon's top five export trade partners are presented in Table 2-2.

Table 2-2: Oregon's Largest Export Partners

	Oregon's Largest Export Partners (2013)	Total Exports
1	China	$3.4 billion
2	Canada	$3.1 billion
3	Malaysia	$1.9 billion
4	Japan	$1.5 billion
5	South Korea	$984 million

Source: International Trade Administration — www.trade.gov/mas/ian/statereports/states.or.pdf

Oregon's Largest Export Industries

	Oregon's Largest Export Industries (2013)	Total Exports
1	Computer and electronic products	$6.7 billion
2	Agricultural products	$2.4 billion
3	Machinery, except electrical	$2.2 billion
4	Chemicals	$1.6 billion
5	Transportation equipment	$1.1 billion

Source: International Trade Administration — www.trade.gov/mas/ian/statereports/states.or.pdf

2.2 Agency Overview

ODOT traces its roots to 1913, when the Oregon Legislature created the Oregon Highway Commission to "get Oregon out of the mud." In 1969, the legislature created ODOT and moved the Department of Motor Vehicles, State Highway Department, Parks Division (then part of Highway), State Board of Aeronautics, State Ports Commission, and the newly created Mass Transit Division under ODOT.

Today, ODOT works to provide a safe, efficient transportation system that supports economic opportunity and livable communities for Oregonians. ODOT develops programs related to Oregon's system of highways, roads, bridges, railways, public transportation services, transportation safety programs, driver and vehicle licensing, and motor carrier regulation.

ODOT's Goals

- **Safety**. Engineering, education, and enforcement for a safe transportation system.
- **Mobility**. Keeping people and the economy moving.
- **Preservation**. Preserving and maintaining transportation infrastructure.
- **Sustainability**. Sustaining the environment and communities.
- **Stewardship**. Maximizing value from transportation investments.

2.3 Agency Organization

Oregon Transportation Commission (OTC)

The Transportation Commission establishes state transportation policy and guides the planning, development and management of a statewide integrated transportation network that provides efficient access, is safe, and enhances Oregon's economy and livability. The commission meets monthly to oversee ODOT's activities relating to highways, public transportation, rail, transportation safety, motor carrier transportation, and drivers and motor vehicles.

The governor appoints five commissioners, ensuring that different geographic regions of Oregon are represented. One member must live east of the Cascade Range; no more than three members can belong to one political party.

Area Commissions on Transportation

Area Commissions on Transportation (ACT) are the 12 advisory bodies chartered by the OTC. ACTs address all aspects of transportation—surface, marine, air, and transportation safety—with primary focus on the state transportation system. ACTs consider regional and local transportation issues that affect the state system. They work with other local organizations dealing with transportation-related issues.

ODOT Divisions

ODOT is composed of the Director's Office and nine divisions:

- **Directors Office.** Oversees the agency's biennial budget and manages Oregon's statewide transportation policy and development of surface transportation, driver and vehicle safety and licensing, and motor-carrier programs. Includes the offices of Employee Safety, Civil Rights, Workforce Development and Small Business Support, Government Relations, and Sustainability.
- **Central Services Division.** Provides services and support to all other ODOT divisions. Central Services includes the offices of Audit Services, Budget, Business Services, Facilities, Financial Services, Human Resources, Information Systems, and Procurement.
- **Communications Division.** Helps citizens understand transportation programs and issues through ODOT's outreach and information efforts, which include community relations, public information, employee and emergency communications, and media relations. Also provides support for the Office of the Director, the OTC, and numerous citizen advisory committees.
- **Driver and Motor Vehicle (DMV) Services Division.** DMV contributes to public safety by licensing only qualified persons and vehicles to drive on Oregon's roads. DMV issues titles to protect the financial and ownership interests in vehicles. DMV is headquartered in Salem, Oregon, with 64 field offices located throughout the state. DMV serves an average of 12,000 customers per day.
- **Highway Division.** ODOT's largest division is responsible for design, construction, maintenance, and operation of more than 8,000 miles of state highways. There are 14 district maintenance offices statewide.
- **Motor Carrier Transportation Division.** Regulates the commercial trucking industry in Oregon, ensures safe operations, and collects heavy truck registration fees and weight-mile taxes. Includes headquarters in Salem and enforcement offices at ports of entry and other locations throughout the state.
- **Public Transit Division.** Administers programs that support public transit agencies and activities throughout the state, including enhancing urban and rural public transportation options, supporting mobility choices for elderly and disabled people, and encouraging use of transit as an alternative to driving alone.
- **Rail Division.** Responsible for passenger and freight-rail planning, operations, and safety.

- **Transportation Development Division.** Responsible for research, data collection and analysis, planning, and related activities that inform current and future transportation system operations and development. Provides technical and planning assistance to local governments and organizations and coordinates multiple funding and grant programs.
- **Transportation Safety Division.** Provides Oregonians with a safe transportation system by offering information, services, grants, and contracts to the public and partner agencies and organizations statewide. Each year, the division administers more than 550 grants and contracts that deliver safety programs to Oregon citizens.

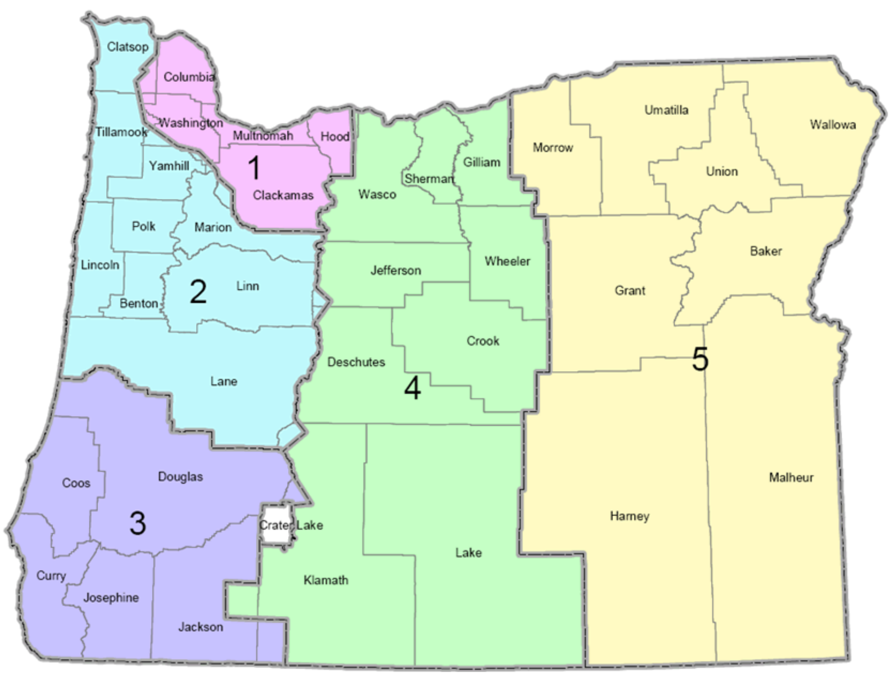
ODOT Region Offices

ODOT also has five regional offices that are responsible for a variety of transportation operations in their respective geographic areas. Each region has several smaller district offices that maintain transportation systems in those areas. ODOT's regional offices are transitioning from highway-centric to multimodal as the industry moves to offer more transportation options.

ODOT's regions are:

- **Region 1—Portland Metro**. Columbia, Multnomah, Washington, Clackamas, and Hood River counties.
- **Region 2—Northwest Oregon**. Clatsop, Tillamook, Yamhill, Polk, Marion, Lincoln, Benton, western Washington, Linn, and Lane counties.
- **Region 3—Southwest Oregon**. Coos, Douglas, Curry, Josephine, and Jackson counties.
- **Region 4—Central Oregon**. Wasco, Sherman, Gilliam, Jefferson, Wheeler, Crook, Deschutes, Klamath, and Lake counties.
- **Region 5—Eastern Oregon**. Morrow, Umatilla, Union, **Wallowa, Baker, Grant, Harney**, and Malheur count**ies.**

Figure 2-1: ODOT Transportation Regions and Counties



2.4 Financing and Budget

ODOT Revenue Sources

Transportation in Oregon is funded through three main revenue sources: 1) State Highway Fund; 2) Federal Funds; and 3) Local Funds.

State Highway Fund

Net revenues from the following state taxes and fees are deposited into Oregon's State Highway Fund:

- Motor vehicle registration and title fees.
- Driver license fees
- Motor vehicle fuel taxes.
- Motor carrier weight-mile taxes.

With minor exceptions, Oregon's constitution dedicates State Highway Fund revenues solely to build, improve, maintain, operate and use public highways, roads, streets, and roadside rest areas.

The State Highway Fund is a shared revenue source; it is divided among ODOT, counties, and cities according to the formula presented in Table 2-3.

Table 2-3: Oregon State Highway Fund Distribution

State Highway Fund Recipient	Funding Distribution	Basis for Distribution
Oregon cities	16%	Population
Oregon counties	25%	Number of registered vehicles
State of Oregon (ODOT)	59%	Remaining balance

ODOT's share of State Highway Fund resources are currently committed to three areas:

- Debt service on transportation bonds.
- The cost of running the agency.
- Maintaining and preserving Oregon's highways.

Federal Funds

Federal fuel and transportation taxes and fees, including the motor-fuels tax, tire tax, heavy-truck and trailer-sales tax, and annual heavy-truck-use tax, provide the funds for highway and transit programs nationwide. These taxes and fees are deposited into the federal Highway Trust Fund. The trust fund has two accounts: a Highway Account and a Mass Transit Account. Congress apportions the federal Highway Trust Fund to the states.

The federal surface transportation program currently invests more than one-half billion dollars in Oregon highway and transit projects each year.

Federal forest funds earmarked for road purposes are also distributed to eligible counties.

Local Funds

City and county local road funds come from several sources, including property taxes, local fuel taxes, local improvement district assessments, traffic-impact fees, bonds, general fund transfers, parking meters and fines, receipts from other local governments, various fines and permit fees, and private contributions.

Biennial State Budget Cycle

The State of Oregon follows a biennial budget cycle that begins on July 1 of odd-numbered years. The current state budget period began on July 1, 2013 and will end on June 30, 2015.

Total revenue for ODOT's 2013–2015 legislatively adopted budget is $5.299 billion, and is presented in Table 2-4.

Table 2-4: ODOT Revenue Sources

2013–2015 ODOT revenue sources	Revenue ($ millions)	Percent of revenue
Federal Funds	**$810**	**15.3%**
State Revenues	**$3,134**	**59.2%**
Beginning balance	$283	
Motor fuels tax	$1,066	
Weight mile tax	$593	
Driver and vehicle licenses	$661	
Transportation Licenses and fees	$106	
Transfers to ODOT	$271	
General Fund	$2	
Lottery proceeds	$94	
Sales and charges for service	$20	
All other revenue	$40	
BondCOP Sales	**$1,353**	**25.5%**
Total ODOT Revenue	**$5,299**	**100 %**

Source: 2013 – 2015 Legislatively Adopted Budget

ODOT's 2013–2015 biennial agency budget is $4.069 billion, which does not include the State Transportation Improvement Program (STIP) and mandated programs or transfers to other agencies. Expenditure categories are presented in Table 2-5.

Table 2-5: ODOT Revenue Uses

2013–2015 ODOT Uses of Funds	$ Millions
State Highway Program	**$2,617**
Maintenance	454
Preservation	249
Bridge	372
Highway Operations	123
Modernization	825

2013–2015 ODOT Uses of Funds	$ Millions
Special Programs	210
Local Government Assistance	367
Other ODOT Programs	**$1,452**
Transportation Safety	32
Public Transit	89
Rail	76
Transportation Program Development	224
Driver and Motor Vehicles	173
Motor Carrier	65
Central Services	192
Debt Service	580
Capital Improvement, Construction and Non-Limited Programs	21
ODOT Biennial Budget	**$4,069**
STIP and Mandated Programs	**$335**
Mandated Transfers to Other Agencies	**$903**
Cities	330
Counties	484
Other Agencies	81

Source: 2013 – 2015 Legislatively Adopted Budget

3.0 Transportation Planning Services

3.1 Transportation Planning Process

ODOT follows an integrated transportation planning process made up of elements providing guidance and direction for developing and managing Oregon's transportation system. Elements include goals and policy direction for the state system; detailed policy guidance for modal and topic plans; and detailed facility plans for specific projects such as highway segments and interchanges. Plans are developed in coordination with regional and local governments and adopted by the OTC as part of the Oregon Transportation Plan (OTP). They collectively form the state transportation system plan and provide guidance and context for decisions about system improvements, services, and management actions.

A description of ODOT's planning context, planning and associated programs, and policy questions considered by the agency, is provided in this section. Technical data required for transportation planning is discussed in Section 5.0.

3.2 Transportation Planning Context

Transportation planning context within ODOT requires coordination and collaboration between state, regional, and local agencies. In addition, transportation planning context provides the impetus for ODOT to create the modeling and analysis services that benefit the agency today. Each of the component plans is based on analysis of existing and projected conditions to help formulate the desired direction for the transportation system. The agency provides guidance on formulating transportation solutions through state system plans and assists and coordinates with local governments to develop local-system plans.

Statewide Planning Goals

Oregon has 19 Statewide Planning Goals designed to maintain a robust statewide land use planning program. The goals express the vision and values of the people of the state of Oregon and provide a framework for a planning process to balance the competing interests around the state. For example, the goals create an environment for rules related to urban growth boundary expansion, designed to protect the resource base of the state such as farmland and forestland. The goals are implemented under specific administrative rules for each subject area that provide detailed requirements on how goals are to be applied. At the local level, state laws ensure goals are achieved through adoption of comprehensive local plans. At the state level, the State Agency Coordination Program1 identifies and establishes how state agencies, including ODOT, comply with the Statewide Planning Goals and coordinate with local plans when developing and adopting state plans. State laws also lend strong emphasize on coordination between local, special districts, and state agencies.[2]

[1] More information on this program can be found here http://www.oregon.gov/LCD/docs/sac/odsl_sac.pdf

[2] More information on Oregon's statewide planning goals is available here: http://www.oregon.gov/LCD/Pages/goals.aspx#Statewide_Planning_Goals. Information on the history of Oregon's land use planning is available here: http://www.oregon.gov/LCD/pages/history.aspx

Transportation Planning Rule

The Oregon Transportation Planning Rule (TPR) provides specific direction and requirements for the implementation of Statewide Planning Goal 12 “Transportation.” The Rule establishes requirements for state, regional, and local governments to develop Transportation System Plans (TSP) and provides a framework for coordination between state and local authorities regarding transportation and land-use-related plans and regulations. The TPR was first adopted in 1991.3

3.3 Transportation Planning Products and Programs

Long-Range Transportation Planning

The current long-range transportation plan for Oregon, the OTP, was adopted by the OTC in 2006. The plan was formulated to address federal and state requirements for state transportation planning. The OTP is a multimodal framework establishing desired goals and policies for the state transportation system. The OTP is a component of the state TSP, which included several integrated component plans. A brief description of the OTP elements is provided below.

- **Oregon Highway Plan**. The overall objective of the current Oregon Highway Plan (OHP) is to define and establish long-range policies and investment strategies for the State Highway System. The plan encompasses a period of 20 years and includes state highway needs, investment strategies, projected revenues, performance measures, and implementation strategies that involve working with regional and local governments. The plan addresses both passenger- and freight-mobility issues. The OTC adopted the current plan in 1999. Since its adoption, the plan has been updated through the following amendments:
    - **Expressway Classifications**. Updated and adopted in 2013.
    - **OHP Tolling and Pricing Policy**. Updated and adopted in 2012.
    - **OHP Freight Route Map Revisions**. Updated and adopted in 2012.
    - **OHP Revisions—Access Management**. Updated and adopted in 2012.
    - **OHP Mobility Standard Revisions**. Updated and adopted in 2011.
    - **OHP Policy Amendment—Access Management**. Updated and adopted in 2011.
    - Facility Plans, such as Interchange Area Management Plans (IAMPs), when approved by the OTC become adopted amendments to the OHP.
- **Oregon Rail Plan**. Oregon is currently updating its 2001 State Rail Plan (SRP), anticipating plan adoption by the OTC in 2014. The update will establish policy, priorities, and implementation strategies for freight, passenger, and commuter rail transportation in compliance with the federal Passenger Rail Investment and Improvement Act of 2008. The SRP will clarify rail’s role in Oregon’s multimodal transportation system by first identifying the rail system’s current capabilities and then planning to meet future freight, commuter, and passenger rail needs statewide. The SRP will enhance community quality of life and economic development throughout Oregon.

[3] Information on the TPR is available here: http://arcweb.sos.state.or.us/pages/rules/oars_600/oar_660/660_012.html

- **Oregon Public Transportation Plan**. The most recent Oregon Public Transportation Plan was adopted in 1997 as an element of the OTP. The plan addresses a number of ODOT's public transportation policies (including transportation policy for intercity travel), inter-agency coordination of public transportation resources, and plan implementation. The plan includes policies and measures for a period of 20 years and sets level-of-service expectations for a preferred system. A plan update is in the early stages of development and completion is expected by 2015.
- **Oregon Transportation Safety Action Plan**. This plan also serves as the state's Strategic Highway Safety Plan (SHSP). The Transportation Safety Action Plan (TSAP) includes an overview of the current transportation safety environment and safety problems, a multi-action safety agenda for the next 20 years, a list of emphasis areas that identifies special safety actions, transportation safety performance measures, and the implementation strategy that includes legislation and investment requirements needed to implement the emphasis area actions by the year 2020. The plan was adopted in 2004, and was amended in 2006 and again in 2011.
- **Oregon Aviation Plan**. The plan is based on a framework defined by the aviation needs of Oregon and the goals of the OTP. The plan includes policies that will guide planning decisions, protect the investment in aviation infrastructure, support economic development, and provide intermodal accessibility. The plan was adopted in 2000 and was updated in 2007.
- **Oregon Bicycle/Pedestrian Plan**. This plan provides direction and guidance to ODOT and local jurisdictions in establishing bicycle and pedestrian facilities on state highways. The plan has two parts: one part establishes policies and implementation strategies, while the second presents design, maintenance, and safety information. This plan was adopted in 1995. Since then, the second part of the plan, updated in 2011, has been incorporated into the Highway Design Manual. An update of the first part is currently underway to reflect any changes to federal requirements and the goals of the statewide planning program.
- **Oregon Freight Plan**. The plan describes the economic structure of the state's freight industries and the freight infrastructure that supports these industries and movements. In addition, the plan analyzes effects of potential changes in commodity flows, the economy, climate change, and other factors on the freight system. Further, the plan includes options/strategies for financing the state freight system and for evaluating the relative importance of undertaking specific improvements that would enhance freight movement. Finally, the plan discusses implementation of the strategies. This plan was adopted in 2011.

Transportation Improvement Program

The Statewide Transportation Improvement Program (STIP) falls under the short-range plan category, though this document is essentially a project funding and scheduling program and not a plan. Specifically, the STIP is a four-year transportation capital improvement program for Oregon that has been approved by the FHWA and the FTA. The program includes multi-jurisdiction projects (federal, state, city, and county-level projects), multimodal projects (highway, public transit, freight, bicycle and pedestrian), and multi-sector projects such as projects on the national parks, national forests, and Indian tribal lands. The transportation projects included in the STIP are funded by federal, state, and/or local governments. The program is normally updated every two years.

Established by the OTC in 2001, the STIP Stakeholder Committee is responsible for providing guidance and advice on STIP development policies and procedures, including specifying STIP Project Eligibility Criteria and Prioritization Factors (known as the "STIP criteria"). The STIP criteria are used throughout the STIP development process to narrow the list of possible investments. Project comparison and prioritization methods vary by area and region of the state. The projects listed in the STIP are taken from two main sources: local transportation plans and program data and management systems, such as the Bridge Management System, Congestion Management System, Pavement Management System, and Safety Management System. The key state programs included in the current STIP include:

- Pavement preservation;
- State and local bridge;
- Modernization;
- Safety;
- Operations; and
- Special programs, including bicycle, pedestrian, and transportation enhancement programs.

In addition to the current STIP, ODOT is looking forward to the next STIP, which will include new criteria that organize projects into one of the following categories:

- **Enhance**. Includes projects/programs that contribute toward enhancement, improvement, or expansion of the transportation system. The Enhance project selection process is significantly different from the previous project selection process as this new process is more focused on making investment decisions based on the transportation system as a whole.
- **Fix-It**. Includes projects/programs that may contribute toward fixing or preserving the transportation system. The Fix-It project selection process is similar to prior STIPs.

Project Prioritization

For some programs, ODOT uses a number of prioritization factors to select projects to be funded from a list of eligible projects. These programs are Modernization, Pavement Preservation, and State Bridge Replacement and Rehabilitation. In addition, there are separate criteria for Development STIP (D-STIP) and Construction STIP (C-STIP) projects. For example, priority should be given to the D-STIP projects that:

- Implement Oregon Transportation Plan Policy;
- Are suitable for the D-STIP;
- Are for a solution that has already completed one or more D-STIP milestones; and
- Are for a solution that has funding identified for development or construction.

Priority should be given to C-STIP projects that:

- Implement the Oregon Highway Plan Major Improvements Policy (Policy 1G, Action 1.G.1);

- Implement Oregon Highway Plan Policy 1B: Land Use and Transportation, including support for sustainable urban development and applicable land use plans;
- Support state and local economic development plans and goals;
- Support freight mobility;
- Improve the safety of the transportation system;
- Implement Oregon Highway Plan Policy 5A: Environmental Resources;
- Leverage other funds and public benefits; and
- Are ready to go to construction within the four years of the STIP.

In addition, the project prioritization process may be affected by special legislative criteria. For instance, in 2001 and in 2003, the Oregon Legislature approved special funding through the Oregon Transportation Investment Acts (OTIA) to address state bridge needs. All projects funded through OTIA had to meet the legislatively approved funding criteria. It should be noted that all prioritization factors may not be applicable to all projects. In general, projects meeting several prioritization factors and/or meeting them more completely are given higher priority over projects meeting fewer prioritization factors or meeting them to a lesser degree.[4]

Other Planning Programs

- **Least-Cost Planning (LCP).** In 2009, the Oregon State Legislature adopted the Jobs and Transportation Act, which directed ODOT to develop a least-cost planning methodology for use in the development and assessment of plans and projects at the state and regional level. The Act defines least-cost planning as "[a] process of comparing direct and indirect costs of demand and supply options to meet transportation goals, policies or both, where the intent of the process is to identify the most cost-effective mix of options." Key objectives of the Oregon LCP effort include helping ensure that transportation decisions are made in a way that is transparent and accountable to the public, and makes the best use of public funds to achieve long-term goals. ODOT is currently working with its stakeholders to develop a LCP methodology and analysis tool. The first two phases of the project—a framework to guide LCP development, a draft analysis tool (Mosaic), and a draft user's guide—are now complete.[5] ODOT has begun work on the implementation phase, which includes one or more demonstration projects.
- ***Connect*Oregon.** This is a lottery-backed revenue bond, multimodal initiative established by the Oregon Legislature in 2005 (*Connect*Oregon I). *Connect*Oregon aimed to improve connections among modes of transportation for air, rail, marine/ports, and transit infrastructure. The success of the first year's $100 million program led to *Connect*Oregon II and *Connect*Oregon III programs, at $100 million and $95 million (plus a separate $5 million for rural airports), respectively, and *Connect*Oregon IV, with $40 million. *Connect*Oregon V recently added bicycle and pedestrian projects as eligible project modes. Projects eligible for funding from state fuel tax revenues are not eligible

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[4] The reader is referred to the following report for more information on project prioritization: 2012-2015 STIP Project Eligibility Criteria and Prioritization Factor for the Development STIP

[5] See www.oregonmosaic.org for the user's guide and more and the draft analysis tool. Project history is available here: www.oregon.gov/ODOT/TD/TP/pages/lcp.aspx

for *Connect*Oregon funding. The OTC approves projects for funding with the assistance of input from 11 review committees, representing five state regions and six modes.

- **Oregon Transportation and Growth Management Program.** This program is a partnership between the Oregon Department of Transportation (ODOT) and the Department of Land Conservation and Development (DLCD). The program provides planning grants, such as transportation system planning and integrated land use and transportation planning; education and outreach services to local government, such as workshops, lecture series, conferences, and other public forums; and assistance to local governments to update their codes, regulations, project design, and existing transportation system plan.
- **Oregon Sustainable Transportation Initiative (OSTI).** This program was created to meet the state's goal to reduce greenhouse gas (GHG) emissions by 75% below 1990 levels by the year 2050. The effort involves several agencies, including ODOT, the Department of Land Conservation and Development, the Department of Environmental Quality, and the Oregon Department of Energy. The program comprises a number of initiatives, including developing a toolkit to assist local governments and MPOs in reducing GHG emissions from transportation; developing guidelines for scenario planning; and conducting outreach and education programs.
- **Freight Route Capacity Rule Development.** This rule (ORS 366.215) restricts the OTC from permanently reducing the vehicle-carrying capacity of an identified freight route. ODOT recently adopted an administrative rule to guide implementation (OAR 731-012). ODOT is working on an internal guidance document that is consistent with the new rule.

3.4 Policy Questions Considered by the Agency

A significant portion of planning work and policy questions considered by ODOT are related to land-use mandates (ORS 197), which makes Oregon unique. The Oregon Statewide Planning Goals and Guidelines, consisting of 19 statewide land-use goals—discussed earlier—form the framework for Oregon's planning program. The planning guidelines for transportation include the following:

- All current area-wide transportation studies and plans should be revised in coordination with local and regional comprehensive plans and submitted to local and regional agencies for review and approval.
- Transportation systems, to the fullest extent possible, should be planned to utilize existing facilities and rights-of-way within the state, provided that such use is not inconsistent with the environmental, energy, land-use, economic, or social policies of the state.
- No major transportation facility should be planned or developed outside urban boundaries on Class I and II agricultural land, as defined by the US Soil Conservation Service, unless no feasible alternative exists.
- Major transportation facilities should avoid dividing existing economic farm units and urban social units, unless no feasible alternative exists.
- Population densities and peak-hour travel patterns of existing and planned developments should be considered in the choice of transportation modes for trips taken

by persons. High-density developments, with concentrated trip origins and destinations, should be designed to be principally served by mass transit, low-density developments, with dispersed origins and destinations, should be principally served by automobile.
- Plans providing for a transportation system should consider, as a major determinant, the carrying capacity of the air, land, and water resources of the planning area. The land conservation and development actions provided for by such plans should not exceed the carrying capacity of such resources.

In addition to the land-use mandate, attaining GHG reduction targets for all modes is also an important policy consideration for ODOT.

4.0 Planning Analysis

The Transportation Planning Analysis Unit (TPAU) within ODOT is responsible for providing technical services necessary to support long-range transportation planning and project development. The Unit provides analytical and technical expertise in many areas, including development and application of a statewide model, urban travel demand models, a transportation GHG model, mesoscopic models, and traffic simulation models. Common modeling and analysis tools used by ODOT to conduct and support transportation, air quality, land-use, and economic planning activities are presented in this section.

Oregon Modeling Improvement Program

Oregon has a comprehensive statewide modeling and analysis program—the Oregon Modeling Improvement Program (OMIP). ODOT started this program in 1994 as a multi-agency collaborative effort. OMIP provides a number of services, including addressing federal and state mandates, identifying innovative methods, and expanding ODOT's modeling tools to support effective decision-making. OMIP encourages collaboration and knowledge transfers within the agency to optimize limited monetary and staff resources. OMIP has a number of outreach programs, including peer review of modeling tools, an international peer review panel for the statewide model, partnerships with universities for research and internships, and facilitation of the Oregon Modeling Steering Committee to serve as an active forum for discussion, partnerships, and knowledge transfers between 18 different agencies.

OMIP includes two central elements:

- Transportation Land-Use Modeling Improvement Program. A substantial part of the Oregon Modeling Improvement Program is the Transportation Land-Use Modeling Improvement Program (TLUMIP). The program was established in 1996 to develop an integrated transportation, land-use, and economic model that can be used for regional/state-level planning and policy analyses. Two statewide models have been developed under this program: the first-generation Oregon Statewide Integrated Model (SWIM1, developed in 1999) and the second-generation Oregon Statewide Integrated Model (SWIM2, developed in 2007). Since their development, both models have been successfully used in a number of projects.
    - TLUMIP sponsored the organization of Oregon's symposia on integrated land-use transportation models. One of the key objectives of these symposia is to provide a platform for national and international presenters to share ideas. Oregon has hosted five symposiums since 1998.
- **Oregon Modeling Steering Committee**. In 1996, OMIP formed the Oregon Modeling Steering Committee (OMSC) to provide direction and oversight to OMIP and share knowledge and expertise among ODOT, MPOs, and other agencies. The Committee provides these services in a number of ways, including:
    - Providing relevant technical information to decision makers;
    - Promoting application of travel demand models at the local, regional, and state-level;
    - Providing support for technical guidance, training, education, research; and
    - Coordinating peer reviews of travel demand models.

The Committee members include representatives from federal, state, and local agencies and jurisdictions.

4.1 Modeling Tools

Statewide Model

The Oregon Statewide Integrated Model (SWIM) integrates the dynamic interaction between Oregon's economy, land-use, and transportation systems into one unified modeling tool. To address the complexity and challenges associated with the dynamic interaction, the SWIM is made up of eight integrated sub-models:

- Economic Model (represents the growth of the state's economy)
- Population Synthesizer
- Location Model (allocates business productions and transactions)
- Aggregate Land Development (identifies land availability)
- Person Travel
- Commercial Goods Transport
- External Goods Transport
- Transport Model (allocates trips to routes)

The model facilitates analysis of complex economic, land-use, and transportation interactions. This tool supports decision-makers when considering policy and transportation alternatives. Examples of analyses that use this modeling tool include:

- Modeling a new North-South freeway in Eastern Oregon to evaluate whether population and traffic growth would be diverted from the Willamette Valley to the east side of the state. Modeling revealed a new freeway would not shift growth away from the Willamette Valley. This study was prompted by a legislative directive to ODOT to study the construction of such a freeway.
- Modeling the possible effects of a Newberg-Dundee bypass on inducing additional development in Yamhill County. The potential for induced growth resulting from the construction of the bypass has been a significant issue in the bypass planning process. The model was used successfully to evaluate the nature and general magnitude of induced growth effects. The results were important to the land-use exceptions process and subsequent court appeal.
- Modeling the economic effects of deteriorating bridges on the Oregon economy. The SWIM was used to evaluate the economic effects of several approaches to the bridge problem, including no repairs and using load restrictions. Modeling revealed a program carefully staging the repairs of key bridges would provide 90% of the economic benefits of repairing all the bridges, at nearly half the cost. This staging plan formed the basis of the Bridge Delivery Program funded by the Oregon Legislature.
- Modeling in support of the Oregon Freight Plan, evaluating future needs given uncertain economic conditions.
- Estimating the economic benefit of investing in a seismic reinforcement program to prepare for a major earthquake along the Cascadia Subduction Zone. The benefit/cost ratio, weighted by the probability of a major earthquake is four, indicated that the program is a good business investment for Oregon, in addition to providing value to emergency services, aid, and recovery after a major earthquake disaster.

Urban Travel Demand Models

Planning requirements in Oregon were creating a large demand for model development and application services. Four of the nine MPOs in Oregon staff their own modeling services, while the remaining MPOs rely on ODOT for development and application services. In order to shorten model development time and support efficient provision of modeling services, ODOT developed two travel demand model frameworks: one framework for MPOs and a second framework for small cities. Each of these model frameworks was estimated using Oregon-wide data. For each framework, there was a single model estimation effort, which was then deployed in each model area. For each model, the components are calibrated and validated. This approach significantly reduced the model development time. Both models are implemented through a series of script files written in the R statistical programming language, with the exception of traffic assignment, which is carried out using proprietary traffic assignment software.

Joint Estimation Model in R

The modeling needs for a Metropolitan Planning Organization (MPO) are directly related to its responsibilities for meeting specific urban transportation planning requirements established by federal law. These are defined by the FHWA and the FTA and are described in Title 23 (Highways) and Title 49 (Transportation) of the Code of Federal Regulations (CFR). Among these requirements is the development of a 20-year transportation plan that includes both long- and short-range strategies/actions that lead to the development of an integrated intermodal transportation system. Specific factors that must be explicitly considered, analyzed, and reflected, as appropriate, include:

- Projected transportation demand of persons and goods in the metropolitan planning area over the period of the plan, based on all applicable short- and long-term land-use and development plans;
- The effectiveness of transportation projects in meeting the projected demand and supporting the overall efficiency and effectiveness of transportation system performance; and
- Expansion, enhancement, and increased use of transit services.

Additional modeling needs are related to the TPR requirement for the preparation of local transportation system plans (TSPs) that “establish a system of transportation facilities and services adequate to meet identified local transportation needs.” While the TPR does not regulate transportation modeling, it does set planning requirements that have direct implications for the type of models needed to develop TSPs, namely that:

- Within urban growth boundaries, the determination of transportation needs must be based on population and employment forecasts and distributions for at least 20 years that are consistent with the acknowledged comprehensive plan, as well as measures to encourage reduced reliance on the automobile; and
- TSPs must be based upon the evaluation of system alternatives that may include improvements to existing facilities or services; new facilities and services, including different modes of transportation that could reasonably meet identified needs; transportation system management measures; and demand management measures.

MPOs also use models to prepare subarea transportation studies. In these instances, a model is focused for a subarea of a city or county to examine detailed land-use or transportation system alternatives, analysis of the transportation system impacts of large-scale development proposals, and the evaluation of the effects large-scale transportation projects, such as bypasses.

In order to facilitate development and maintenance of many travel demand models within the state, ODOT partnered with Oregon MPOs to develop a model framework to use for all MPOs in the state. This was done by using results from the 1994–96 Oregon Household Activity Surveys and by adopting the Portland Metro model structure. This structure is referred to as the Joint Estimation Model in R (JEMnR). JEMnR is a 4-step, state-of-the-practice MPO model class.

The model consists of the following modules:

- The **Pre-Generation module** consists of three household submodels that stratify households by the number of workers, number of autos owned, and number of children and routines to calculate three accessibility measures.
- The **Trip Generation module** generates daily trip productions using a set of cross-classification models for eight trip purposes: 1) home-based work; 2) home-based shop; 3) home-based recreation; 4) home-based other; 5) non-home-based work; 6) non-home-based non-work; 7) home-based college; and 8) home-based school.
- The **Multimodal Accessibility module** calculates the utilities used in the trip distribution module. Utilities are calculated for the peak period, off-peak period, or a combination of both. The calculation is split into two steps: First, utilities are calculated by trip purpose, mode, and income. Second, purpose/income-specific logsums are calculated from the individual modal utilities.
- The **Trip Distribution module** distributes daily trips to destinations for all trip purposes using a destination choice model, with the exception of home-based school trips, which are distributed using a separate method. Internal-external, external-internal, and external-external trips are also handled with separate procedures.
- The **Mode Choice module** calculates peak and off-peak trips by purpose/mode/market segment. The utility functions for the mode choice model are identical to those used for destination choice, with the exception of household variables, which are added for mode choice.
- The **Peaking and Demand Matrices module** creates trip matrices for assignment. The daily P-A matrices from the mode-choice module are converted to time period-specific O-D matrices based on input time-of-day/directional factors, by trip purpose. The external trips from the trip distribution module are then added to produce total trip matrices, by time period.

Oregon Small Urban Model

The Oregon Small Urban Model (OSUM) framework was developed and estimated by ODOT with assistance from Portland Metro. The 1996 non-MPO household activity survey data used for the model estimation was collected from a sample of 3,200 households in eight rural counties throughout Oregon.

The general structure of the model follows a basic three-step process: 1) trip generation; 2) trip distribution; and 3) traffic assignment. Prior to trip generation, there is a pre-generation step that produces all necessary inputs for trip generation using a set of household submodels stratifying households by number of workers, household size, and number of workers by household size. The trip generation model produces person-trip productions, by trip purpose, for each hour of the day. Within the trip distribution step, a destination choice model is used to distribute internal-internal trips, while internal-external, external-internal, and external-external trips are handled with separate procedures. Prior to trip distribution, a submodel is used to estimate the percentages of external-external traffic at each external station and a daily through-trip matrix. Trip assignment is performed using a single-class (auto), equilibrium capacity restraint technique. Currently, ODOT is responsible for more than 10 active OSUM models.

Land-Use Models

Land-Use Scenario DevelopeR (LUSDR). Land-use models are generally recognized as useful tools for forecasting land-use inputs to transportation models and for analyzing land-use effects of transportation projects. Unfortunately, the complexity of most land-use models gets in the way of their widespread use by planning agencies. The Land Use Scenario DevelopeR (LUSDR) was created by ODOT to fulfill the need to evaluate transportation conditions under uncertain land-use futures. LUSDR includes the land-use behavior and policy sensitivity desired in a land-use model and has a simple structure and manageable data requirements. LUSDR operates at the level of individual households and employment establishments, micro-simulating location decisions of land developments. The model produces a synthetic population of households and applies the following attributes: size, workers, age of household head, income, dwelling tenure, and dwelling type. Households are spatially located within residential developments. Employment is calculated from workers and allocated to economic sectors, employment establishments, and business developments (e.g., shopping centers, office parks, etc.). Residential and business developments are allocated to zones using an iterative process that identifies candidate zones based on land availability and plan compatibility, choosing zones via a location model and reconciling land supply and demand in each zone through a bidding process.

UrbanSim. In 1998, the urban phase of TLUMIP included development of an Oregon Prototype Metropolitan Land-Use Model, UrbanSim. This is an open-source software system designed for integrated planning and analysis of urban development. UrbanSim was designed by Paul Waddell (University of California, Berkeley) and developed with numerous collaborators to support metropolitan land-use, transportation, and environmental planning. It has been distributed on the Internet since inception, with regular revisions and updates.

Transportation Emission Model

GreenSTEP. The GreenSTEP model was developed by ODOT to estimate and forecast the effects of policies and other influences (e.g., gas prices) on the amount of vehicle travel, the types of vehicles and fuels used, energy consumption for vehicle travel, and the resulting GHG emissions. The name, GreenSTEP, is an acronym for "Greenhouse Gas Strategic Transportation Energy Planning." The full name of the model helps to describe the model's origin and function.

The origins of GreenSTEP's development and its main applications have been to estimate and forecast GHG emissions from the transportation sector. GreenSTEP was designed to support strategic planning efforts that require the consideration of many possible scenarios and contingencies. It combines higher-level analysis with an ability to compute the effects of multiple factors that influence vehicle ownership and use, energy consumption, and GHG emissions. It runs rapidly, quickly analyzing many scenarios and contingencies.

The initial focus of GreenSTEP was on household travel using light-duty vehicles. This focus reflected a statutory emphasis on reducing emissions from this portion of the transportation sector. GreenSTEP's capabilities are now being expanded to address household travel more completely and to address more portions of the transportation sector. For example, although walking does not produce any GHG emissions, a walk model was added because the amount of walking is an important indicator of the health effects of a transportation and land-use scenario. Work is also underway to incorporate air travel into the household emissions estimates.

FACTORS CONSIDERED AT THE HOUSEHOLD LEVEL

HOUSEHOLD STRUCTURE
Number of People
Ages
Income

LOCATION ATTRIBUTES
Density
Design

TRANSPORTATION ATTRIBUTES
Roads
Transit

OTHER
TDM
Eco-Driving
Parking
Carshare
Prices…

In addition to computing GHG emissions, the GreenSTEP model calculates the amount of fuel and electricity consumed for the transportation modes that it models. This enables GreenSTEP to be used to assess potential consequences for fuel consumption, electricity consumption, household fuel expenditures, gas tax receipts, and related effects.

GreenSTEP is a planning model that can be applied at the statewide level or metropolitan level. It is being used to provide analytical support for a number of planning purposes, including: the development of Oregon's Statewide Transportation Strategy for reducing GHG emissions; the Climate Smart Communities Scenarios project for the Portland metropolitan area; the Oregon Governor's Ten-Year Energy Action Plan; and the assessment of the future effects of hybrid, plug-in hybrid, and electric vehicles on fuel-tax receipts.

GreenSTEP can be applied at different geographic scales. When the model is applied at the statewide scale, the geographic area is subdivided into counties and population is apportioned to the urbanized, other urban, and rural portions of each county. Similarly, when the model is applied at a metropolitan scale, the geographic area is subdivided into districts and population is apportioned to the urbanized, other urban, and rural portions of the district. However, metropolitan applications may be limited only to the urbanized portions of the metropolitan area. GreenSTEP can be scaled to different geographies because the model performs calculations at the household level. Individual households are simulated based on characteristics.

GreenSTEP then simulates vehicle ownership and use, energy consumption, and GHG emissions for each household given the household's characteristics and other relevant factors, such as fuel prices, land use, transportation services, and the penetration of advanced vehicles in the market.

The household-level model results, and other GreenSTEP calculations, can be used to calculate a wide variety of travel, energy, GHG, economic, and health measures. Examples can be seen in the Statewide Transportation Strategy technical appendices. The large number of model outputs and capabilities for evaluating many scenarios can pose a challenge for making sense of massive amounts of data; data visualization methods (e.g., GreenSTEP Scenario Viewer) are being developed for this purpose.

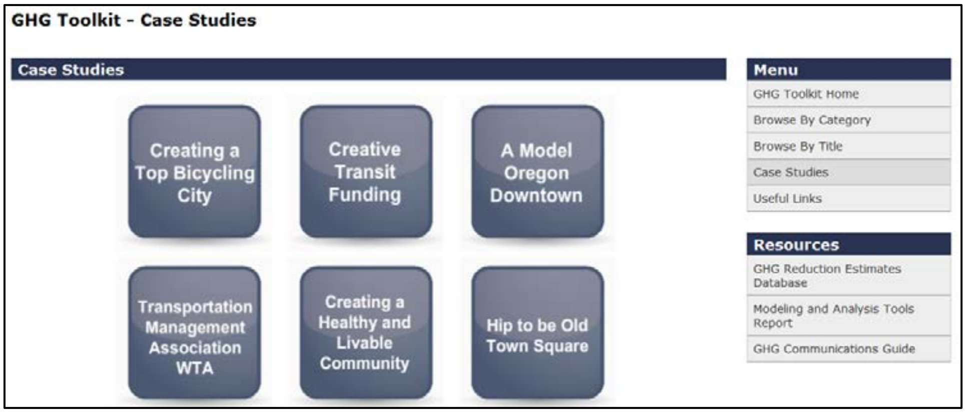
The GreenSTEP model was reviewed extensively by state, national, and international travel and emissions modeling experts in multiple venues. Evaluation at the national level led to the FHWA adopting GreenSTEP as the basis for their Energy & Emissions Reduction Policy Analysis Tool (EERPAT). In 2010, the American Association of State Highway and Transportation Officials (AASHTO) awarded ODOT staff its President's Transportation Award for Planning for the development of the GreenSTEP model.

Other Modeling Tools

Greenhouse Gas Emissions Reduction Toolkit. This toolkit was developed by ODOT. It is designed to help local jurisdictions identify and explore the kinds of actions and programs they can undertake to reduce vehicle emissions. It can also help local jurisdictions meet other community goals, including helping to spur economic development, increase biking and walking, support downtowns, create healthy livable communities, and more. Each Strategy Report describes an action, program, or policy that can be implemented by a jurisdiction. The report gives an overview of what it is, how it can benefit a community, how costly it is to implement (how long it takes to see results), and gives examples of where it has been used in Oregon. The reports are an entry point to a topic, and are a tool for planners to explore and communicate with respect to the strategies described. Case studies are included that explore the interaction between strategies, and highlight implementation considerations. Figure 4-1 demonstrates the toolkit starting point by category, and Figure 4-2 by case study. The toolkit is accessible online via ODOT's website. This is an easy-to-use method of exploring different options quickly.

Figure 4-1: GHG Toolkit Category Menu

Figure 4-2: GHG Toolkit Case Studies Menu



4.2 Analysis Tools

Analysis Procedure Manual

The Analysis Procedure Manual (APM) is unique to Oregon. The APM is a comprehensive source on current methodologies and procedures that may be applied to analyze long-term ODOT projects. The APM does not recommend any specific software; rather, it presents best practices for consistent and accurate results. Although the manual addresses multiple topics, the information included in the document is not exhaustive. Topics in the APM include safety, developing existing-year volumes, future-year forecasting, system-planning analysis, mesoscopic analysis, performance measures, analyzing alternatives, segment analysis, un-signalized-intersection analysis, signalized-intersection analysis, multimodal analysis, traffic-simulation models, environmental-traffic data, travel demand modeling, and operational analysis. Use of the manual is supported by the Analysis Procedures Manual User Group (APMUG), which is open to all interested parties and meets quarterly. The manual is utilized by private consultants and other government agencies across the nation.

Safety Analysis Tools

ODOT developed two Excel-based safety analysis tools:

- **Critical Rate Calculator**. The tool uses Highway Safety Manual Critical Rate network screening methodology to calculate crash rates and to identify priority intersections or road segments for further safety analysis.
- **Excess Proportion of Specific Crash Types Calculator**. This tool uses the Highway Safety Manual Excess Proportion of Specific Crash Types network screening methodology to identify intersections with an excess proportion of specific crash types for further safety analysis.

Crash Forecasting Tools

- **SPIS**. Safety Priority Index System (SPIS) is an analysis tool developed by ODOT in 1986 to identify potential safety problems on state highways. The software complies with the requirements of the Highway Safety Improvement Program (HSIP). SPIS has been updated/modified to include both on- and off-state highways. ODOT uses SPIS for network screening and to identify and prioritize sites with potential for safety improvements.

- **Systemic Plans**. ODOT has developed systemic plans covering the three safety focus areas in the Oregon Transportation Safety Action Plan: 1) Roadway Departure; 2) Intersections; and 3) Bicycle/Pedestrians. Each area has a separate systemic implementation plan identifying potential project locations, and each area involves deploying large numbers of relatively low-cost, cost-effective countermeasures.
- **IHSDM**. ODOT has used FHWA's Interactive Highway Safety Design Model (IHSDM) to evaluate safety and operational effects of geometric designs of highways. The software is based on the Highway Safety Manual (HSM). IHSDM is data intensive and ODOT is evaluating the software for use in design (not for evaluation, however) and for segments with little change over the length, or short sections of urban arterials.
- **OASIS**. The Oregon Adjustable Safety Index System (OASIS) was developed as an online safety analysis tool capable of performing "SPIS-like" safety analysis and allowing users to vary the SPIS calculations. Users can analyze specific types of crashes or alter parameters, such as segment length, number of crash data years, and SPIS formula defaults, like formula weighting. The OASIS tool allows the user to create custom safety analyses of the data within the system.

In addition to the software discussed above, ODOT is currently exploring data requirements for SafetyAnalyst software and other HSM methods based on the Minimum Inventory of Roadway Elements (MIRE).

Traffic Microsimulation Models

Static Traffic Assignment Models

- **Synchro/SimTraffic**. This software simulates movements of car, bus, truck, and pedestrian traffic through intersections and arterials/freeway networks. SimTraffic includes vehicle and driver performance characteristics that are consistent with FHWA's recommendation for traffic microsimulation models. The software is used in Regions 2–5 (volume/capacity [v/c] ratios in these regions are usually over 0.70), and in Region 1 where v/c ratios exceed 0.90. ODOT recommends that, in general, SimTraffic should be used to analyze signal systems and estimate vehicle queue when v/c ratio is over 0.90, as well as for the analysis of all coordinated signal systems.
- **CORSIM**. This software can be applied to simulate traffic on streets, arterials, and freeway networks. Also, CORSIM can simulate any control devices, including stop/yield signs, traffic signals, and ramp metering. Similar to SimTraffic, CORSIM uses vehicle and driver performance characteristics that are consistent with FHWA's recommendation for traffic microsimulation models. CORSIM has been used in some of ODOT's projects.

Dynamic Traffic Assignment Models

- **TRANSIMS**. TRansportation ANalysis SIMulation System (TRANSIMS) is an integrated set of tools that includes the following components: a population synthesizer, an activity generator, a route planner, and a microsimulator of traffic. TRANSIMS was developed as part of the Travel Model Improvement Program (TMIP), primarily with funding from

USDOT, with some additional assistance from the EPA. TRANSIM is available for free to download. During the development of TRANSIMS, Portland was selected as a test site/case study because of its size, mix of transportation, and staff availability. TRANSIMS implementation in Portland represented microsimulation on a regional scale. The task involved exploring the effects of different types of data on the results and testing sensitivity of TRANSIMS. Also, the route planner and microsimulation components of the software were tested for a number of travel modes, including auto, large vehicles, transit vehicles, and transit passengers.

- **Paramics**. Paramics is a microsimulation software that can model traffic flows (e.g., cars, trucks, buses, heavy rail, and light-rail transit), traffic management systems (e.g., ramp meters, toll roads, and special lanes), and transit priority systems. The software can undertake both static and dynamic traffic assignment (DTA), and animate traffic movements in 3D. However, Paramics cannot produce signal coordination timing. Also, the software is data intensive, can be time consuming when constructing and calibrating a scenario, and requires special knowledge/expertise to run. Currently, Paramics is not practical enough for most ODOT applications.
- **VISSIM**. VISSIM has may features and functionalities that are similar to Paramics. VISSIM can also model traffic flows (e.g., cars, trucks, buses, heavy rail, and light-rail transit), traffic management systems (e.g., ramp meters, toll roads, and special lanes), and transit priority systems. The software also has the capability of both static and dynamic traffic assignment. In addition, VISSIM can simulate on-street and double-parking behavior. However, like Paramics, VISSIM cannot produce signal coordination timing, is data intensive, and requires special knowledge/expertise to run. The software is not practical enough for most ODOT applications; few ODOT offices currently own the VISSIM software.

Signalization Intersection

- **SIGCAP2**. SIGCAP2 is a computer program for signalized intersections. The software was developed by ODOT based on the 1985 Highway Capacity Manual (HCM). SIGCAP2 is a sketch planning-level tool used to estimate the v/c ratio of an intersection only.
- **Saturation Flow Rate Calculator**. This Excel-based tool uses the methodology included in the HCM (2010) to calculate saturation flow rates from field data.
- **Signal Progression Calculator**. This Excel-based tool uses volumes at the critical intersection to obtain a preliminary estimate of the minimum required progression bandwidth for signalized intersections.

Un-signalized Intersection

- **UNSIG10**. ODOT developed this software for un-signalized intersections based on the HCM (1985). UNSIG10 is a sketch planning-level tool used to estimate the v/c ratio of an un-signalized intersection only.

- **Roundabout Calculator**. This Excel-based tool is currently under development. Once fully functional, the tool may be used to calculate conflict flow volumes, entry capacity, v/c ratio, control delay, level of service (LOS), and the 95th percentile queue for each approach. The method described in the NCHRP Report 572 is being used to develop the tool.

Traffic Optimization Tools

- **TRAFFIX**. Local authorities in Oregon use this software to evaluate the impacts of various development proposals and small regional projects on isolated intersections. The software is typically used for traffic impact analysis (TIA) and similar analysis work. Specifically, TRAFFIX is used to model existing traffic, develop future-year traffic volumes for several alternatives, evaluate potential signal timing, and generate LOS for intersections (both signalized and un-signalized). Many TRAFFIX files can be converted to files that are compatible with Synchro.
- **HCS**. Similar to TRAFFIX, Highway Capacity Software (HCS) is primarily used by local jurisdictions to model isolated intersections. The software implements the procedures defined in the HCM for analyzing capacity and determining LOS for intersections (signalized and un-signalized), ramp junctions, roadways (e.g., urban streets, multi-lane arterials, and freeways), weaving areas, and transit.

Benefit-Cost Tool

- **HERS-ST**. ODOT uses the state version of FHWA's Highway Economic Requirements System (HERS-ST) software to compare costs and benefits associated with alternative highway improvement-related proposals/options. Output from HER-ST includes system performance and improvement costs. ODOT has used HERS-ST to update/provide input on a number of highway programs/plans/projects, including Oregon's Statewide Congestion Management Program, highway needs analysis for development of Oregon Highway Plan, OR62 Bypass, US97 Bend North Corridor, and US101 Corridor (Seaside).

5.0 Agency Data Collection Efforts

Oregon transportation data products and services are provided to local, regional, state, and national government agencies, and the private sector. Data is used for transportation planning, project delivery, design, construction, operations, maintenance, funding apportionment, legislation, and regulatory activity. It is essential to conducting ODOT business to have access to affordable, high-quality data. A large portion of the department's data products and services are provided by the Transportation Data Section (TDS). The Trans Data Portal provides a single resource for data: http://www.oregon.gov/ODOT/TD/Pages/Data_Portal.aspx

TDS activities are guided by a 10-year business plan that provides the vision, goals, and objectives associated with fulfilling agency data needs. This plan is implemented by following a set of strategies:

- Encourage customers to become self-reliant by providing resources, tools, and training.
- Refine process mapping and shared responsibilities across units.
- Concentrate efforts on agency-required activities.
- Consider intermodal data needs in all TDS data-management activities.
- Support key federal initiatives, such as MAP-21.
- Support key agency initiatives, such as Intermodal Oregon.
- Develop enterprise content that facilitates data integration across ODOT business systems.
- Encourage inter- and intra-agency partnerships.
- Utilize emerging web and mobile technology tools to increase information accessibility and reduce field safety risks.
- Support and promote Transportation Development Division (TDD) Diversity Action Council (DAC) activities.
- Encourage activities that realize safety-aware solutions.

5.1 Data

Household Travel Survey

State and federal regulations require the use of reasonably current data for transportation modeling and analysis. The Oregon Travel and Activity Survey (OTAS) was the first in-depth study of household travel behavior in Oregon in nearly 15 years. Previous surveys were conducted between 1994–96, and in 1985 and 1977. These data are necessary to estimate travel demand models used for transportation planning analysis, including air-quality conformity, long-range planning, and evaluating transportation investment alternatives. Surveys are traditionally conducted every 10 years, since household activities and population demographics change over time.

The 2009–2011 survey was a joint effort among agencies conducting modeling in Oregon. The joint effort was administered through the Oregon Modeling Steering Committee (OMSC), of which ODOT is a member, and asked approximately 18,000 households to identify where and how they traveled on a typical weekday. In order to ensure a representative sample for the study, each household was asked a series of detailed questions about the household's access to transportation and its socioeconomic characteristics during the recruitment phase. These data will be used to estimate how much travel is generated by all households across the State of Oregon. Differences in activity patterns, by region and household characteristics, will be evaluated and the findings integrated into current analysis and forecast tools.

Traffic Count Program

As is required for all states, Oregon collects and processes traffic-related data on public roads within the state. Data collected include traffic volume and vehicle class information on federal, state, and some local roads, and data are available in several formats, including seasonal-trend tables and automatic traffic recorder (ATR) characteristic table and maps.[6] In addition to ODOT, some local agencies also collect traffic count data.

Safety/Incident/Accident Data

ODOT compiles, maintains, and performs quality assurance checks on the motor vehicle crashes database. The database includes information on vehicle crashes on city streets, county roads, and state highways; it also provides geographic coordinate values for mapping crash sites. Crash data since 1985 are included in the database. Crash data are provided on demand to state and local governments, MPOs, law enforcement, the legislature, public media, consulting firms, and private citizens. An online crash reporting tool is also available. In addition, ODOT publishes several annual documents, including motor vehicle traffic crashes quick facts, a crash summary book, crash by injury severity facts, crash by road type facts, and a crash rate book.[7] The Oregon Traffic Records Coordinating Committee (TRCC) is responsible for providing guidance and leadership to improve transportation safety in Oregon. Its membership comprises representatives from highway safety, highway infrastructure, law enforcement and adjudication, public health, injury control, and motor carrier agencies and organizations.

Highway Performance Monitoring System Data

The Highway Performance Monitoring System (HPMS) includes information on the condition, use, performance, and operating characteristics of the nation’s highways. The HPMS data are submitted to the FHWA annually to support the biennial Condition and Performance Reports to Congress and for annual Highway Statistics publications.

The HPMS Submittal includes limited data on all public roads, more detail on selected samples on the Arterial and Collector functional systems, and statewide summary information. The sampling process allows ODOT to gather data on a limited number of samples while statistically representing the entire state. Oregon currently has over 2,200 samples, with 100% of the Interstates and Freeway/Expressways sampled. Samples on the rest of the Arterials and Collectors have expansion factors. These factors represent the ratio of universe mileage to sample mileage for a category of roads. Expanding data from the samples provides the ability to create robust summaries of data about various road systems. The additional sample data provides more detail about traffic, pavement, and geometrics.

[6] For more information, the reader is referred to the following website: http://www.oregon.gov/ODOT/TD/TP/Pages/Data.aspx

[7] For more information, the reader is referred to the following website: http://www.oregon.gov/ODOT/TD/TDATA/pages/car/CAR_Publications.aspx

Asset Management / Physical Network Data

Asset Management is a process and decision-making framework that uses economic, business, technology, and engineering considerations to make cost-effective investment decisions that consider an extended timeframe. The goal of any Asset Management process is to use a system-wide approach in order to improve operations and make the organization more effective by considering the full investment and lifecycle of assets. In recent years, Asset Management has gained considerable support in many organizations, including transportation agencies. Asset Management is beneficial to transportation agencies because it supports informed decision-making for planning, policies, and programs to help manage assets as effectively as possible. The American Association of State Highway and Transportation Officials (AASHTO) supports Asset Management; they developed the Transportation Asset Management (TAM) Guide to help agencies implement their own Asset Management programs.

ODOT was an early adopter of an asset management approach. Recent efforts have expanded to develop a more comprehensive program. Broader Asset Management efforts started with the formation of the Oregon Transportation Management System (OTMS), designed to manage automated methods for projects, such as bridge, pavement, and safety management systems. By 2006, ODOT conducted an asset management pilot, followed by creating the Asset Management Integration (AMI) Section in 2007 to staff the ongoing effort.

The work of AMI, building on existing Asset Management successes at ODOT, continues efforts to add capacities for proactive management. AMI efforts followed recommendations from national organizations such as AASHTO and the FHWA, and were supported by research looking at national and international transportation agencies. Key Asset Management efforts include:

- Basic inventory supported by technology for data collection;
- Systems for storing, sharing, and reporting; and
- Development and implementation of analysis and decision-making frameworks.

Positive impacts from these initiatives are already apparent: Noticeable cost-savings have come from sharing the data gathered via a web-based tool and inventory data helped make the case with FHWA for a 1R (mainly pavement) Program. In addition, communication and data-sharing improvements have resulted in more cross-divisional collaborations, and additional inventory has also helped with other compliance requirements and improved programmatic plans.

ODOT faces several challenges to fully integrate Asset Management principles. Future work will include a focus on improving communication throughout the agency, changing the business culture to fully incorporate Asset Management methods, and maintaining the focus and momentum of past asset management efforts. ODOT has developed an Asset Management Strategic Plan to guide this vision. This plan outlines the agency's course of action by fulfilling four goals:

- Foster integrated strategic decision-making.
- Sustain and establish a complete and reliable asset inventory.
- Build a fully integrated data system or collection of systems.
- Create integrated reporting and analysis tools that make use of the integrated data System.

In support of these goals are the Implementation Plan, Communication Plan, and Technology Strategy, which are listed in this document. The four goals will be implemented through the actions identified in three related plans: the Implementation Plan, the Communication Plan, and the Technology Strategy.

State data are available to support asset management at ODOT:

- Statewide data are available on bridges, large culverts (greater than six feet), tunnels, ITS, pavement, right-of-way, signs, traffic barriers, sidewalks, ADA ramps, bike facilities, WIM sites, sound barriers, wetland mitigation sites, and material sources.
- Limited statewide data are currently available on small culverts (less than six feet), signals and beacons, retaining walls, unstable slopes, and approaches. However, a compilation effort is in progress.
- No statewide data are currently available on stormwater facilities and major traffic support. However, a data compilation effort is in progress.

TransInfo Highway Reports

ODOT recently implemented a new enterprise database, TransInfo, to track linear assets. So far the system has been configured to contain state highway information needed for the annual Highway Performance Monitoring Submittal (HPMS), and other data used for managing culverts, bicycles and pedestrian facilities, and a variety of other physical and logical highway features. The database includes some financial tracking information so that ODOT can better tie physical assets to the financial system. Monthly updates of road inventory information from TransInfo is also provided online with a tool that allows users to run various reports for information on user-defined portions of the highway system.

5.2 Digital Video Log (DVL)

The State Highway Digital Video Log is a pictorial record of state highway features from a driver's perspective. The Digital Video Log (DVL) consists of digital images in both increasing and decreasing milepoint directions. Two images (one straight ahead, and the other angled to the right) are captured every 26 feet. The online application presents DVL images with a corresponding milepoint log. Images can be accessed either through a tabular web interface, or by using the TransGIS online webmap tool. Oregon's DVL began as an interagency exchange of software from Washington State and Oregon's Marion County. Oregon has since rewritten the software and continues the legacy of sharing by occasionally assisting local agencies and other parts of ODOT with their video log needs. Most recently, Oregon completed Video Log collection of all the new MAP_21 NHS routes, including about 300 miles owned by local governments. This enables ODOT's Outdoor Advertising Program staff and others to have an immediate record of conditions on the new NHS routes.

Intelligent Transportation Systems

The agency uses Intelligent Transportation Systems (ITS) data to manage passenger and freight traffic. ITS data collected by ODOT includes:

- **Road Weather Information Systems (RWIS) Data**. The system comprises weather stations that use sensors to collect data, such as air and pavement temperatures, wind speed and direction, visibility, humidity, and precipitation. RWIS data are shared with the public and are used for making winter road maintenance decisions.

- **Weigh-in-Motion Data**. ODOT uses "weigh-in-motion" (WIM) technology to weigh commercial vehicles that are moving at normal highway speeds. This eliminates the need for the commercial vehicles to pull over into a weigh station and reduces overall delay. Currently, Oregon collects WIM data from 22 sites around the state.

Geographic Data

ODOT provides geographic information products and services through the development of spatially enabled applications, databases, mapping products, analysis, education, and technical support. Activities include:

- Geographic Information Systems (GIS) products, including maps, data, and analysis;
- Official Oregon State highway maps;
- Oregon transportation map-bases, including city and county maps;
- Development and support of the Natural Resource Data Management Systems;
- Maintenance of 125+ individual data layers, delivering 82 layers through the web application TransGIS; and
- Developing, maintaining, and testing web applications such as TransGIS and TPOD.

Resources/tools provided include the following:

- **The Oregon Spatial Data Library**. This is a common repository of the GIS files available from the agency. The library provides easy access to several spatial files, such as: boundaries (e.g., city limits, ODOT regions, etc.); highway network with functional classification; rail network, including rail crossings, bridges, and tunnels; transit routes and stops; traffic volume and recorder/count stations; pavement (e.g., conditions, retaining walls, traffic barriers, etc.); crash sites; bridges (e.g., condition, weight restricted bridges, low-clearance bridges, etc.); and environmental/climate data (e.g., wetlands, wildlife collision hotspots, soil type, annual precipitation, etc.). (A complete list of all the geo-spatial data from the ODOT is available here: http://www.oregon.gov/DAS/CIO/GEO/pages/alphalist.aspx)
- **TransGIS and Other Mapping Tools**. This is a web-based interactive mapping tool built on several layers of data. The user is presented with a graphical display of selected layers, such as traffic volume, transit stops, and crash data. The tool also offers some of the features available in ArcGIS, such as object identification, zooming in/out of the display area, and changing background map (for more information, visit: https://gis.odot.state.or.us/transgis).

In addition to TransGIS, there are a number of other useful web mapping applications available to the public, including:

- **ODOT Project Tracker**. The map displays how and where transportation funds are spent. The projects listed are part of the Statewide Transportation Improvement Program (STIP), ODOT's four-year capital improvement program.

- **Hazards and Assets Tracker**. Provides an interactive map of assets by type and condition, terrain, and natural hazards (e.g., flood plains, landslide hazards, volcano hazards, earthquake hazards).
- **Crime Tracker**. The users may query data to look at crime attributes (e.g., reported offense, charges, convictions, etc.) by area of interest.
- **Environmental and Public Health Tracker**. Allows user to query data and examine potential exposure to environmental hazards and health-related risk by geographic location.
- **Transportation Planning Online Database (TPOD).** ODOT's web-based GIS tool with document links to local Transportation System Plans and state facility plans. With this tool, users can query a polygon on a GIS map and see a pop-up of all the related transportation planning documents. The user can read and/or print the document, execute a search for a key word, or save the document on their computer.

ODOT's work using GIS tools has been recognized nationally. The agency has received recognition through the AASHTO GIS for Transportation Conference, including, but not limited to:

- Best Use of Information, 1st place; Oregon Traffic Flow, 2008
- Best Use of Information, 1st Place; Oregon Solar Highways, 2009
- Best Use of Information, 1st Place; ODOT Freight Mobility Map, 2010
- Most Effective Cartography, 1st Place; Oregon ARRA and Go Oregon Economic Programs, 2012
- Best Transportation Publication, 1st Place; Official Oregon State Map, 2012
- Best Use of Information, 1st Place; Oregon Highway Incident Density, 2013
- Saavy Wed Application, 1st Place; Oregon TransGIS 2.2, 2013

5.3 Transportation Management System

The Oregon Transportation Management System (OTMS) has evolved. Most of its original seven components remain:

- **Bridge Management System (BrM)**. The program maintains and upgrades the Bridge Data System, updates the Bridge Design Manuals and Bridge Inspection Guides, and develops mathematical models to test alternative policies and programs to make recommendations.
- **Congestion Management System (CMS)**. The objectives of the program are to: 1) identify the locations and forecast the average severity of congestion on the state highways; 2) forecast the effect of congestion on highway mobility; and 3) identify key highway attributes and travel patterns that are likely to affect congestion. This program uses data available from the state highway system, traffic volume data, and Highway Performance Monitoring System data to report congestion trends on the state highway system. CMS coordinates their activities with other traffic monitoring and analysis programs such as the Transportation and Land Use Model Integration Program. In a

study undertaken by ODOT in 2004, the effects of the following five congestion management/operational treatments were considered, including:8

- Ramp metering;
- Traffic signal coordination;
- Incident management programs;
- High-occupancy vehicle (HOV) lanes; and
- Public transportation services.

The study concluded that a full deployment of operational treatments in large urban areas could reduce delay by about 23%. The study also concluded that public transportation services alone could reduce delay in the Portland area by about one third of the area's annual delay. The metropolitan areas in Oregon have already implemented a number of operational treatments, including promoting public transit use, incident management, and use of Intelligent Transportation Systems.

- **The Pavement Management System**. This system has two components: 1) a comprehensive database of current and historical pavement condition, pavement structure, and traffic flow,; and 2) a set of tools that allows user to predict future pavement conditions, determine financial needs, and identify and prioritize pavement preservation projects. Together, these two components can provide necessary information and help decision-makers in finding the most effective strategies for preserving and maintaining pavements in working condition.
- **Safety Management System**. The system has two main parts. The first part is the Information Safety Management System (ISMS), which includes data from a number of sources. The data collected/compiled under ISMS is used for the overall monitoring and administration of ODOT's Roadway Safety Program. The second part is the Project Safety Management System (PSMS), which uses ISMS data to address project scoping, design, and construction-related critical safety issues.
- **Traffic Monitoring System**. The system is required for collecting and processing highway vehicular traffic and bike/ped data. The TMS provides traffic volumes, trends, flow maps, turning movement, and vehicle class data to a number of authorities including federal, state, and local constituents.

[8] Statewide Congestion Overview for Oregon, February 2004. The report is available here: http://www.oregon.gov/ODOT/TD/TP/CM_HERS/overview0204.pdf

6.0 Agency Performance Measures

ODOT uses 27 key performance measures (KPM) to present results to external clients/interested groups, such as the legislature and citizens. These measures are selected from multiple areas, including transportation (e.g., travel delay, transit ridership, crashes and fatalities, pavement condition, bridge condition, etc.), environment and sustainability (e.g., fish passage, bike lanes and sidewalks, etc.), and economy (e.g., number of construction jobs created, number of projects on budget, etc.). The KPMs[9] are grouped under the following five goals.

6.1 Safety

The measures considered under this goal are as follows:

- **Traffic Fatalities**. Measured as traffic fatalities per 100 million VMT. Data sources include Crash Analysis and Reporting (ODOT), Fatality Analysis Reporting System (ODOT), and National Highway Traffic Safety Administration (USDOT).
- **Traffic Injuries**. Measured as traffic injuries per 100 million VMT. Data from Crash Analysis and Reporting (ODOT) and Traffic Monitoring System is used to calculate this measure.
- **Impaired Driving**. Measured as percent of fatal traffic accidents that involved alcohol. Data sources are Crash Analysis and Reporting (ODOT), Fatality Analysis Reporting System (ODOT), and National Highway Traffic Safety Administration (USDOT).
- **Use of Safety Belts**. Measured as percent of all vehicle occupants using safety belts. Data sources include Transportation Safety Division (ODOT) and Occupant Protection Observation Study (by Intercept Research Corporation).
- **Large Truck at-Fault Crashes**. Measured as the number of large truck at-fault crashes per one million VMT. Data sources are ODOT Motor Carrier Division and ODOT Transportation Development Division (Crash Analysis and Reporting Unit).
- **Rail Crossing Incidents**. Measured as the number of highway-railroad at-grade incidents. Data from the Rail Division is used to calculate this measure.
- **Derailment Incidents**. Measured as the number of train derailments caused by human error, track, or equipment. Rail Division is the data source for this measure.
- **Travelers Feel Safe**. Measured as percent of public satisfied with transportation safety. Data sources include Transportation Safety Division (ODOT) and Traffic Safety Attitude Survey (by Intercept Research Corporation).

[9] More information on the KPMs, including 2013 ODOT Annual Performance Progress Report, is available here: http://www.oregon.gov/ODOT/CS/PERFORMANCE/Pages/index.aspx

6.2 Mobility

The measures considered under this goal are as follows:

- **Travel Delay**. Measured as hours of travel delay per capita, per year in urban areas. Travel delay is measured using data available from ODOT's Transportation Development Section and the methodology described in the Urban Mobility Report (by Texas Transportation Institute).
- **Incident Response**. Measured as the percent of lane-blocking crashes cleared within 90 minutes.
- **Special Transit Rides**. Measured as the average number of special transit rides per each elderly and disabled Oregonian, per annum. Public Transit Division is the data source for this measure.
- **Rail Ridership**. Measured as the number of state-supported rail service passengers. Rail Division is the data source for this measure.
- **Intercity Passenger Service**. Measured as the percent of Oregon communities of 2,500 or more with intercity bus or rail passenger service. Public Transit Division is the data source for this measure.
- **Commuting to Work**. Measured as the percent of Oregonians who do not commute alone to work during peak hours. Sources include data from Research Unit and Transportation Development Division.

6.3 Preservation

The measures considered under this goal are as follows:

- **Pavement Condition**. Measured as the percent of pavement-lane miles rated "fair" or better out of the total lane miles in the state highway system. The Pavement Services Unit, Highway Division is the data source for this measure.
- **Bridge Condition**. Measured as the percent of highway bridges that are not distressed out of all highway bridges.

6.4 Sustainability

The measures considered under this goal are as follows:

- **Fish Passage at State Culverts**. Measured as the number of high-priority ODOT culverts remaining to be retrofitted or replaced to improve fish passage. Statewide Culvert Inventory for Priority Culverts data, and data from Oregon Department of Fish & Wildlife (Fish Passage Program), is used to calculate this measure.
- **Bike Lanes and Sidewalks**. Measured as the percent of urban state highway miles with bike lanes and pedestrian facilities in "fair" or better condition. Data from Bicycle/Pedestrian Program, Highway Division is used to calculate this measure.

6.5 Stewardship

The measures considered under this goal are as follows:

- **Jobs from Construction Spending**. Measured as the number of jobs sustained as a result of annual construction expenditures. Data sources are Transportation Program Office, Highway Division, Financial & Economics Analysis Section, and Central Services Division.
- **Timeliness of Projects Going to Construction Phase**. Measured as the percent of projects going to construction phase within 90 days of target date. For this measure, the project's target bid let date is obtained from the Project Control System (PCS), and the actual Notice to Proceed (NTP) date from the Letting and Awards System (LAS) module.
- **Construction Project Completion Timeliness**. Measured as the percent of projects with the construction phase completed within 90 days of original contract completion date. Highway Program Office provides data to calculate this measure.
- **Construction Projects on Budget**. Measured as the percent of original construction authorization spent. Highway Program Office provides data to calculate this measure.
- **Certified Businesses**. Measured as the percent of ODOT contract dollars awarded to disadvantaged, minority, women, and emerging small businesses. Office of Civil Rights, Executive Office provides data to calculate this measure.
- **Customer Service**. Measured as the percent of customers rating their satisfaction with the agency's customer service as "good" or "excellent" on overall customer service, timeliness, accuracy, helpfulness, expertise, and availability of information. Central Services Division (Audit Services Branch) provides data to calculate this measure.
- **Office Wait Time**. Measured as field office wait time (in minutes).
- **Phone Wait Time**. Measured as phone queue time (in seconds).
- **Title Wait Time**. Title transaction turnaround time (in days).

In addition to the KPMs, the department uses a number of other performance measures for internal management purposes. For example, ODOT provides motor carrier crash data required to meet a federal performance measure for Oregon's motor carrier safety performance by the Federal Motor Carrier Safety Administration (FMCSA), which determines ODOT's qualification for motor carrier division safety grants. Transportation performance measures commonly used by ODOT to evaluate projects/alternative plans are per capita vehicle miles of travel, volume/capacity ratios, and auto occupancy. As expected, some of these measures address requirements defined by state and federal policies, including MAP-21, more completely than others. ODOT is currently in the process of developing new performance measures. The agency plans to start the integration of the new performance measures, including the performance measures developed in response to MAP-21, into the existing performance management system in 2014.

7.0 Agency Challenges and Emerging Issues

7.1 Agency Support for Planning

ODOT faces some key challenges. One challenge is the lack of resources available to improve its transportation planning, in terms of the required number of staff and relevant data. It is assumed that information required by decision-makers can be extracted readily from available data. In reality, this seldom is the case. Often, providing decision-makers with relevant data that support agencies' goals and objectives requires processing, manipulation, and analysis. Dwindling revenues also pose challenges to current obligations to provide and develop and report on new information. In addition, ODOT faces the following resource-related challenges:

- Collecting/obtaining observed data required for planning-related analysis in a timely and affordable manner, especially related to federal legislation, such as MAP-21.
- Allocating sufficient time for a thorough and inclusive process to inform, educate, and evaluate (where necessary) stakeholders and local/regional agencies.
- Providing training on traditional and advanced modeling tools. Part of this challenge is identifying and mentoring staffs interested to become skilled enough in modeling, analysis, and planning to operate effectively in this field.
- Obtaining access to powerful computers and software to meet the growing need to run complex models and process large datasets.

7.2 Lack or Affordability of Quality Data

Freight data are often proprietary and difficult to obtain. ODOT believes the agency's analysis and modeling capacity will improve if reliable data on regional truck movements are obtained/made available. Several datasets couple improve the agency's planning capabilities. For example, link speeds, by time of day, could help model calibration (possible sources are TomTom, INRIX, and FHWA's NPMRDS dataset), national county-to-county trip tables could help the agency understand long-distance travel, both in and outside or Oregon (possible data sources include AirSage and INRIX, which collect cellphone location data).

ODOT is currently exploring options to fund additional data collection efforts and development of new methods and tools for analysis. Recent progress in this initiative includes moving toward a comprehensive dataset that includes all streets in the state to meet network data needs, making progress on bicycle and pedestrian count standardization and developing a database on bike network attributes.

7.3 Limitations of Existing Tools and Methods

ODOT and its modeling partners have multiple analysis tools, but the needs of decision-makers are continuously evolving. Analysts must anticipate future questions and develop tools to address such questions. The Oregon Modeling Steering Committee (OMSC) conducts periodic inquiries with decision-makers, inquiring about emerging issues. The last inquiry was conducted in 2012, and several areas of interest emerged. Participants provided valuable feedback related to several topic areas, including, but not limited to: communication of technical information, data, performance measures, analytical techniques, training and education, research, freight modeling and data, public health, MAP-21, and travel demand model improvements.

As a direct result of these meetings, the OMSC established two new ad hoc subcommittees to explore two topic areas: freight and public health. The committees will evaluate how to integrate features into current tools and methods to address needs related to these two areas of information.

NOTICE