PUBLIC REVIEW DRAFT

2018 Regional Transportation Plan

Regional Freight Strategy

A strategy for efficient goods movement in, to and from the greater Portland region

June 25, 2018

oregonmetro.gov/freight

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Project web site: oregonmetro.gov/rtp

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CHAPTER 1

INTRODUCTION

FREIGHT'S ROLE IN THE REGION'S ECONOMY

The 2018 Regional Freight Strategy sets regional freight policy for the Portland metropolitan area, and is a replacement of the Regional Freight Plan from June of 2010. This introduction provides context for the Regional Freight Strategy, including the role of regional government in freight planning, and existing federal, state, and regional policies related to goods movement.

1.1 Metro's role

As the region's metropolitan planning organization (MPO), Metro has a variety of roles and requirements in freight planning, including:

- Developing the Regional Transportation Plan (RTP) and the Metropolitan Transportation Improvement Plan (MTIP), including projects consistent with regional plans and policies.
- Allocating federal transportation funding through a project selection process informed by regional policies.
- Reviewing local comprehensive and transportation plans for consistency with the RTP.
- Reporting on freight targets and freight system performance measures.
- Convening jurisdictions and agencies to achieve better coordination.
- Collecting, maintaining and disseminating data.
- Encouraging best practices in freight strategies and roadway design with funding and programmatic support.
- Supporting local and state efforts to implement and update plans, policies and projects.

The 2018 Regional Freight Strategy provides the freight plan for the Portland metro region, defined as the area within the Metropolitan Planning Area (MPA). The MPA is slightly larger than the region's Urban Growth Boundary. Since freight and goods movement do not stop at the MPA boundary, Metro staff made sure to coordinate with the Oregon Department of Transportation (ODOT), the Port of Vancouver and Regional Transportation Council in Washington State to receive information on freight related networks and issues outside the MPA.

1.2 History of the Regional Freight Plan

The 2010 Regional Freight Plan defined goals, strategies and actions designed to guide the stewardship of our critical multimodal regional freight infrastructure and industrial land supply, to support a sustainable, balanced and prosperous tomorrow.

The 2010 Regional Freight Plan was an element of the RTP update and was guided by the Metro Council-appointed 33 member private-public sector Regional Freight and Goods Movement (RFGM) Task Force and a technical advisory committee. The plan is built on a foundation of technical work, including research on the region's freight transportation systems and facilities, needs and issues. A more detailed history of the RFGM Task Force (including a membership roster), and the Regional Freight Advisory Committee, that served as the technical advisory committee, is included in Appendix B of this Regional Freight Strategy.

The 2010 Regional Freight Plan provided implementation strategies for addressing environmental and community impacts, system management, economic development and financing that were reviewed and recommended.

In 2016 and 2017, the Regional Freight Work Group was one of eight technical work groups identified to provide input and technical expertise to support the 2018 Regional Transportation Plan (RTP) update. In this role, the work groups were convened to advise Metro staff on implementing policy direction from the Metro Council, the Metro Policy Advisory Committee (MPAC) and the Joint Policy Advisory Committee on Transportation (JPACT). The Regional Freight Work Group met nine times from January 2016 through early 2018.

The primary charge of the Regional Freight Work Group was to:

- Review status of 2010 Regional Freight Plan recommendations and help update freight data.
- Review documents on key trends and challenges with updated existing conditions data.
- Review a shared freight investment strategy.
- Review draft freight policy refinements and actions to support implementation.

The regional freight work group consists of topical experts, Portland Freight Committee members, Transportation Policy Alternatives Committee (TPAC) and Metro Transportation Advisory Committee (MTAC) members or their designees, and staff from the City of Portland, larger cities in the region, Clackamas County, Multnomah County, Washington County, Port of Portland, Port of Vancouver, Regional Transportation Council (RTC), Federal Highway Administration (FHWA), and Oregon Department of Transportation (ODOT).

Table 1: Regional Freight Work Group Members:

Name	Affiliation
Nathaniel Brown	Portland Business Alliance
William Burgel	Burgel Rail Group
Gary Cardwell	NW Container Services, Inc.
Tim Collins	Metro, Regional Freight Work Group Lead
Lynda David	Regional Transportation Council, Washington State
Kate Dreyfus	City of Gresham
Nicholas Fortey	Federal Highway Administration
Jerry Grossnickle	Bernert Barge Lines
Jim Hagar	Port of Vancouver
Brendon Haggerty	Multnomah County – Public Health
Phil Healy	Port of Portland
Robert Hillier	City of Portland – Bureau of Transportation
Jana Jarvis	Oregon Trucking Association
Todd Juhasz	City of Beaverton
Steve Kountz	City of Portland – Bureau of Planning & Sustainability
Kathleen Lee	Greater Portland, Inc.
Jon Makler	Oregon Department of Transportation
Kate McQuillan	Multnomah County – Planning
Zoe Monahan	City of Tualatin
Joel Much	Sunlight Supply, Inc.
Don Odermott	City of Hillsboro
Carly E. Riter	Intel
Patrick Sweeney	City of Vancouver
Erin Wardell	Washington County
Pia Welch	FedEx Express
Steve Williams	Clackamas County

Table 2: Regional Freight Work Group Alternates:

Name	Affiliation
Steve Kelley	Washington County
Gregg Snyder	City of Hillsboro
Joanna Valencia	Multnomah County

1.3 Relationship to other plans

To be revised and completed later.

Implementation strategies for addressing environmental and community impacts, system management, economic development and financing have been reviewed and recommended as part of the RTP. The freight strategy will contribute to recommendations to better incorporate truck movement into Metro's Designing Livable Streets and Trails Guide.

Regional Transportation Plan
Metro periodically reviews and updates the Regional Transportation Plan (RTP) to keep it current with transportation challenges facing the region, and to incorporate new information, technologies and strategies. The updated plan provides a blueprint for building a sustainable transportation future that allows the region to compete in the global economy and preserve the unique qualities and natural beauty that define our region. An overarching aim of the RTP is to move the region closer to the vision of the region's long-range strategy for managing growth, the 2040 Growth Concept. Fundamentally, the RTP defines a framework for making choices about the future of the region – choices about where to allocate limited transportation resources and choices about the future residents wish to see for our region and, by extension, the state of Oregon. The Regional Freight Strategy for the Portland metro region is an element of the RTP. While the strategy targets needs and issues specific to the freight transportation system, key policies and actions are incorporated into the comprehensive RTP.

1.4 Process and public engagement

2018 Regional Transportation Plan:

Phase 1: Getting started Beginning in summer 2015, the first phase consisted of engaging local, regional, state, business and community partners to prioritize the regional challenges to be addressed in the update and the process for how the region should work together to address them. This engagement included:

- interviews with 31 stakeholders
- discussion groups in partnership with Metro's diversity, equity and inclusion team with communities of color and youth on priorities and issues related to racial equity
- a partnership with PSU's Center for Public Service and 1000 Friends of Oregon to explore components of inclusive public engagement to develop an approach to better reach underrepresented communities
- a public involvement retrospective that summarized previous feedback from communities of color on transportation planning and project development
- an online survey with more than 1,800 participants to help identify the top transportation issues facing the greater Portland region.

This phase concluded in December 2015 with JPACT and Council approval of the work plan and public participation plan for the update. In addition to implementing the 2014 Climate Smart Strategy, the adopted work plan identified seven policy topics for the Regional Transportation Plan update to focus on – safety, equity, freight, transit, finance, performance, and design.

Phase 2: Framing trends and challenges The second phase began in January 2016 and concluded in April 2016. In this phase, Metro engaged the public, jurisdictional partners and business and community leaders to document key trends and challenges facing the region as well as priority outcomes for investment in the region's transportation system. This included:

- an online survey with more than 5,800 participants working through the questions
- a Regional Snapshot on transportation, published in April 2016.

Also in April 2016, the Metro Council convened members of MPAC, JPACT, state legislators, community and business leaders and other interests from across the region to discuss the key trends and challenges facing the region during the first of four regional leadership forums.

Metro staff also worked with ODOT's economist and jurisdictional partners, individually and through a technical work group, to forecast a budget of federal, state and local funds the greater Portland region can reasonably expect by 2040 under current funding trends.

Phase 3: Looking forward From May 2016 to May 2017 technical work and public engagement activities continued to focus on finalizing a shared vision statement for the plan, developing draft strategies for safety, transit and freight, and updating the evaluation framework and measures for evaluating plan performance. The engagement for this phase included:

- a round of follow up discussion groups in partnership with Metro's diversity, equity and inclusion team with communities of color and youth to review actions and priorities for the agency's racial equity strategy
- focus and discussion groups on transportation priorities for communities of color and strategies to improve engagement with underrepresented groups,
- an online survey focusing on priorities for communities of color
- an online survey with more than 2,600 participants on investment priorities and funding,
- another round of discussion groups with communities of color on hiring practices and priorities related to the Planning and Development department-specific equity plan.

Metro Council also hosted its second and third regional leadership forums. In regional leadership forums 1 and 2, there was consensus that a bold vision and more funding are needed to build a 21st century transportation system. In forum 3, leaders discussed a

shared vision for the future transportation system and potential near-term priorities for addressing regional transportation challenges in ways that supported the vision. Participants also identified actions to build a path to future funding.

Staff also compiled background information and online resource guide maps to support jurisdictional partners as they updated their investment priorities for further evaluation and public review during Phase 4. In addition, staff launched the RTP Project Hub – an online visual database – for jurisdictional partners to use to update project information and collaborate with other jurisdictions. Phase 3 concluded with Metro Council directing staff to release a call for projects to update the region's transportation near- and long-term investment priorities to support regional goals for safety, congestion relief, affordability, community livability, the economy, social equity and the environment.

Phase 4: Building a shared strategy The fourth phase began in June 2017 with release of a second Regional Snapshot on transportation and the Call for Projects for jurisdictional partners to update the plan's regional transportation project priorities. Agencies were asked to identify projects that address regional needs and challenges, reflect public priorities and maximize progress toward the region's agreed upon vision and goals for the future transportation system.

Local jurisdictions and county coordinating committees worked within a constrained budget and capital funding targets to determine the project priorities to put forward for inclusion in the plan in collaboration with the Oregon Department of Transportation (ODOT), Metro, South Metro Area Regional Transit (SMART) and TriMet. All project submissions were required to have come from adopted plans or studies that provided opportunities for public input.

In summer 2017, Metro analyzed three funding scenarios: 10-year constrained project priorities, 2040 constrained project priorities and 2040 strategic project priorities. The analysis tested new and updated outcomes-based system performance measures to evaluate performance of the transportation system as a whole for each scenario to help inform finalizing the plan's project priorities in Phase 5. Metro staff also prepared an interactive map of proposed projects and lists that was made available on the project website for the public and partners to use to learn more about the projects under consideration. Safety, transit, freight and emerging technology strategies continued to be developed on parallel tracks. Jurisdictions also piloted project-level evaluation criteria on 50 projects; the pilot project evaluation will be advanced during the next RTP update.

The results of the analysis were released in November 2017. Engagement on the call for projects included:

- a community leaders' forum for feedback on the results
- Metro Councilor briefings to business and neighborhood groups
- an online survey with more than 2,900 participants.

The analysis was also summarized in a larger discussion guide for decision-makers that also relayed key issues and the results of the Call for Projects. A fourth and final Regional Leadership Forum was held in March 2018 to discuss findings and recommendations from the technical analysis and public engagement to inform finalizing the plan during Phase 5.

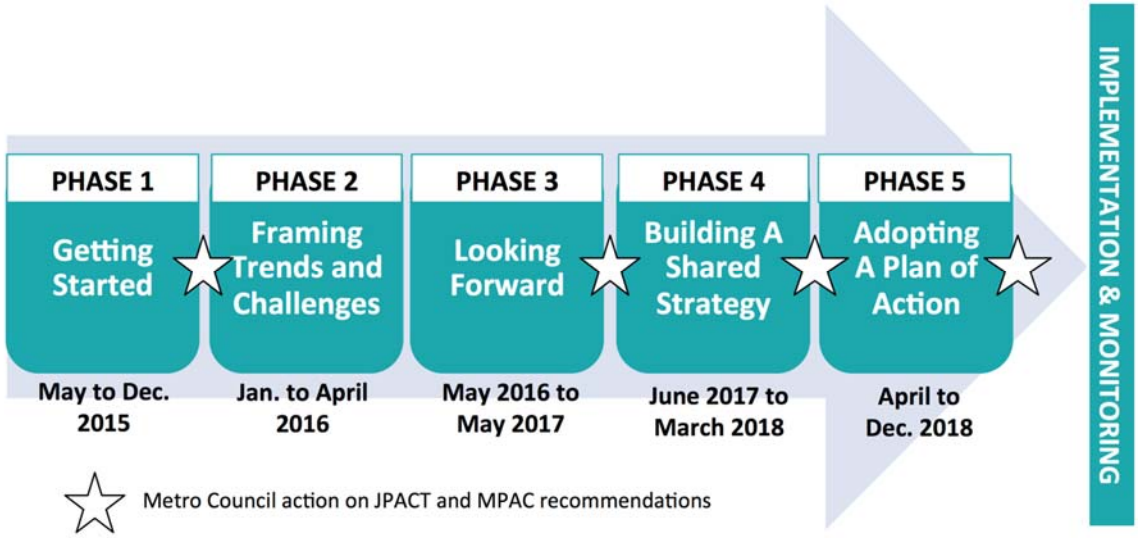
Phase 5: Adopting a plan of action The fifth and final phase of the process began in April 2018 and is focused on finalizing and adopting the region's investment priorities and strategies recommended through 2040. The 2018 Regional Transportation Plan will be available for public review in June 2018, with a formal comment period from June 29 through Aug. 13. For this comment period, engagement activities include:

- an online survey with a high level summary the plan
- an interactive map of projects, project lists and a briefing book that provides a more in-depth summary;
- draft documents, including the 2018 Regional Transportation Plan and safety, transit, freight and emerging technology strategies, available for review and comment.

The Metro Council will hold a hearing on August 2, 2018. All comments received during the comment period will be summarized in a public comment report. Recommended changes to the draft materials to respond to all substantive comments received during the comment period will be summarized in a public comment log that will be considered by MPAC, JPACT and the Metro Council during the adoption process.

JPACT and MPAC will make recommendations to the Metro Council in October 2018. Metro Council is scheduled to hold legislative hearings on November 8 and December 6. Metro Council will consider adoption of the final plan, project priorities and strategies for safety, transit, freight and emerging technology in December 2018.

Figure 1: Summary of the Regional Transportation Plan development process



1.5 Document organization

This section provides a guide for the context and organization of the rest of the 2018 Regional Freight Strategy.

Chapter 2 provides the context for how the Portland metro region became and continues to be a hub for trade and commerce for the entire state of Oregon and beyond, and why that has been an important factor in the economic health of the region. The chapter shows data for the Portland-Vancouver area that confirms the importance of imports and exports to the region's job market, and defines the region as a global gateway for freight and goods movement. The chapter also shows the importance that increasing goods movement could have on the growth of industrial middle income jobs.

Chapter 3 sets the framework for the rest of the Regional Freight Strategy by defining the Regional Freight Concept, the Regional Freight Network map, and the development of the seven Regional Freight Network Policies.

Chapter 4 provides an overview of the regional freight needs by freight mode, and the priority issues for freight and goods movement. The chapter provides summaries of the key freight studies that have been completed since 2010 that identified and addressed important freight issues in the region.

Chapter 5 outlines the importance of manufacturing, warehousing and distribution to providing jobs and supporting the region's economy. Manufactures and shippers throughout Oregon and Southwest Washington depend on regional warehousing, distribution and multimodal goods movement infrastructure to move materials and products to both domestic and international destinations. The chapter also defines the importance of regional goods movement that travel by the six different freight modes (truck, rail, air cargo, marine ship, pipeline, and river barge).

Chapter 6 covers innovation and technology as it relates to freight transportation. The chapter describes vehicle-to-infrastructure (V2I) communications development to understand how different applications of connected vehicle (CV) technology will improve commodity movement within the next five years. The chapter also describes the tools being used to improve efficiency and reduce idling of truck diesel engines; and the elements of Oregon's Clean Diesel Initiative and Oregon's Senate Bill 1008 that provide the benefits of cleaner air.

Chapter 7 provides information on freight funding sources and new state and federal funding resources for freight projects that have become available as part of Oregon's HB 2017 and the 2015 Federal Transportation Bill (FAST Act).

Chapter 8 provides freight strategies and actions for each of the seven regional freight network policies. Achievable near-term actions (within 5 years) and long-term actions are included and recommended for implementation to support the regional freight and goods movement policies.

Chapter 9 provides the list of all 2040 RTP Freight Projects that were included as part of round 2 of the RTP call for projects. Freight projects are defines as RTP projects within an investment category (Freight and Throughways), and those projects that meet certain criteria for benefiting freight. The chapter defines available freight data sets and analysis tools, including the Commodity Flow Forecast, the Economic Value Atlas, and the new Regional Freight Model. The chapter also provides a description of two future freight studies that will be completed as part of the implementation of the Regional Freight Strategy.

Chapter 10 provides the context for how the region will measure progress toward achieving national freight performance goals and the goals and policies for freight and goods movement that are outlined in the 2018 Regional Transportation Plan.

CHAPTER 2
TRENDS FOR REGIONAL FREIGHT AND GOODS MOVEMENT AND THE GREATER PORTLAND ECONOMY

2.1 Trade, transportation and economic health

The Columbia River serves as a critical international marine gateway to the region's system of multi-modal freight networks.

Portland and Vancouver were founded and grew on the basis of vibrant and profitable statewide, regional and international trade. Access to the Pacific Ocean via the Columbia River from the inland empire to the east created the region's original economic engine. The Willamette River delivered the wealth of the various river valleys south and west of the Portland metro region in much the same way. It was through this trade that the Portland metro region established itself as a trade hub and prospered.

The Cost of Congestion to the Economy of the Portland Region[1] (2005) reported that the region has a higher than average dependency on traded sector industries, particularly computer and electronic products, wholesale distribution services, metals, forestry, wood and paper products, and publishing. These business sectors serve broader regional, national and international markets and bring outside dollars into the region's economy. Traded sector industries, such as semiconductor manufacturing or consulting services, are the primary enabler of Portland metropolitan

What is the "traded sector"?

As defined in ORS 285A.010, (8), "traded sector" means industries in which member firms sell their goods or services into markets for which national or international competition exists. As a result of their exchange earnings, these industries increase spending power within their regional or state economies.

[1] Economic Development Research Group, November 2005.

economic growth. The Portland region's traded sector industries are anchored by six core clusters.[2] These industries are important drivers of regional economic activity today and well-positioned to spark future growth. These industries depend on a well-integrated and well-functioning international and domestic transportation system to stay competitive in a global economy. The six core clusters are defined below:

Clean Technology and Green Cities - Manufacturing, energy production, design, and waste disposal industries related to sustainability and resilience.

Computers and Electronics – Establishments that manufacture computers, computer peripherals, communications equipment, and similar electronics products.

Health Sciences and Technology – Advanced medical device manufactures, plus related research and development establishments; does not include local hospitals.

Metals and Machinery – Broad array of goods-producing establishments working with heavy metals, ranging from foundries to pump makers to ship builders.

Software and Media – Service establishments writing software, planning and managing computer systems, hosting data, and producing and distributing video and sound recordings.

Sporting Equipment, Apparel, and Design – A unique collection of global apparel companies, personal hardware manufactures, and various design establishments.

As an international gateway and domestic freight hub, the region is particularly influenced by the dynamic trends affecting distribution and logistics. The 2007 commodity flow survey projected an overall doubling of freight tonnage moved in the region by 2035. The region's forecasted population and job growth – an additional 670,400 residents and 420,200 jobs by 2040[3] – along with the associated boost in the consumption of goods and services are significant drivers of projected increases in local freight volume. Much of the projected doubling of freight tonnage passing through the Portland metropolitan region doesn't terminate there but instead moves well beyond the region's boundaries to the rest of the country.

Today the Portland-Vancouver area boasts an underlying foundation for a strong and diverse regional economy that will continue to support an enviable quality of life. The local economy is still very dependent upon an efficient, reliable and safe freight transportation

[2] Portland Economic Value Atlas Market Scan (The Brookings Institute) August 2017

[3] Metro Data Resource Center for 2040 Regional Transportation Plan. Population and employment forecasts include Multnomah, Clackamas, Washington counties in Oregon, and Clark County in southwest Washington. The percentage increases from 2015 to 2040 are 30.2% (population) and 39.2% (employment).

system that recognizes the region's role as an international gateway and key domestic freight hub.

2.2 Freight trends

The global economy is in the midst of a profound change. Twenty-first century innovations in trade policy, communications and transportation have altered the sourcing, production and marketing of products on a global scale. Some of the most important trends are identified below:

- Due to open trade policies, more freight than ever before is moving across international boundaries.
- The rise of worldwide communications networks allow for the inexpensive and instantaneous transfer of information around the globe. These networks have allowed businesses to expand operations and markets and have given rise to new business models like e-commerce, leading to a higher volume of smaller, demand-responsive shipments.
- Access to good transportation services has allowed businesses to develop increasingly complex supply chains that are longer and far more specialized.

As a result of these global trends, U.S. international and domestic trade volumes are expected to grow at an accelerated rate. Trade volumes in Portland are expected to nearly double by 2040 to 600 million tons annually.[4] This is expected to have a profound effect on shippers and the infrastructure they depend upon.

West Coast ports have been struggling to keep pace with the increasing volumes of marine and air cargo coming from Pacific Rim trading partners like Japan, China, South Korea and Taiwan. The Portland Harbor will likely have a longer-term trend of growth in freight volumes. In addition, the ports of Portland and Vancouver are not as constrained by dockside capacity as a number of other West Coast ports, so additional growth here can be handled at the ports.

According to the US census, total US trade with the Pacific Rim amounted to $1,170.7 billion in 2016. About $362 billion of that trade is exports. Most of the Portland-Metro region's international trade is with Pacific Rim counties and was estimated to be $10.5 billion in 2016. Much of the Pacific Rim freight processed by West Coast ports is destined for the rest of the country. However, the financial burden of maintaining and expanding the publicly owned transportation system serving this national need falls to local West Coast trade gateway jurisdictions.

Canada and Mexico are also important trading partners with the USA. According to the Western Washington University Research Institute, the value of US exports to Canada in 2015 was $280.1 billion and the value of US exports to Mexico was $236.4 billion. The value

[4] Port of Portland Commodity Flow Forecast, March 2015 (Cambridge Systematics).

of US imports from Canada in 2015 was $295.2 billion and the value of US imports from Mexico was $294.7 billion. These numbers represent a rapid expansion of both imports and exports from our neighboring trading partners since 2002.

The goods movement industry has responded to this capacity crunch by employing larger trucks, rail cars, ships and planes. Long-haul trucks and ships carrying containers have trended toward increased size and capacity. However, small scale delivery associated with e-commerce is also growing at the same time. These trends place new demands on the goods movement infrastructure, and reinforce the need to reconsider our approach to providing a goods movement infrastructure that addresses both needs. Government and industry must also work together to address increasingly stringent safety and security requirements being placed on the goods movement system.

Against this backdrop of sustained expansion in global trade the region must prepare to compete globally. The viability of the regional and state economies, and the ability to attract and sustain business investment in both, depend on it. Industry needs tangible and continuous improvements in the operating efficiency, capacity, modal redundancy and reliability of the regional goods movement system to remain competitive globally. Government must do its best to work with private sector stakeholders to accomplish this in a sustainable, environmentally sensitive and cost effective manner.

The regional goods movement system is falling short for some large shippers. Several traded sector firms in the region must truck their loads to San Francisco or Seattle/Tacoma to achieve satisfactory international aviation or marine connections. Some resource based industries and agricultural products served by the Portland metropolitan region's goods movement system are very sensitive to transportation costs and can easily lose global market share with shipping cost increases measured in pennies per pound. Still other area manufacturers have had to repeatedly adjust production schedules to compensate for congestion on the region's runways, roads and rail lines, leading to increased production costs and reduced productivity.

As shippers' supply chain logistics evolve, the definition of "state of the art" warehousing and distribution centers continues to change dramatically. Larger truck-biased cross dock facilities are becoming the new standard.

The local component of the goods movement system is also critically important to the economy and daily life. The local movement of goods and services is focused primarily on trucks. The ability to maneuver on local streets and to park to unload freight is vital for those trying to deliver goods and services to local communities.

The region's goods movement infrastructure and unique geographic location are competitive advantages that have created transportation sector jobs for more than a century. These jobs, in turn, serve the industrial and local freight needs of the Portland metro region, the state, the Pacific Northwest, the West Coast and the nation.

2.3 Efficient goods movement for the future

In the post-recovery world economy, strong growth in international, national and regional trade has once again driven the need for a flexible, adaptable, high performance multimodal freight transportation system. Efforts must consider these new stresses on marine, air, road, rail and pipeline networks and facilities. By 2040, the region's goods movement system will need to absorb a near doubling of freight volumes, measured in tonnage by all freight modes, with approximately 75 percent of that dependent on trucks to link producers and consumers, or to reach intermodal nodes for import and export.[5]

Many local manufacturing firms that trade internationally, and who could locate globally, have chosen to make the greater Portland-Vancouver area their home because of its connections as an international transportation hub. These firms require a smoothly functioning goods movement system to operate efficiently and maintain profitability. In the absence of such a system, they will consider relocating to an area that meets these requirements.

And as the global economy recovers and grows, the Portland metro region will be called upon to address vastly expanded regional, national and international shipping needs reliably, safely, efficiently and sustainably. We have a responsibility to the region, the state and the nation to maintain an efficient and flexible goods movement system of sufficient capacity to meet future needs.

2.4 The Portland region is a global gateway

The ports of Portland and Vancouver processed 20.2 million metric tons of cargo in 2016. 12.7 million tons of cargo in Portland alone. Another 8 to 10 million tons of inland barge cargo also moves through these facilities. In addition to being the leading grain and mineral bulk harbor on the West Coast, the ports processed nearly 379,000 automobiles in 2016. The dollar value of foreign trade moving through the Portland Harbor was about $14 billion, with about $10 billion of that moving through Portland. Most of this cargo is transported beyond the Portland metro region, generally by truck and rail. There is also a huge support industry located in Portland associated with moving this freight.

The Portland Metro area's industries collectively produced $158.8 billion in gross regional product, making it the country's 20th largest metropolitan economy in 2015.[6] Traded sector industries produce roughly 45 percent of gross regional product while employing 31 percent of workers.

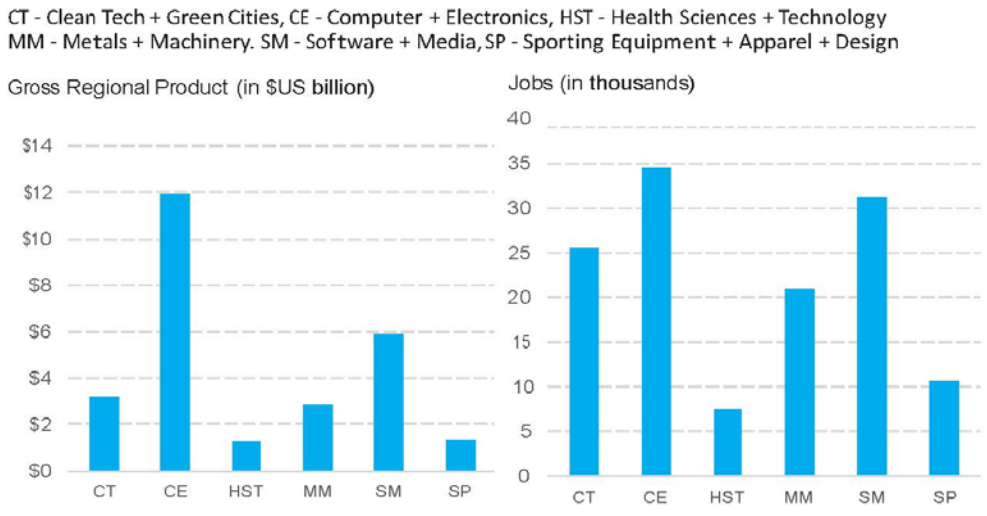
[5] Port of Portland Commodity Flow Forecast, March 2015

[6] Portland Economic Value Atlas Market Scan (August 2017) based on Brookings analysis of Bureau of Economic Analysis data.

The region's six core clusters (defined in section 2.1) demonstrate the importance of traded sector industries to our economy. The clusters generated 20 percent of all the Portland metropolitan output in 2015.[7]

When comparing the clusters to one another, their differences reflect the large variation of our industrial base. The clusters vary in size (see figure 2 below), with the Computer and Software cluster having the largest output and employment, while Health Sciences and Technology has the smallest output and employment. In 2016, the Computer and Electronics, and the Software and Media clusters each employed more than 30,000 people. The Clean Technology and Green Cities cluster employed about 25,000 people. In 2016, the leaders for gross regional product were the Computer and Software cluster with nearly $12 billion, and the Software and Media cluster with nearly $6 billion.

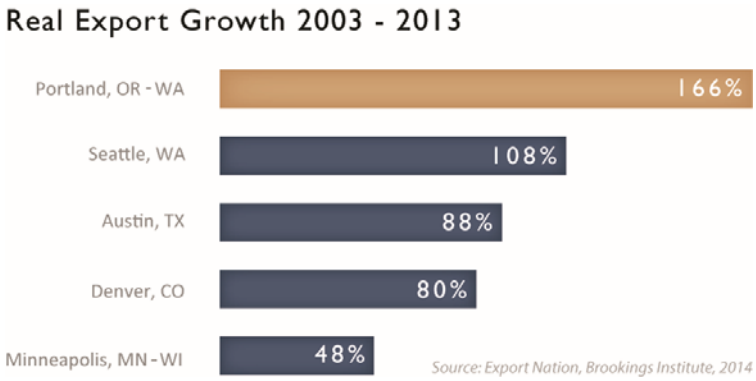
Figure 2: Portland MSA focus clusters: Various performance measures, 2016



[7] Portland Economic Value Atlas Market Scan (The Brookings Institute) August 2017

As the figure below shows, the Portland region had a growth in export volume of 166% between 2003 and 2013. This growth made the Portland region the fifth-fastest growing export market among the 100 largest metropolitan areas and the region was 13th largest by export volume in 2013.

Figure 3: Real Export Growth 2003-2013



- The Port of Portland also operates the largest international airport in Oregon. Portland International Airport acts as the air freight hub for much of Oregon and Southwest Washington. Approximately $1.9 billion of international air freight cargo was shipped through Portland International in 2016.
- Oregon's total exports rose by 9.3% in 2016, and Oregon was the only state among its Pacific neighbors to post a net gain in dollar value.[8]
- The 2015 Commodity Flow Forecast uses the 2007commodity flow survey, and projects an overall doubling of freight tonnage moved in the region by 2040. Imports and exports are projected to grow much faster than domestic freight tonnage moved in the region. Between 2007 and 2040, the tonnage of imports is projected to increase an average of 3.2% per year; and exports are projected to increase an average of 3.0% per year. Currently one in ten jobs in Oregon is transportation related. Though the Port of Portland is sufficiently diversified to bear a temporary downturn better than some, there are many employers, large and small, who make up the Port of Portland's customer base that could be hit hard.

Mounting congestion and capacity issues on several freight modes could impede the region's ability to compete globally. Regional congestion and capacity issues already impact several national goods movement corridors traversing the region, including freight rail and trucking corridors.

[8] Portland Business Journal April 2017

Made in Oregon: the ninth most trade-dependent state

The Portland metro region is home to several traded sector industries that help drive the regional economy by bringing in money from outside the region. Traded sector businesses in our region include Nike, Adidas, Columbia Sportswear, Intel, Lattice Semiconductor, FLIR, Genentech, Precision Cast Parts, Boeing, Oregon Steel Mills and Boise Cascade.

If the region is to maintain its status as an international freight gateway, steps must be taken to ensure that a flexible, adaptable, efficient and reliable goods movement system is in place. Cooperation with agencies and stakeholders across the state border with Washington is critical to make sure that freight throughways and access to primary hubs are seamless and that needed improvements are coordinated.

Deliveries of daily necessities increase with population and jobs

Modern urban life would be impossible without local goods movement. Nearly all the foodstuffs, clothing, housing materials, medical supplies, etc. that residents rely on daily come from outside the region.

Local suppliers and retailers require good connections to regional, national and international goods movement systems. They also need reasonably sized lane widths, curve and curb radii and loading zones.

2.5 Regional competitiveness requires cooperation across jurisdictions

The Portland-Vancouver area is a globally competitive international gateway and domestic hub for commerce. While Portland's status as Oregon's economic crossroads permits the region to have a vibrant, diverse and flourishing economy, it also carries certain responsibilities. The multimodal freight transportation system is a foundation for economic activities and we must strategically maintain, operate and expand it in a timely manner to ensure a vital and healthy economy.

This Regional Freight Strategy identifies mode-specific issues, policies, strategies and investments designed to meet those responsibilities and support a truly multimodal, sustainable freight network within the Portland metro region. A systems approach to planning and managing our multimodal freight transportation infrastructure must recognize and coordinate both regional and local transportation and land use decisions to maintain seamless freight and goods flow and access that benefit us all.

The recommended actions will necessarily require collaboration between public and private sectors, the coordination of freight modes that are often competitors, and the reconciliation of institutional, jurisdictional and political perspectives. Yet stakeholders have shown a strong interest in and commitment to improving freight mobility and access and reducing freight's impacts on the communities it serves.

2.6 Congestion's costs

Traded sector industries require well-integrated and highly efficient international and domestic transportation connections to stay competitive in the global economy. These firms have historically located in the region to take advantage of the pipeline, rail, marine, aviation and highway connections it offers.

Increased roadway congestion and decreased system reliability have adversely impacted the productivity of traded sector firms throughout the region. This has led to decreases in equipment productivity, increased labor costs and inefficient use of fuel, leading to increased pollution for combined air cargo, trucking, pipeline, marine and rail carriers.[9] Each of these modes relies on the regional road system for some portion of their operations and all are impacted by congestion.

Manufacturers, shippers and distributors in the region operate in a time sensitive production environment, with each operating under a unique set of parameters. Missing critical connections due to transportation system failure costs these firms significant sums of money. This can drive companies to consider relocating outside the region or prevent companies from starting up operations in the region.

2.7 Jobs and trade

As the region grows, the health of residents and communities will depend on decision-makers who appreciate the interdependence of economic, transportation and land use goals. The logistics and freight transportation sectors perform the vital task of distributing the myriad of goods that Oregonians consider essential to the maintenance of our households, businesses and communities. Additionally, this sector provides tens of thousands of jobs to the region by facilitating the transport or trans-shipment of goods entering the region via various freight modes and routes to intermediate or end users. These firms provide family wage employment that is a critical element in sustaining the region's high quality of life for all.

2.8 Freight oriented expansion supports middle income jobs

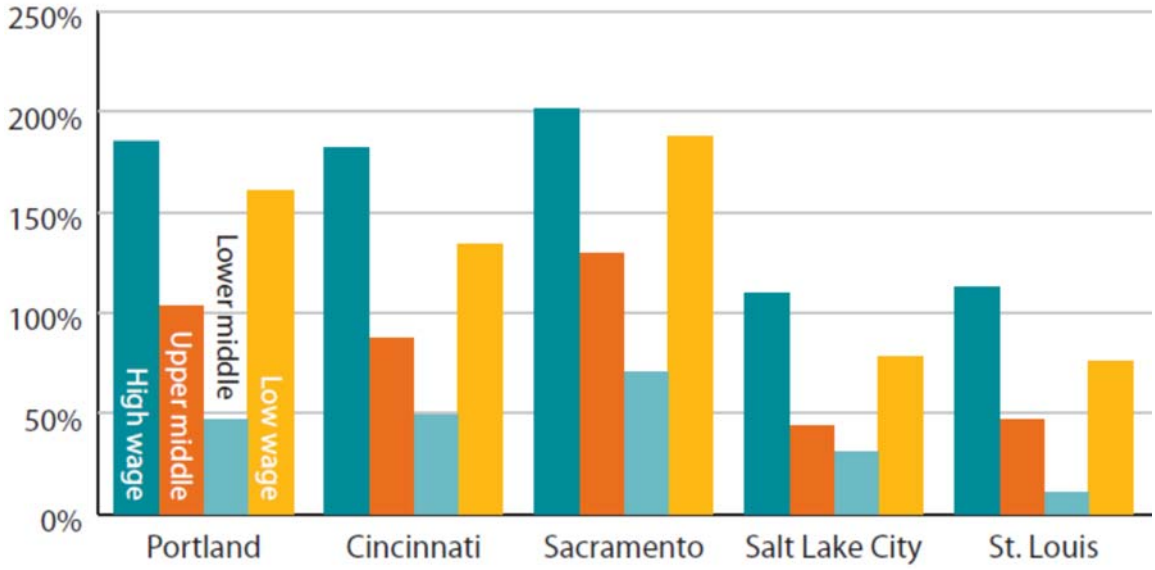
In 2015, with the assistance of the City of Portland, Port of Portland, Associated Oregon Industries, Oregon Business Association, and Oregon Business Council; the Portland Business Alliance published "Middle-income jobs in the Portland-metro economy". The report explores the current conditions of middle-income jobs and workers in the Portland metro area. Middle-income is defined as an annual income between $29,420 and $50,360 based on median wages in 2013. Two additional categories for lower-middle incomes ($29,420 to $35,170) and upper-middle incomes ($40,730 to $50,360) were established to more accurately track the trends in wage polarization.

[9] Cost of Congestion to the Economy of the Portland Region (Economic Development Research Group)

The report found that in the Portland-metro area the jobs that comprise these income ranges mainly include manufacturing, production, sales and administrative support roles. Many middle-income jobs are also impacted by local markets and populations – these often include teachers, and trade workers - both of which are impacted by business cycles.

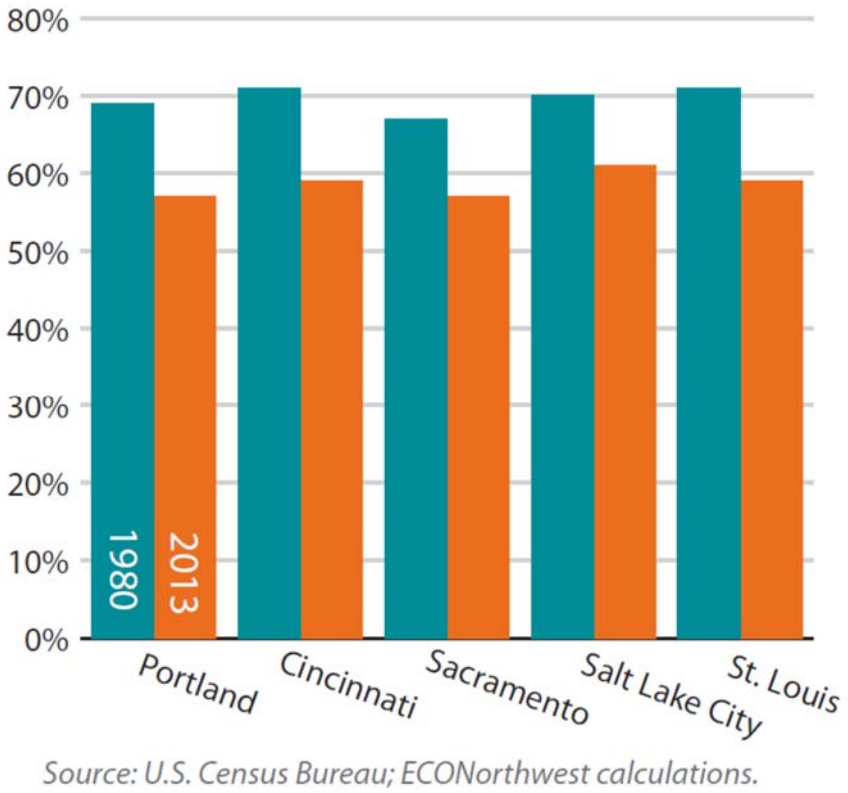
Between the years 1980 and 2013 the number of high-wage jobs increased by 185% and low wage jobs by 161%; in contrast, during this same period upper-middle wage jobs only grew by 103% and lower-middle jobs only saw an increase of 47%. This growth distribution was not limited to the Portland-metro area, in fact, both the aspirational city group and peer city group saw similar distributions of growth – the figures below more clearly express this.

Figure 4: Change in employment by wage group, peers



Source: U.S. Census Bureau; ECONorthwest calculations.

Figure 5: Middle-wage job share, peer cities, 1980 and 2013

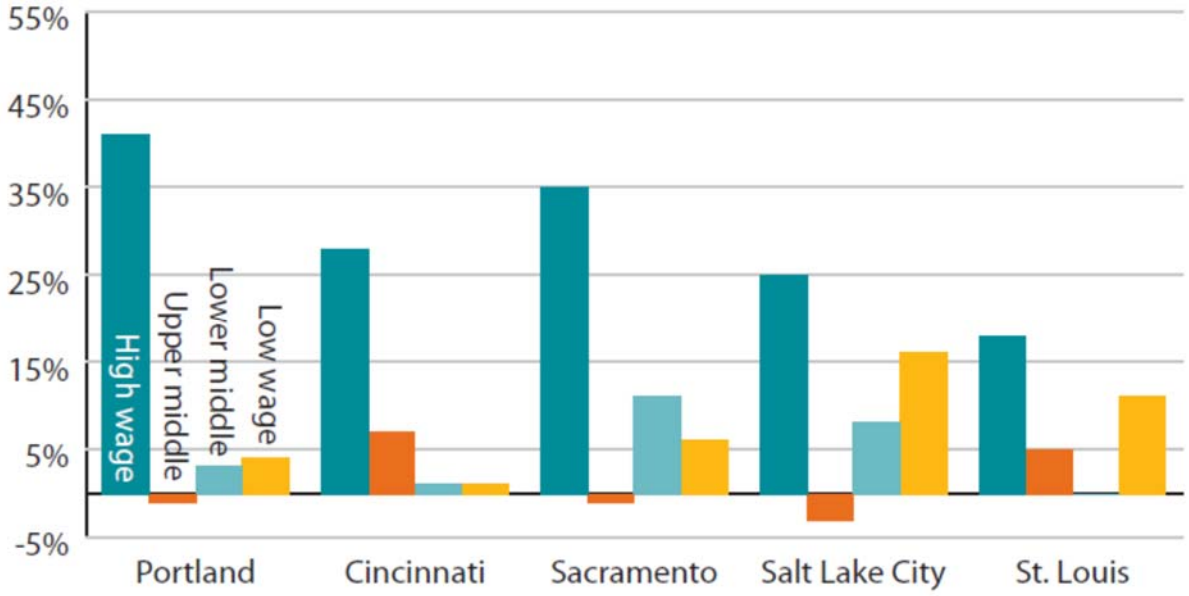


Source: U.S. Census Bureau; ECONorthwest calculations.

The report also focuses on the decrease of overall employment share that middle-income jobs hold. In 1980, middle-wage jobs represented 69% of Portland-metro's overall employment. By 2013 that number had decreased by 12 percentage points to a share of just 57% (an 18% decrease).

In addition to the share of middle-wage jobs declining, increases to real median wages within middle-wage jobs have stagnated. Both peer and aspirational data sets show a substantial increase in median income of high-wage jobs, minor increases in low-wage jobs – and in all but one case (see Cincinnati) the least substantial change impacting middle-wage jobs. When compared to the aspirational cities, Portland-Metro performed the worst in growth of median wages in every category except high-wage.

Figure 6: Growth in real median wages by wage group, peers, 1980-2013



Source: U.S. Census Bureau; U.S. Bureau of Labor Statistics; ECONorthwest calculations

The Brooking Institute reports that median annual wage for the Portland region, from 2001 to 2016, have increased by $10,000 ($30,000 to $40,000), while those with the 75th percentile wages (highest) have grown by over $20,000 ($45,000 to $65,000). Those with 25th percentile wages (lowest) have seen even flatter growth relative to the others, growing only by $7,000 ($21,000 to $28,000).[10]

Findings of "Middle-income jobs in the Portland-metro economy"
The result of all this data t indicates that wage polarization continues to impact the Portland-Metro area.

It is important to come up with strategies that help make the region accessible and affordable for anyone who wants to live here. The report offers multiple strategies for combating the effects of the declining share of middle-wage jobs. These strategies are summarized as:

- **Education** –Regions that invest in education and training will be more resilient to the changes new technology has on jobs. Greater emphasis should be placed on closing the education achievement gap so that all workers, including underserved groups, have equal access to better-paying jobs.
- **Protection of existing job corridors** – Many middle-income jobs have been tied to geographical locations; for our region these primarily include the industrial sectors

[10] Portland Economic Value Atlas Market Scan (The Brookings Institute) August 2017

along the Columbia and Willamette rivers. Policies that protect, and support the further development of jobs in these industrial areas have the potential to play a significant role in the maintenance of a stable and secure middle-income demographic.

- **Trade** – For our region, trade expansion means job growth. Trade-related jobs are wonderful sources for middle-wage growth, and jobs in this sector also support local-service industries that are also significant drivers of middle-wage jobs including manufacturing, education and health care.
- **Facilitation of growth corridors** – Many middle-income jobs are located in the growing technology centers in western Washington County, and around medical centers. It is important for government and the private sector to understand the factors that support growth and develop policies that support these growing job centers.
- **Infrastructure** – As mentioned earlier, a large portion of middle-income jobs are along rivers and key highways. Infrastructure maintenance and improved access is critical to retaining and growing middle-income jobs in these areas. Policy makers should focus on ensuring that the region's port facilities are thriving and that intermodal connector and highway congestion points are being addressed.
- **Workforce housing** – If leaders truly support the preservation of middle-income jobs an effort must be made to make living in the region an obtainable goal.

2.9 Invest now to boost the triple bottom line: People, planet, profit

The Portland-Vancouver area is a globally competitive international gateway and domestic hub for commerce. The multimodal freight transportation system is a foundation for economic activities and we must strategically maintain, operate and expand it in a timely manner to ensure a vital and healthy economy. And with so many new residents expected in the Portland metro region by 2040, family wage job creation is going to be of paramount importance. Freight policies and programs should be refined and implemented to ensure that the Portland metro region is flexibly and securely positioned for the future of freight and goods movement.

Concrete freight-related projects must be built to ensure that the goals of the Regional Freight Strategy are met. Maintaining the Portland region's historic preeminence as a goods movement and industrial hub must remain a regional priority. Regional infrastructure investment discussions should consider impacts to the local, regional and national economy, in addition to looking for cost-effective solutions. Identified benefits—including those accruing to freight—must be conserved over time through regional policy and system management and monitoring. Investment in smart, strategic and green freight system improvements now can help the region secure not only its economic future by increasing its share of family wage jobs but also support the development of a green economy that is the Portland-Metro area's trademark.

CHAPTER 3 REGIONAL FREIGHT VISION

3.1 Regional Freight Vision Framework

Informing the regional framework for freight policy is the understanding that the Portland-Vancouver region is a globally competitive international gateway and domestic hub for commerce. The multimodal freight transportation system is a foundation for economic activities and we must strategically maintain, operate and expand it in a timely manner to ensure a vital and healthy economy.

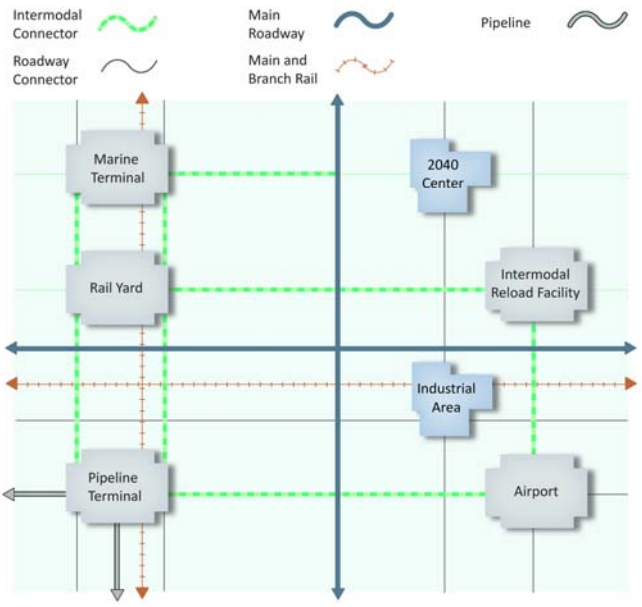
The Regional Freight Strategy addresses the needs for freight through-traffic as well as regional freight movements, and access to employment, industrial areas, and commercial districts.

3.2 Regional Freight Concept

The Regional Freight Network Concept contains policy and strategy provisions to develop and implement a coordinated and integrated freight network that helps the region's businesses attract new jobs and remain competitive in the global economy.

The transport and distribution of freight occurs via the regional freight network, a combination of interconnected publicly and privately owned networks and terminal facilities. The concept in Figure 7 shows the components of the regional freight system and their relationships.

Figure 7. Regional freight concept



Rivers, mainline rail, pipeline, air routes and arterial streets and throughways connect the region to international and domestic markets and suppliers beyond local boundaries. Inside the region, throughways and arterial streets distribute freight moved by truck to air, marine and pipeline terminal facilities, rail yards, industrial areas and commercial centers. Rail branch lines connect industrial areas, marine terminals and pipeline terminals to rail yards. Pipelines transport petroleum products to and from terminal facilities.

Note: Figure 7: Regional freight concept will also be in Chapter 2 of the updated RTP.

The Regional Freight Network map, shown as Figure 8 at the end of this chapter, applies the regional freight concept on the ground to identify the transportation networks and freight facilities that serve the region and state's freight mobility needs.

3.3 Regional Freight Network Classifications and Map

The Regional Freight Network map has been updated for the latest Regional Freight Strategy and is significantly different than the one found in the 2014 Regional Transportation Plan and the 2010 Regional Freight Plan. To show the continuity of the freight system in both Oregon and Washington State, the map now shows the freight routes in Clark County, north of the Columbia River. The previous Regional Freight Network map was difficult to read and many of the main roadway routes and road connectors were covered up by the main rail lines and branch rail lines. The updated Regional Freight Network map now has the main roadway routes and road connectors as the top Geographic Information System layers and has offset the rail lines where possible to make them more visible. The Regional Freight Strategy now features the Regional Freight Network map as an 11x17 inch map to enhance readability. To highlight the importance of the rail network, and have better visibility for the rail lines that are still partially hidden on the main map, the updated Regional Freight Network map has added six inset maps (brown dotted line boxes) that focus on the key intermodal facilities (marine terminals, rail yards and pipeline facilities) and rail lines. These inset maps are located on the back side of the main map (see the next page).

The other major update to the Regional Freight Network map is the addition of a new freight roadway designation for Regional Intermodal Connectors. The Regional Intermodal Connectors represent National Highway System (NHS) intermodal connectors and other Tier 1 intermodal connectors that were designated by ODOT as part of the Oregon Freight Intermodal Connector System (OFICS) Study completed in 2017. The description and importance of NHS intermodal connectors and other Tier 1 intermodal connectors is described in the next section of this strategy.

3.4 Regional Freight Network and Intermodal Connectors

National Highway System (NHS) intermodal connectors are roads that provide the "last-mile" connections between major rail, port, airport, and intermodal freight facilities and the rest of the National Highway System. NHS Intermodal Connectors are defined by the FHWA's Freight Management and Operations as "roads that provide access between major intermodal facilities and the other four subsystems making up the National Highway System"[11]. The four subsystems are Interstates; Other Principal Arterials; the Strategic Highway Network; and Major Strategic Highway Connectors. NHS intermodal connectors

[11] *FHWA Freight Management and Operations NHS Connectors*

account for less than one percent of total nationwide NHS mileage, but these roads are critical for the timely and reliable movement of freight[12].

Oregon Freight Intermodal Connector System (OFICS) Study

The Oregon Freight Intermodal Connector System (OFICS) Study was completed by ODOT in April of 2017, and defined and identified freight intermodal terminals and intermodal connectors within the Portland region (and the rest of Oregon). Freight intermodal terminals are defined as facilities which provide for the transfer of freight from one freight mode to another. Examples include the NHS intermodal terminals such as Port of Portland's Terminal 5 and Union Pacific's Brooklyn Yard. Smaller intermodal terminals and businesses that use more than one freight mode onsite, along with the smaller intermodal terminals are defined as "Intermodal Terminals/Businesses" (ITB), and were identified by the study.

The OFICS Study identified the locations of new intermodal connectors using the following criteria:

- They must be a public road
- They must serve as a primary access between an ITB and a state highway or an existing NHS intermodal connector
- Be a maximum length of 5 miles unless a longer length is justified

A review of the existing NHS Intermodal Connectors was completed as part of the study. The review determined if the connectors still met the FHWA's criteria for NHS Intermodal Connectors. All of the NHS Intermodal Connectors in the Portland region meet the NHS primary criteria of an average of 100 trucks in each direction per day.

Since a wide range of freight activity occurs on intermodal connectors, the study developed three tiers that sort the already recognized and new intermodal connectors by levels of importance. One of the main criteria for determining which tier an intermodal connector should be in is the average number of trucks per day on the intermodal connector. Sometimes this data was difficult to obtain so the study developed other criteria. The Tier 1 Primary Intermodal Connectors must meet the NHS Intermodal Connector criteria, which generally include:

- 50,000 TEUs/year or 100 trucks/day in each direction [13]
- Secondary Criteria: Connecting routes targeted by the state or MPO to address existing deficiency caused by increased traffic

The study defined Tier 2 Secondary Intermodal Connectors and Tier 3 Minor Intermodal Connectors. However, Metro determined that these intermodal connectors that don't meet

[12] *USDOT Federal Highway Administration, Freight Intermodal Connectors Study, April 2017*

[13] *TEU is a Twenty-foot Equivalent Unit that is equal to a 20 foot shipping container*

NHS criteria, and have less than 100 trucks/day each direction or serve smaller ITBs, are not of regional significance and are not included on the Regional Freight Network map. The Regional Freight Network map includes the Tier 1 Primary Intermodal Connectors and designates them as Regional Intermodal Connectors.

The Tier 1 intermodal connectors are the highest level of connectors and are considered as the primary classification in Oregon. The majority of the state's and the Portland region's ITBs are served by the Tier 1 intermodal connectors. In the Portland region the Tier 1 intermodal connectors consist of 16 existing NHS intermodal connectors and 3 recommended additional intermodal connectors. The three additions meet the NHS Intermodal Connector Criteria, and ODOT recommended to FHWA that these three additional intermodal connectors be designated as NHS intermodal connectors. These three additions are:

- North Rivergate Blvd. – between Terminal 5 and multiple ITBs, and N. Lombard St.
- North Leadbetter Road – a loop road south of Marine Dr. between the Terminal 6 access road and Portland French Bakery.
- NE Alderwood Road – between NE Cornfoot Road and Columbia Blvd.

Regional Intermodal Connectors

It is important to understand the truck usage and performance of the region's tier 1 and NHS intermodal connectors since they have a direct impact on goods movement efficiency and the health of the region's economy. Marine terminals, truck to rail facilities, rail yards, pipeline terminals, and air freight facilities are the primary types of intermodal terminals and businesses that the tier 1 and NHS intermodal connectors are serving in the Portland Metro region. An example of a NHS intermodal connector is Marine Drive between the marine terminals (Terminal 5 and 6) and I-5; which in 2014 had over 4,100 average daily trucks. Another NHS intermodal connector is Columbia Boulevard between I-5 and OR 213 (82nd Avenue) which had over 3,500 average daily trucks and is a vital freight connection between the air-freight terminal at Portland International and both I-5 and I-205. Another example is NW Front Avenue/NW 26th Drive that provides a vital connection between the energy pipeline terminals (near NW 61st), and marine Terminal 2 and US 30, which had between 568 and 866 average daily trucks.

These Regional Intermodal Connectors are carrying many more trucks than the typical road connectors on the Regional Freight Network map. They are also of critical importance for carrying commodities that are being exported from and imported into the state and across the county.

3.5 Regional Freight Network Policies

In 2008, the Regional Freight and Goods Movement (RFGM) Task Force developed six goal statements to elaborate a policy framework that would protect and improve the cost-effective functioning of the critical regional freight network. They also developed five

policies to serve as the foundation of the freight network concept that somewhat mirrored the goal statements but did not exactly match.

As part of the 2018 update to the Regional Freight Strategy, the intent of the RFGM Task goal statements has been maintained by combining them with the RFGM Task Force policies, and for consistency and simplicity, renaming them the Regional Freight Policies. In addition, the Metro Council directed staff to add a new policy (Policy 7) that addresses the issue of freight safety regarding the interaction of different freight modes (trucks, railroad trains, etc.) with passenger cars, bicyclist and pedestrians. These freight network policies were used to develop the freight actions that are outlined in Chapter 8. The following are the seven freight policies that guide the Regional Freight Strategy:

- **Policy 1:** Plan and manage our multimodal freight transportation infrastructure using a systems approach, coordinating regional and local decisions to maintain seamless freight movement and access to industrial areas, and intermodal facilities.
- **Policy 2:** Manage first-rate multi-modal freight networks to reduce delay, increase reliability, improve safety and provide shipping choices.
- **Policy 3:** Better integrate freight issues in regional and local planning and communication to inform the public and decision-makers on the importance of freight and goods movement issues.
- **Policy 4:** Pursue a sustainable multimodal freight transportation system that supports the health of the economy, communities and the environment through clean, green and smart technologies and practices.
- **Policy 5:** Protect critical freight corridors and access to industrial lands by integrating freight mobility and access needs into land use and transportation plans and street design.
- **Policy 6:** Invest in our multi-modal freight transportation system, including road, air, marine and rail facilities, to ensure that the region and its businesses stay economically competitive.
- **Policy 7:** Eliminate fatalities and serious injuries caused by freight vehicle crashes with passenger vehicles, bicycles, and pedestrians, by improving roadway and freight operational safety.

Figure 8

Regional Freight Network [DRAFT]

June 12, 2018

- Main rail lines
- Branch rail lines
- Main roadway routes
- Roadway connectors
- County routes outside MPA boundary
- Regional intermodal connectors
- Marine facilities
- Rail Yards
- Employment
- Industry
- Urban centers
- Metropolitan planning area (MPA)
- County boundaries
- Airports
- Extent indicator *see inset maps on back*

(dotted lines indicate planned projects, and do not identify specific alignments)

1 2 3 4 5 6

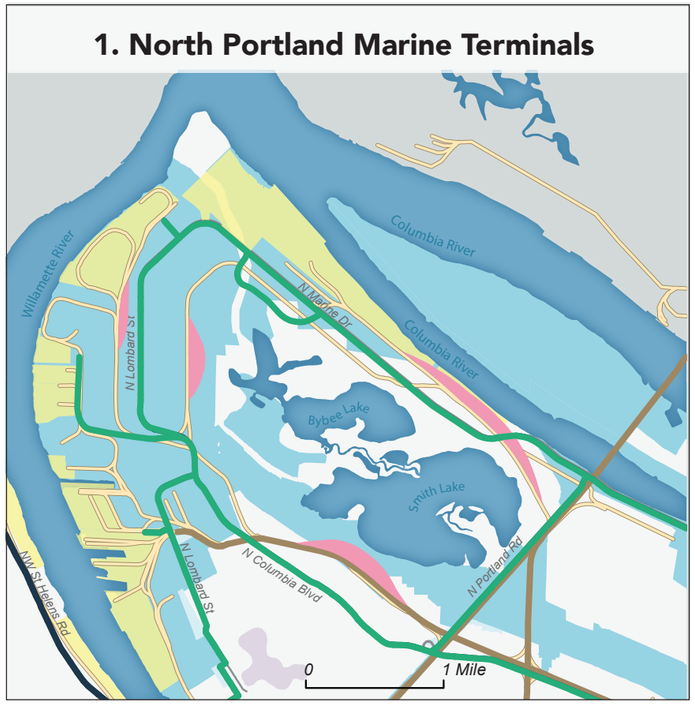
Central City

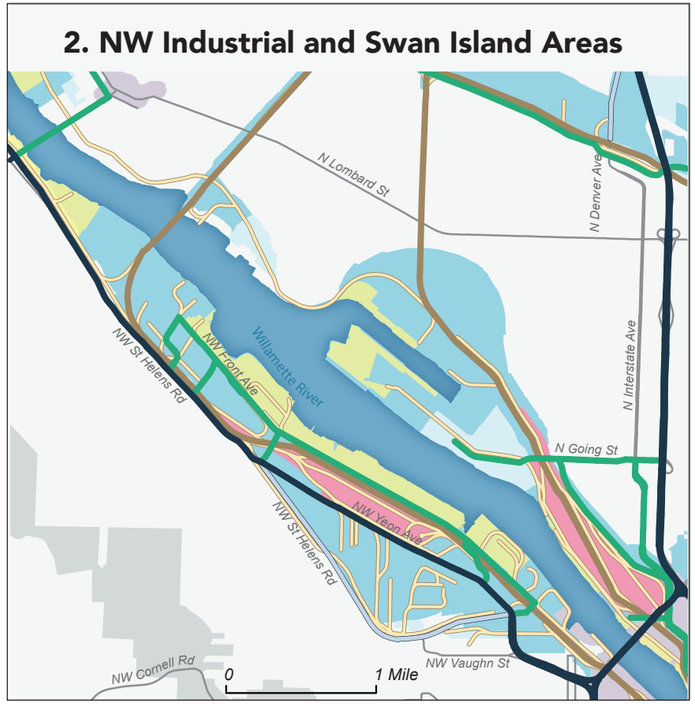
0 Mile 1

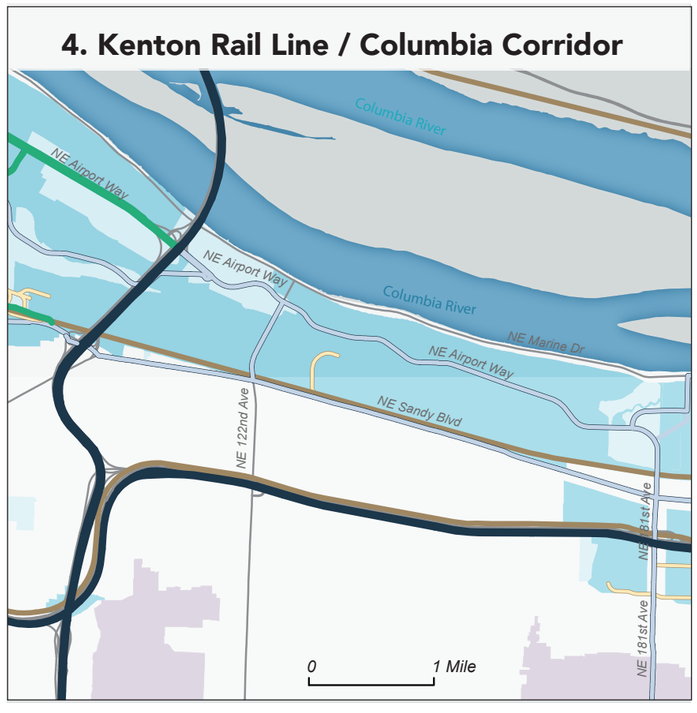
0 Mile 4

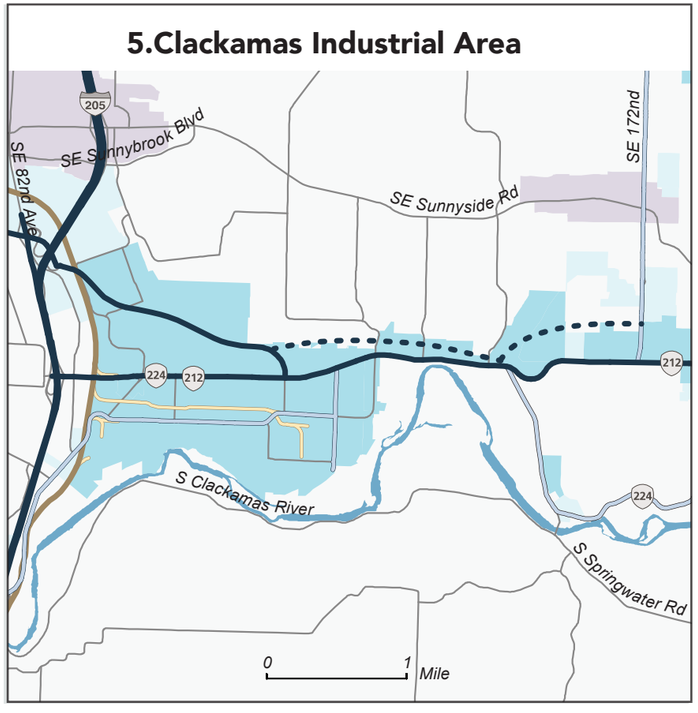
Metro

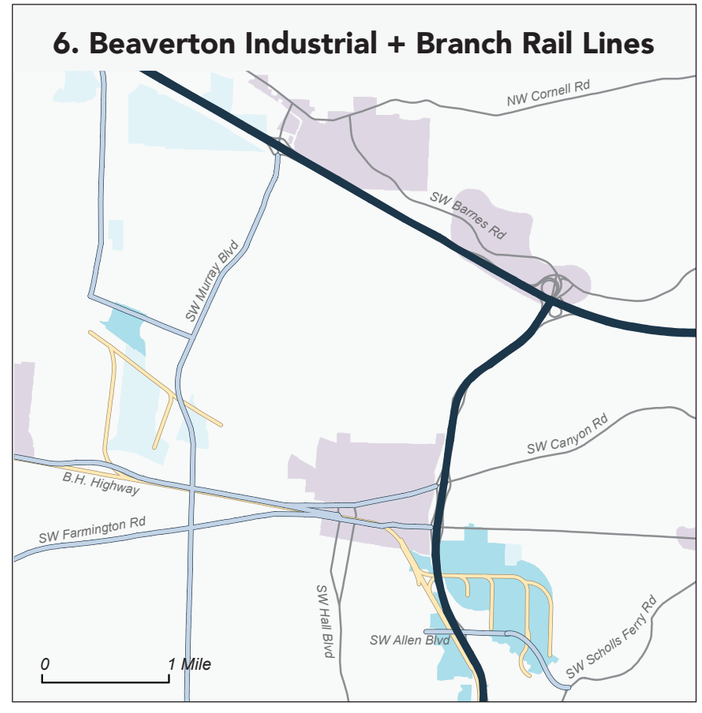
Figure 8











Legend

(dotted lines indicate planned projects, and do not identify specific alignments)

- Main rail lines
- Branch rail lines
- Main roadway routes
- Roadway connectors
- Regional intermodal connectors
- Marine facilities
- Rail Yards
- Employment
- Industry
- Urban Centers
- Urban Growth Boundary
- County Boundaries
- Airports

June 12th, 2018

CHAPTER 4 REGIONAL FREIGHT NEEDS AND ISSUES

4.1 Overview of Issues

In 2017, the Regional Freight Work Group (RFWG) reaffirmed that these six problem areas are the ones that need to be targeted:

- congestion and hotspots – chronic road and rail network bottlenecks that impede regional freight/goods movement
- reliability – unpredictable travel time due to crashes, construction, special events and weather
- capacity constraints due to physical and operational issues as well as lack of capacity in critical corridors
- network barriers – safety concerns and out of direction travel resulting from weight-limited bridges, low bridge clearances, steep grades, at-grade rail crossings and poorly designed turns or intersections
- land use – system capacity and land for industrial uses that is being lost to other activities
- impacts – managing adverse impacts including diesel emissions, greenhouse gas emissions, water quality, noise and land use conflicts

In line with sound regional planning practice, a systems approach must be taken in order to produce important outcomes such as reduced delay, better travel time reliability, safer travel across all modes and trip types, and broader shipping choices and better customer service to help area businesses remain competitive. Such an approach must also consider the economic context in which projects are built, and link transportation investment decisions to the local, regional and national economy.

4.2 Specific needs identification

The Regional Freight Work Group had open discussions that allowed them the opportunity for identifying challenges affecting freight and goods movement on the designated Regional Freight Network. A summary by mode of the RFWG's current constraints, challenges, and opportunities for freight and goods movement follows.

Constraints, challenges and opportunities on roadways and highways

- Increased congestion and congestion spreading over more hours per day on I-5 north of the Freemont Bridge (I-405).
- Capacity constraints exist at the Columbia River Bridge on I-5.
- Traffic constraints on roadway connections and intermodal connectors to I-5 are causing goods movement delays.
- I-5 at the Rose Quarter has been identified as a major traffic constraint.

- Highway 217 south of Beaverton-Hillsdale Highway has been identified as a major traffic constraint.
- Intra-county freight movements; such as high value commodities from Washington County that need to get to the air freight facility near PDX in Multnomah County, are experiencing long delays for extended periods of the day.
- Increased congestion and congestion spreading over more hours per day on US 26 (west of downtown Portland) create traffic constraints that cause trucks to avoid the freeway and travel out of direction on NW Cornelius Pass Road (north of US 26) and Highway 30 as an alternative route to avoid delays and unreliable travel times.
- For truck trips, NW Cornelius Pass Road has curvature and other design issues that need to be addressed.
- Increased demand for trucking on the region's freeway systems presents a major challenge to moving freight during congested hours.

Constraints, challenges and opportunities on and around rail lines

- Rail speed is slow, with some industrial trains that are a mile long (100+ cars), and at-grade railroad crossings cause major traffic impacts on the roadway system.
- Grade separating rail crossings at many more locations in the region presents a challenge. An example that was mentioned is the need for grade separation of the Union Pacific line as it crosses SE 8th Ave., SE Milwaukie Ave., and SE 12th Ave. (south of SE Division St.). The current at-grade crossings cause major delays to cars and trucks on the street network around these crossings in an active industrial area. This delay is amplified when freight trains and scheduled Light Rail Transit occur within a short time of one another.
- Freight rail demand on shared rail tracks at North Portland and Peninsula Junction is causing long delays to other freight trains and passenger trains (Amtrak). In 2017 the Oregon Transportation Commission approved an $8.2 million Connect Oregon VI project for rail improvements at North Portland Junction. However, improvements at Peninsula Junction were not included in this project.
- The Union Pacific Kenton Line that runs adjacent to Sandy Boulevard needs some double-tracking to address rail capacity constraints.
- There is an opportunity to address the issue of double-tracking with the Kenton Rail Line Study.
- Short term need for speed improvements to the Union Pacific Railroad line just north of the Steel Bridge river crossing. The current train speeds are 6 mph in the curves and would require a realignment of the tracks to improve speed.
- Capacity constraints on major rail lines in the region may require consideration of more double-tracking to: 1) improve freight train reliability; and 2) provide staging locations for freight trains off-line of the Seattle/Portland/Eugene passenger train corridor.

Constraints, challenges and opportunities around air freight

- Providing increased access to the Portland Airport (PDX) and consolidation facilities is limited by the existing routes. Air freight demand will grow as the area's population grows.
- The US Post Office has moved to NE Cornfoot Road near PDX. Increased truck demand, construction project impacts and overall traffic in the airport area will cause delays.
- The Westside Logistics Study showed computer and electronics shipments face constraints getting to the air fright facility on Air Trans Way, with congestion and reliability issues on US 26 (Sunset Highway) causing delays and other freight routing to get to east Portland.

Constraints, challenges and opportunities around energy pipelines

- Pipelines that supply fuels and other energy sources to the region are clustered along the Willamette River in the NW Portland Industrial area face the costs and challenges of retrofits for seismic resiliency.
- There are also financial challenges with providing seismic retrofits for resiliency on the regional freight system.

Constraints, challenges and opportunities for Marine/River (ships and barges)

- Providing more marine terminal space could be challenging.
- Deepening the Willamette River Channel for shipping has high costs and environmental challenges.
- There is a need to restore full container service at Terminal 6 (see "Loss of Container Service at Terminal 6" in Chapter 5, p.60). The impacts and short term challenges for commodity movement and freight modal changes have been addressed by ODOT and the Port of Portland. However, the long term opportunities are still being explored.
- The barges on the Columbia River cause the lift span on the I-5 Bridge to open when the river rises over six feet. There have been some years with nine months of high water.
- The location of the narrow opening of the railroad bridge (adjacent to the I-5 Bridge) makes for a difficult s-curve maneuver of barge traffic on the Columbia River that comes under these two bridges without lifting the I-5 Bridge. Barge safety is a major concern at this location. Barge traffic must avoid causing I-5 bridge lifts during peak traffic periods. During high water bridge lifts on I-5 cause major traffic delays even during off-peak hours.
- There is a need to restore operations of the Willamette Falls Locks to expand freight traffic on the Willamette River and reduce demand for trucks on the highways coming into the region. The historic Willamette Falls Locks in West Linn "were built

in the early 1870s to move river traffic around the 40-foot horseshoe-shaped basalt ridge between Oregon City and West Linn" (US Army Corps of Engineers website).

Since December 2011, the Willamette Falls Locks have been in a "non-operational status".

Table 3 provides a categorized list of the key issues.

Table 3: Priority Issues for Freight and Goods Movement

Issue category	Key issues
Mobility and accessibility	• Road congestion on regional truck routes • Travel time reliability on regional truck routes • Accessibility between intermodal terminals, industrial areas, centers and the interstate highway system • Class 1/short line rail – throughput and velocity, capacity constraints in rail yards, sidings • Improved rail access and service for regional shippers • Barriers: weight/vertical clearance issues on bridges; gaps in connectivity (new roads/bridges) • Safe barge navigation in I-5/BNSF bridges area • At-grade rail crossings – grade separation • River channel deepening
System management	• Preservation and efficient use of existing capacity • Intelligent Transportation System tools (signal timing, cameras) • Access management • Increase in truck crash rate • Faster response to roadway incidents (crashes) • Truck parking: hours of service limitations • Efficient loading/unloading operations in commercial centers • Advances in traveler information (road conditions, directional signage) • Workforce access to industrial and employment areas • Maintenance dredging and Willamette Falls Locks repair • Rail system management (directional running, grade crossing info) • Modal redundancy
Land use	• General population growth and impacts to transportation system • Competition between industrial and other uses for interchange capacity • Adequate supply of industrial land served by transportation system (i.e., marine accessible) • Incompatible land uses along rail lines and major truck corridors • Accommodation of truck delivery in pedestrian-friendly areas and corridors (street design trade-offs)
Environment	• Air quality impacts from diesel engine emissions • Residential noise impacts from truck, rail and air cargo operations • Water quality

Issue category	Key issues
Investment strategies	• Link transportation investment decisions to regional, state and national economy. • Use of public-private partnerships to fund improvements. • The role of the public sector in funding private operations. • Use a building block approach to fix corridors (i.e., ITS first, then graduate to other solutions). • Incorporate lifecycle cost (maintenance) into project.
Coordination	• Create better coordination between freight system stakeholders in the region. • Educate decision makers and public about importance of region's freight transportation system. • Consider rail service needs for regional shippers. • Consider freight/goods movement needs in project development.
Research and data	• Freight system performance over time • Ongoing truck counts • Economic impact assessments of investments

In 2017, the Regional Freight Work Group reaffirmed that this list of key issues has the appropriate categories and issues that the Regional Freight Strategy should continue to address.

4.3 Key issues that have been addressed

A sizable number of significant freight studies have been completed since the completion of the Regional Freight Plan (2035) in June of 2010 that identified and addressed important freight issues in the region. These analysis reports and studies address freight needs, along with freight delay and access issues that the 2010 Regional Freight Plan had not yet explored. The following sections provide summaries of nine of these key freight studies, categorized by the freight issue that was addressed:

Freight bottlenecks and congestion

Portland Region - 2016 Traffic Performance Report (ODOT Region 1)
The 2016 Traffic Performance Report was produced by Region 1 at ODOT, and provides information on the health of the region's freeway system. It establishes a baseline for long-term monitoring that will enable Oregon Department of Transportation (ODOT) to better understand the urban freeway traffic mobility conditions of the system.

Traffic congestion is directly affecting freight in the region. The increasing congestion is moving into the mid-day hours. In the past, freight relied on the congestion-free mid-day hours to move goods and services in the region. As the mid-day becomes more unreliable, freight is having more problems meeting delivery schedules, and the cost of shipping is increasing.

Overall, the number of crashes for the region's six freeway corridors has continued to increase in parallel with growing congestion. However, analysis of individual corridors shows the crash trend has declined or stabilized after construction of targeted operations and safety projects.

Corridor-level performance

The traffic data indicate the region's travel speeds and travel reliability are systematically getting worse. The following tables show indicators for corridors with the slowest average weekday speed (mph) and corridors with the least reliable travel. Buffer time is a measure of reliability. It is the extra time or cushion a traveler should add to their trip to ensure on-time arrival (95% of the time). Increasing buffer time equates to reliability getting worse.

Figure 9: Corridor-Level Performance

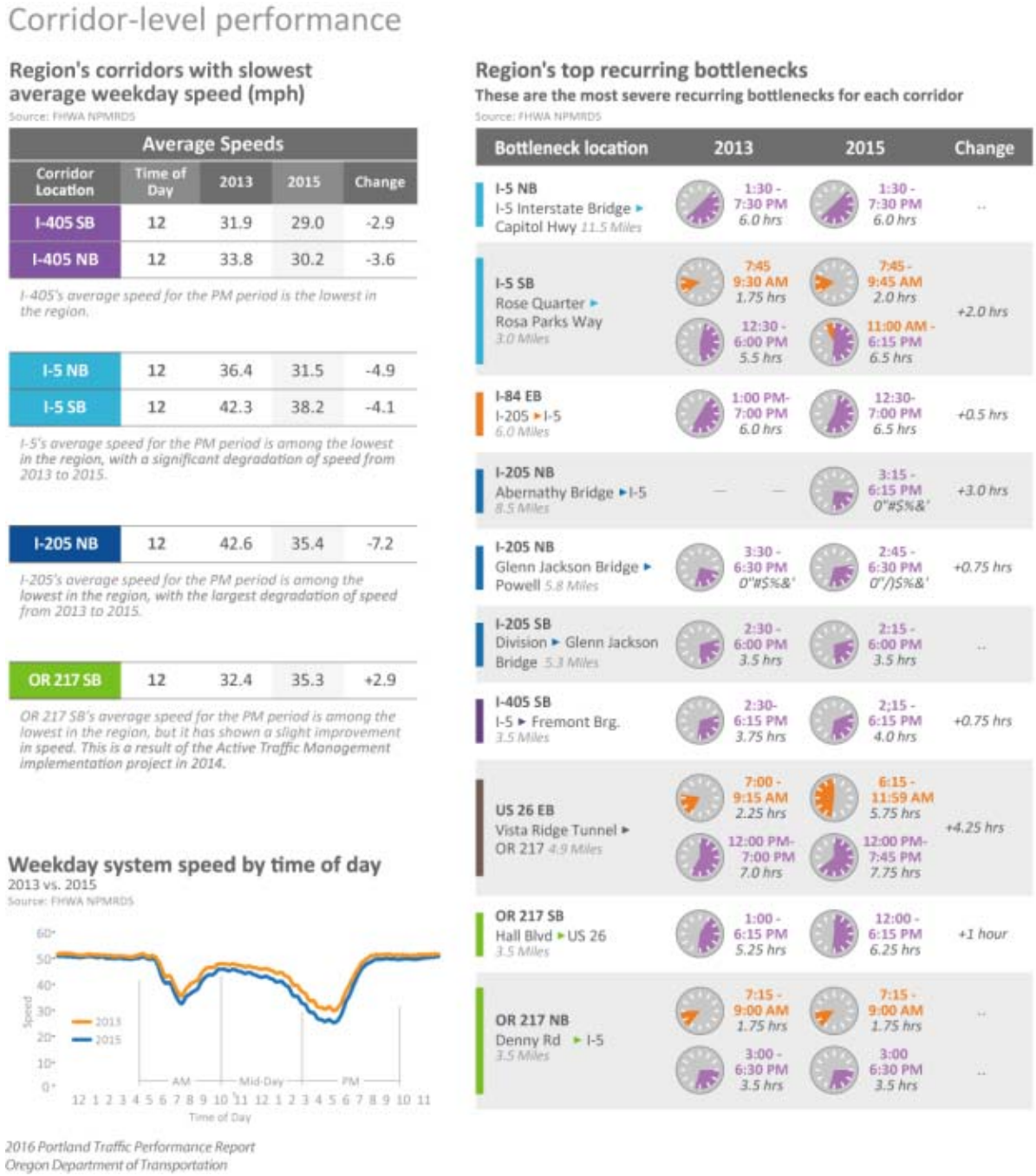


Figure 10: Travel Time Reliability Summary

Region's reliability

Travel time reliability summary

Source: FHWA NPMRDS

Corridors with least reliable travel*

Corridor location	Time of day	Travel time buffer (minutes) 2013	2015	Change	% Change
I-5 NB	PM	35.5	38.4	+2.9	8.2%
I-5 SB	PM	34.0	46.1	+12.1	35.6%
I-205 NB	PM	31.2	43.4	+12.2	39.1%
I-405 NB	PM	3.7	6.7	+3.0	81.1%
I-405 SB	PM	4.4	6.2	+1.8	40.9%
US 26 EB	PM	16.2	17.8	+1.6	9.8%
OR 217 SB	PM	7.6	8.1	+0.5	6.6%

Corridors with most significant increases in PM buffer time*

Corridor location	Time of day	Travel time buffer (minutes) 2013	2015	Change	% Change
I-5 SB	PM	34.0	46.1	+12.1	35.6%
I-205 NB	PM	31.2	43.4	+12.2	39.1%
I-405 NB	PM	3.7	6.7	+3.0	81.1%
I-405 SB	PM	4.4	6.2	+1.8	40.9%
US 26 WB	PM	2.0	5.4	+3.4	89:;

Corridors with largest increases in mid-day buffer time*

Corridor location	Time of day	Travel time buffer (minutes) 2013	2015	Change	% Change
I-5 SB	Mid-Day	10.0	14.5	+4.5	45.0%
I-205 NB	Mid-Day	4.0	8.1	+4.1	102.5%
I-205 SB	Mid-Day	4.2	9.6	+5.4	128.6%
US 26 EB	Mid-Day	3.7	7.0	+3.3	89.2%
OR 217 SB	Mid-Day	2.1	5.0	+2.9	138.1%

**Selection based on buffer time weighted for length of corridor*

Corridor with improved buffer time* and reliability

Corridor location	Time of day	Travel time buffer (minutes) 2013	2015	Change	% Change
I-84 EB	PM	12.0	6.8	-5.2	-43.3%

Reliability on I-84 EB has shown a decrease in both average and buffer travel time during the PM peak. This is due to the auxiliary lane extension project constructed in 2014 at the I-84 EB exit ramp to I-205 NB.

Corridor that experienced sustainable reliability

Corridor location	Time of day	Travel time buffer (minutes) 2013	2015	Change	% Change
OR 217 SB	PM	7.6	8.1	+0.5	+6.6%

OR 217 SB PM travel time has decreased and the buffer time change is among the lowest in the region.

This is the result of the Active Traffic Management (ATM) project that was deployed in 2014. The purpose of the ATM is to manage the recurring congestion to improve the safety and reliability of the corridor.

2016 Portland Traffic Performance Report
Oregon Department of Transportation

Interstate freight routes

I-5 carries the highest freight volumes, ranging from 13,600 to 17,800 trucks per day. It is the major north-south corridor for long-haul freight movement. In the northern corridor it serves Port of Portland marine facilities and Portland International Airport. In the southern corridor, it serves the Tualatin-Wilsonville industrial area.

I-205 carries the second highest freight volume, ranging from 7,900 to 13,100 trucks per day. It also functions as a north-south corridor for long-haul freight movement. In the north corridor it serves the Portland International Airport and the Columbia Corridor industrial area. In the southern corridor, it serves the Oregon City and Clackamas industrial areas.

I-405 has freight volumes ranging from 5,900 to 10,000 trucks per day. It functions as an inter-urban freight route for the west side and the US 30 industrial areas.

I-84 has freight volumes ranging from 6,500 to 7,800 trucks per day. It is the only interstate for east-west freight movement in the state. It serves the Troutdale industrial area, Port of Cascade Locks, and Port of Hood River.

Freeway Freight Routes

US 26 and OR 217 are the two freeways that provide fright access to the industrial areas in Washington County.

US 26 has freight volumes ranging from 1,500 to 6,000 trucks per day. It provides east-west freight connections from I-405 and I-5 to the North Hillsboro industrial area. Freight from high-tech industries in the Hillsboro area are low volume but high value commodities.

US 26 is restricted from hauling hazardous materials through the Vista Ridge Tunnel near I-405, Trucks carrying hazardous materials are required to use OR 217 or Cornelius Pass Road to US 30.

OR 217 provides a north-south freeway freight route connecting Washington County freight to US 26 and I-5. It has freight volume of about 4,300 trucks per day.

Figure 11: Average Daily Freight Truck Volume / Percent

Freeway Congestion and Reliability Impacts on Freight

Data for the region's six freeways show increasing congestion, decreasing travel speeds, greater delays and unreliable trip times. In 2013, 11.3 percent of freeway travel in the Portland metro region took place in congested conditions. This increased to 13.7 percent in 2015.

"Congestion and travel delay due to deficiencies in the transportation system are impacting businesses throughout the state, threatening their national and international competitiveness." (Note: Economic Impacts of Congestion on the Portland Metro and Oregon Economy – Portland Business Alliance 2014)

Many business owners report that they have changed to staggered shifts, added evening and overnight operations, and are increasing operations during off-peak hours (Economic Impacts of Congestion on the Portland Metro and Oregon Economy). This results in increased labor expenses, as operators need to hire additional drivers to cover new shifts.

As congestion creeps into the mid-day, truckers find it challenging to deliver goods and services on time. The loss of reliability during the day makes it difficult for interstate travel

and delivery of goods resulting in increases in trucking costs. Reliability has degraded on all six of the region's freeways between 2013 and 2015.

Figure 12: Corridor Length

I-5 Corridor –I-5 truck volume accounts for 10 to 17 percent of total traffic, and have the highest truck volumes in the Portland region. For both directions of I-5 in the AM peak, mid-day, and PM peak, both the average travel time and the buffer time increased. I-5 northbound and southbound during the PM peak experiences some of the most unreliable travel times in the region. I-5 southbound during the PM and I-5 northbound during the mid-day has one of the largest buffer travel time increases in the region.

I-84 Corridor – I-84 truck volume accounts for 5 to 20 percent of total traffic. It carries the fourth highest truck volumes in the Portland region, providing long haul access for interstate east-west connections. Reliability on I-84 westbound has degraded between 2013 and 2015 for the AM peak, mid-day, and PM peak. Reliability on I-84 eastbound has shown a decrease in both average and buffer travel time during the PM peak. Buffer time reliability for I-84 eastbound in the AM peak and mid-day has remained the same.

I-205 Corridor - I-205 truck volume accounts for 6 to 9 percent of total traffic. It carries the second highest truck volumes in the Portland region, providing an alternative north-south interstate route to I-5 on the east side. For both directions of I-205 in the AM peak, mid-day, and PM peak, both the average travel time and the buffer time increased. I-205 northbound during the PM peak experiences some of the most unreliable travel times and largest buffer travel time increases in the region. I-205 northbound and southbound during the mid-day have some of the largest buffer travel time increases in the region.

I-405 Corridor – I-405 is an urban interstate connector, linking I-5, US 26 (Sunset Highway) US 26 (Ross Island Bridge) and US 30. I-405 truck volume accounts for 6 to 8 percent of total traffic. I-405 has the third highest truck volume in the Portland region. For both directions of I-405 in the AM peak, mid-day, and PM peak, both the average travel time and the buffer time increased. I-405 northbound and southbound during the PM peak is among the corridors with unreliable travel time and is also among the corridors with the largest buffer time increase in the region.

US 26 Corridor – US 26 is a primary east-west connector to I-5 from the west side. Hazardous material cargo is restricted on US 26 at the Vista Ridge Tunnel. US 26 truck volume accounts for approximately 4 percent of total traffic. US 26 provides east-west freight connections to I-405 and I-5 freight routes. For both directions of US 26 in the AM peak, mid-day, and PM peak, both the average travel time and the buffer time increased. US 26 eastbound during the PM peak is among the top corridors with unreliable travel time. Westbound PM travel experiences some of the most significant increases in mid-day buffer time.

OR 217 Corridor – Because of hazardous material restriction on US 26 at the Vista Ridge Tunnel, OR 217 is the west-side detour connection for trucks carrying this material between US 26 and I-5. OR 217 truck volume accounts for approximately 4 percent of total traffic. OR 217 southbound during the PM peak is among the worst for reliability not only for the corridor but also the region. However, from 2013 to 2015, it had the lowest rate of change, whereas other freeway corridors in the region have degraded at a significantly higher rate. This is attributable to Automated Traffic Management (ATM) measures deployed in the corridor. Mid-day reliability on OR 217 southbound has degraded substantially, with buffer times longer than the AM buffer time.

Overall, freight truck reliability on the Portland region's major freeway and highway system has deteriorated rapidly since the last Regional Freight Plan in 2010.

Freight Highway Bottlenecks Project and delay areas (ODOT - March 2017)
Bottleneck identification is of national concern, as expressed in the 2012 Moving Ahead for Progress in the 21st Century Act (MAP-21) and carried into the Fixing America's Surface Transportation (FAST) Act. MAP-21 specifically highlights the importance of identifying and addressing bottlenecks on the multimodal freight system. Studies of existing freight highway conditions in Oregon identified that congestion from bottlenecks is a major issue, impairing Oregon's economy with variations in travel time reliability and rising travel costs. The 2011 *Oregon Freight Plan* (OFP) incorporated a strategic implementation initiative 2.3, which directed the state to "identify and rank freight bottlenecks…in particular those located on the strategic system. The Freight Highway Bottlenecks Project (FHBP) was initiated to identify locations on Oregon's highway network that were experiencing significant freight truck delay, unreliability and increased transportation costs.

There are many elements associated with freight truck delay and unreliability, including roadway congestion, high collision areas, and geometric conditions such as steep grades, severe curves or roadways that are not up to functional standards. The FHBP looked at a variety of key measureable indicators to identify locations on the state freight highway network, specifically those routes identified at ORS 366.215 restriction review routes. Indicators were things such as:

- **Delay** – the hours of delay that trucks accumulate at each corridor per day, during the season of the year that produces the largest delays for that segment.
- **Unreliability** – unreliability of shipment travel times that cannot be anticipated.
- **Geometric Issues** – % grade, degree curvature, narrow lanes or shoulders.
- **Volume** - Volume-to-capacity ratio and peak congested travel.
- **Incident-Related** – Frequency of various collision types.
- **Cost –** Transportation delay costs, inventory delay costs, and unreliability costs.

Feedback and responses/contributions from freight stakeholders were essential for the successful identification and tiering of freight highway bottlenecks. A technical advisory committee (TAC), made up of local and regional freight practitioners, an OFAC representative, ODOT Motor Carrier Division representative, Oregon Trucking Associations and other stakeholders was convened to review data, assess indicators and review bottlenecks list.

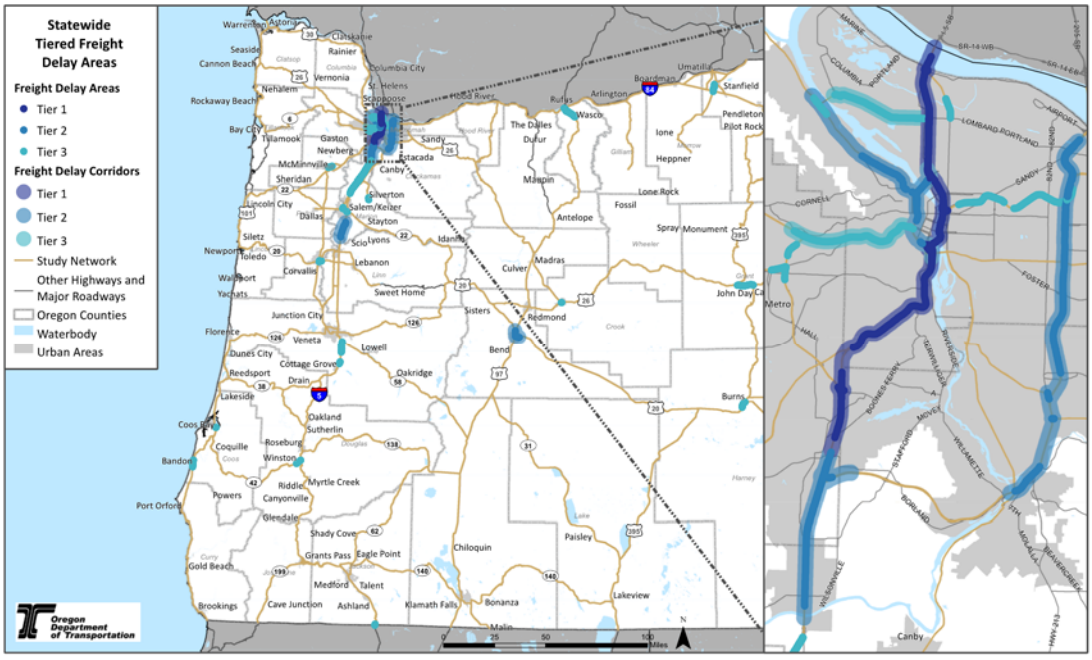
Some considerations the stakeholder groups identified at various points in the project that were incorporated into the final list included:

- **Key Indicators** – All stakeholder groups indicated that they did not believe all the indicators were equal in terms of importance. The stakeholders collectively agreed that travel delay and unreliability were the two major indicators that should be focused on to trigger a bottleneck designation. The other indicators were used to help understand the cause of the delay area and tier the bottleneck areas.

- **Urban vs. Rural** – The analysis found that the freight network in urban areas often operated at a different scale than in the rural areas of the state. Therefore, different thresholds were considered in urban and rural conditions.
- **Corridors** – There were clear strings of delay areas, particularly in the Portland-Metro area that, should be considered as corridors, rather than individual delay areas. This reflects the cumulative impact that longer segments have on freight movements. It also acknowledges the need to consider the entire corridor when developing solutions.
- **Tiering** – The costs associated with travel delay and unreliability was determined to be the key indicator to determine the bottleneck corridor and delay area severity.

The final tiered freight highway delay areas map is shown below. As shown, both freight delay **areas** and freight delay **corridors** are presented. The Portland-metro area has the bulk of the identified delay areas and corridors, even though the thresholds for rural areas are significantly lower than those in urban areas. Delay areas within corridors represent nearly all of the first two tiers, reflecting the high cost of cumulative delay and reliability on the freight industry. The only tier one corridor is I-5 in the Portland metropolitan area because the impacts to freight in this corridor far exceed those in other locations throughout the state. The freight highway bottleneck list and map were endorsed by OFAC during their regular meeting on January 18, 2017.

Figure 13: Freight Highway Delay Areas



Corridor Bottleneck Operations Study (ODOT)

The Corridor Bottleneck Operations Study (CBOS) is a 2013 study conducted by ODOT to identify low-cost and effective solutions to the recurring bottlenecks within the Portland Metro area. The resulting document was a Project Atlas that identified bottleneck locations along the five metro area corridors (I-5, I-205, I-84, I-405 and US 26) as well as a collection of low-cost, operational solutions to the various bottlenecks.

The development of the Project Atlas consisted of three primary steps:

1. **Corridor-level reconnaissance**

This included preliminary surveying and research to provide a solid foundation for specific investigation in order to validate recurring bottleneck activity and primary causes.

2. **Bottleneck Analysis, evaluation, screening, and selection of solutions**

This step was aimed at design and operation – during this step the bottlenecks were analyzed and potential solutions were developed, evaluated, and screened by a design panel consisting of professionals from an array of discipline areas. The projects proposed were primarily constrained by cost ($1 million to $20 million range) and the inability to add capacity. As a result, the benefits resulting from projects are likely to be moderate or incremental and be geared towards improving safety by limiting the amount of weaves and merges that occur at interchanges.

3. **Refinement of Solutions**

The third and final step focused on more in depth evaluation of operation and design solutions. The evaluation included traffic modeling as well as an assessment of project feasibility.

Study Area

The study area in the CBOS consists of five corridors in the Portland metropolitan area (see Figure 14.) Note that the study area within these corridors includes the ramp merge and diverge locations in addition to the roadway mainline. Figure 14 (below) highlights the boundaries of the study area.

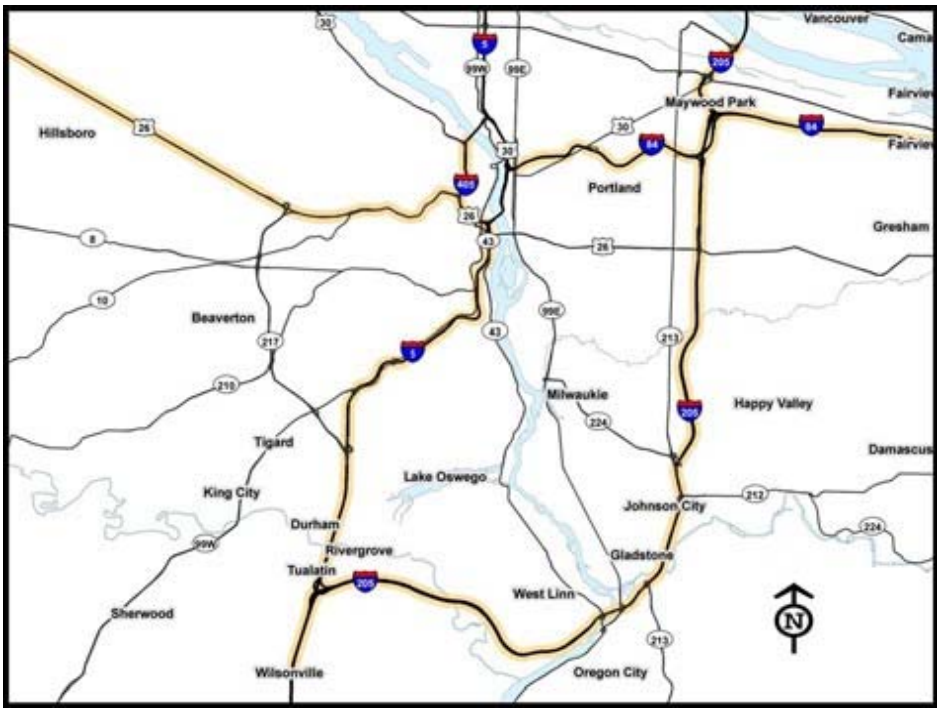


Figure 14: The Study Area in the CBOS

I-5: North Boundary – Marquam Bridge| South Boundary – Boones Bridge
I-205: North Boundary – Airport Way | South Boundary – I-5 interchange in Tualatin
I-84: West Boundary – I-5 | East Boundary – 257th Avenue
I-405: North Boundary – I-5 | South Boundary – I-5
US 26: West Boundary – OR 47 | East Boundary – I-405

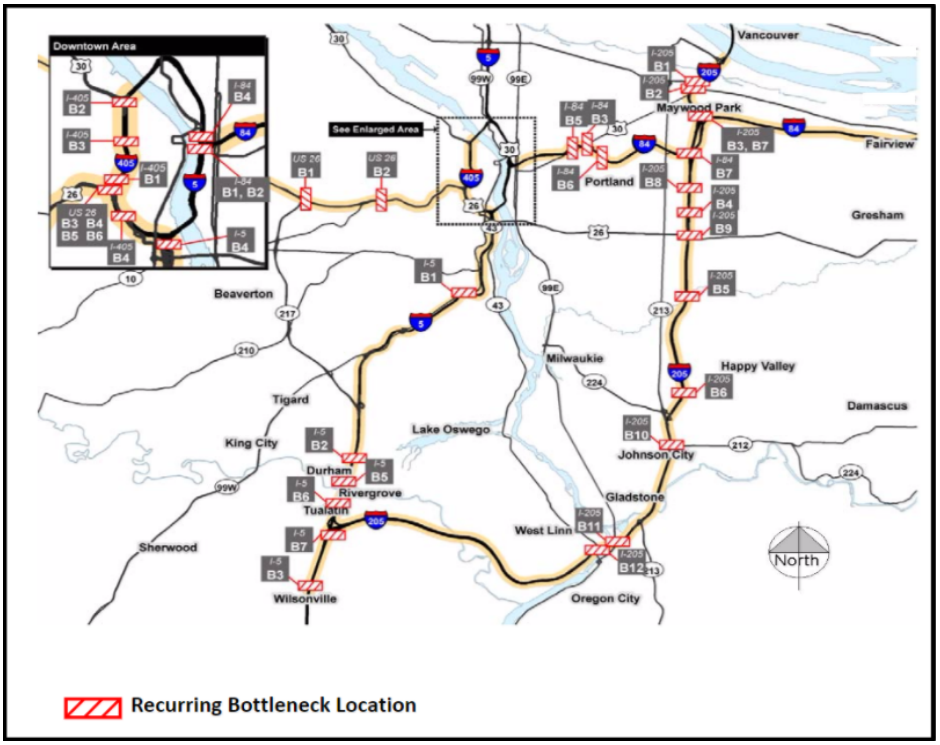


Figure 15: Bottleneck Locations

Findings
The conclusion of the study offered helpful information regarding the location, duration, and typical cause of each bottleneck. The study identified 36 recurring bottleneck locations distributed throughout the five corridors. Figure 15 highlights these bottleneck locations.

Economic Impacts of Congestion in Oregon (2014)
The final report for the study was prepared by the Economic Development Research Group in February 2014 for the Portland Business Alliance, Oregon Business Council and the Port of Portland. The following is a summary from the report of transportation's role in the state's economy, the transportation system's impact on business, and the impact of congestion and travel delay on the Oregon economy.

Oregon's transportation system is the backbone of the state's economy. A well-maintained, resilient, and efficient network of highways, rail and waterborne transportation is essential to support the businesses that provide the jobs and revenues needed to underpin the resource-based, traditional manufacturing and advanced biotech and computer/electronics technologies that characterize the state's economy. The key findings are:

- Oregon's competitiveness is largely dependent on efficient transportation. Over 346,400 jobs are transportation related, or transportation dependent, meaning that system deficiencies threaten the state's economic vitality.
- Businesses are reporting that traffic congestion and travel delay is costing money, forcing changes in business operations and location decisions.
- Oregon's geographic location makes it a key component of US West Coast logistics, serving as a major hub for domestic and international freight. The state provides key international air and maritime gateways, as well as an important junction of critical transcontinental highways.
- "Traded industries" – those industries that provide goods and services outside of Oregon and bring money back into the state economy – are particularly reliant on an efficient transportation network. Exports from these industries are shipped through most major ports on the US West Coast. These industries are also critical to statewide economic growth and job creation.
- Congestion and travel delay due to deficiencies in the transportation system are already impacting businesses throughout the state, hurting their competitiveness. Direct interviews with businesses were conducted as part of this study, and the results underscore the fact that transportation is critical to business competitiveness and sustained business growth in Oregon. Due to increasing congestion, businesses report that they are drastically altering operations in order to keep a competitive edge.
- Changes in business operations are nearing the limits of what a business can do to overcome transportation congestion before it becomes a severe issue. Many respondents reported that they have implemented staggered shifts, evening and overnight operations, and are increasingly operating during "off-off-peak" hours.

However, the businesses do so at the boundaries of regulatory limits on hours, concern about driver safety, and limits as to when they can feasibly deliver to customers.

- Failure to adequately invest in the transportation system will result in significant losses to Oregon's economy, job base and quality of life. Congestion is becoming an increasing problem statewide, and that investments in infrastructure can strongly mitigate these conditions.
- These travel time savings from new investments translate to significant economic impacts. With transportation investments in the "Improved Future Investment Scenario," these savings would generate an additional 8,300 jobs by 2040; $928 million in output; $530 million in GDP or value added; and $380 million in wages and compensation to employees.

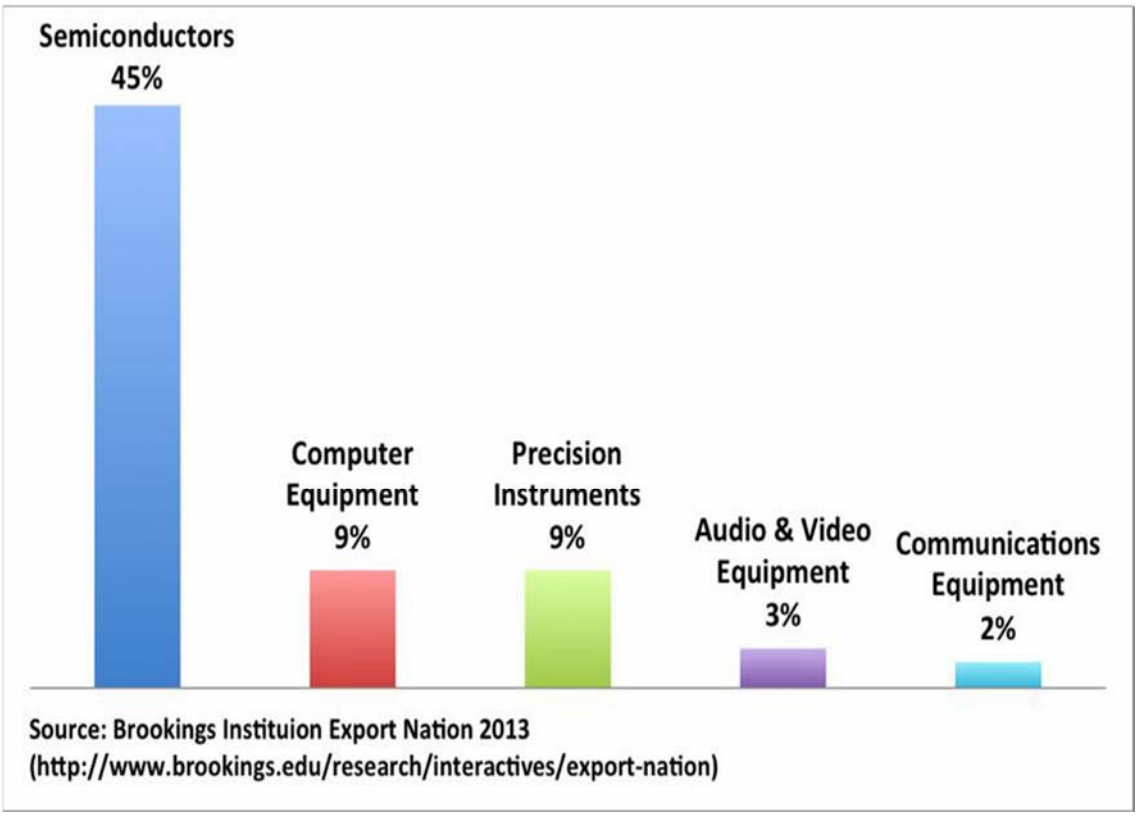
Freight access and logistics

Portland Region Westside Freight Access and Logistics Analysis Report (DKS - October 2013)

Portland's Dependence on High-Tech Exports

Portland's economy has long relied on export industries, serving broad domestic and international markets and bringing outside dollars into the region. Increasingly, Portland's export economy relies on semiconductors and the computer and electronics (C&E) industry, which accounts for over half the total value of the region's exports (Figure16). This industry is primarily located in the region's Westside (sometimes called the "Silicon Forest") and depends on a tightly managed supply chain to efficiently bring products to markets that are mostly outside of the Portland Metropolitan area. This study provided recommendations on how to improve goods movement from the Westside C&E industry to Portland International Airport (PDX) freight consolidation locations.

Figure 16: Industries Representing Two Percent or More of the Portland Region's Exported Goods



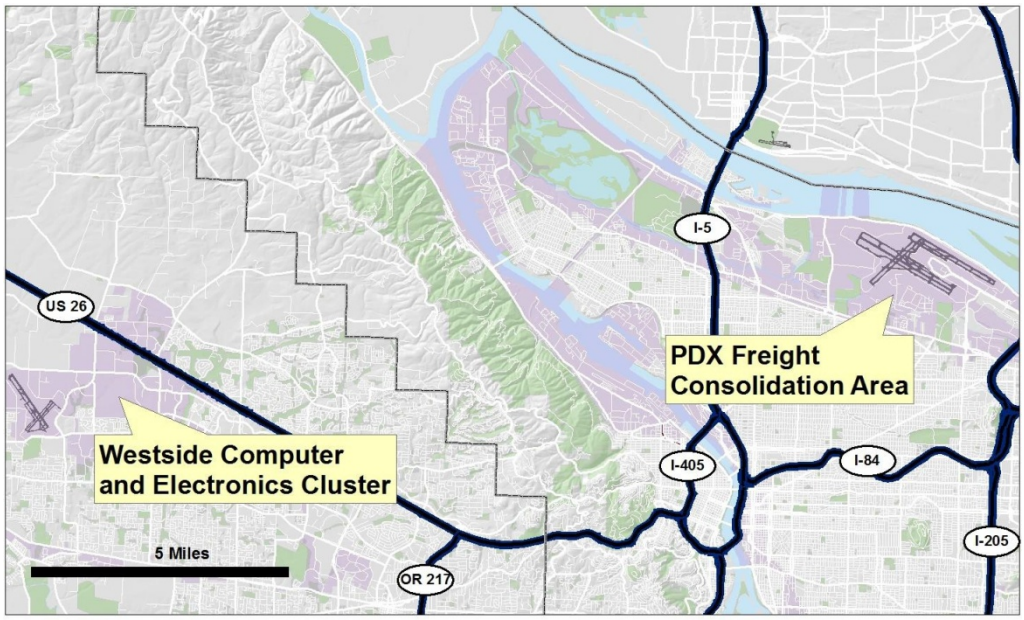
While this study focused on a single sector of the region's export economy, it is important to recognize that policies and investments that support the computer and electronics industry may support other key export industries such as footwear, apparel, and agricultural products.

Continued growth in these other industries will tend to have ancillary benefits to the computer and electronics industry, such as improving the frequency of Portland International air cargo service or increasing the range of freight movement options.

Study Focus

This study focused on the outbound movement of goods from Westside computer and electronics manufacturers to the freight consolidation area at Portland International Airport (PDX), as shown in Figure 17. While not all C&E goods fly out of PDX, the freight consolidation area, generally located north of Columbia Boulevard and south of the terminal, is home to several firms that support international and domestic service by handling and combining C&E goods before trucking them north or south of the Portland region for consolidation at other airports. For the purposes of the study, Westside C&E firms are assumed to be clustered south of US 26 in the vicinity of Brookwood Parkway.

Figure 17: Portland Region Westside Freight Access and Logistics Analysis Study Area



Freight movement between the Westside C&E cluster and the PDX freight consolidation area depends on two routes: (1) US 26 to I-405 north to I-5 north, and (2) Cornelius Pass Road to US 30 then eastbound across the St. Johns Bridge to Columbia Boulevard. These key routes are the focus of this study. The study does not consider other corridors, such as OR 217 and I-5 south that are important to regional freight movement but are not regular routes for transporting freight from the Westside to PDX.

The study looked at projects that can have a significant impact on speed, efficiency, and reliability that can be pursued in the near term.

Study Findings

Several important findings emerged from this study's industry interviews and technical analysis:

- Portland International Airport (PDX) is a crucial location along the supply chain, but most C&E freight moves out of PDX on a truck.
- Firms involved in freight movement and logistics currently use PDX as a freight consolidation hub, but they generally find it is most efficient to truck, rather than fly, goods to airports that have better links to overseas destinations.
- Supporting a strong Westside C&E cluster can help leverage freight movement options for other industries. While the Silicon Forest is dominant in the region's export economy, other regional export industries such as footwear, apparel, and agriculture can benefit from the short-term strategies identified in this report. All export industries in the region benefit from air cargo services out of PDX, and these services can be maintained and/or increased by increased export activity.

- Reliability of the roadway system is key to C&E goods movement. Interviews indicated that after 2:00 pm "all bets are off" regarding the reliability of the US 26/I-405/I-5 corridor and that Cornelius Pass Road/US 30 becomes the de facto route in the afternoon. Analysis of travel time data confirms that Cornelius Pass Road/US 30 is significantly more reliable in the midday and p.m. hours.
- The Westside C&E industry is heavily dependent on a rural road with known deficiencies. Cornelius Pass Road from the Washington County line to US 30 was designed and built for rural use, but is increasingly used for urban-to-urban trips. Because it is a winding and steep road through a narrow pass, it is susceptible to incident-induced congestion (such as truck rollovers) and a lack of viable alternative routes.

Recommendations

Three strategies emerged from this study that show clear benefit to Westside C&E freight movement and can potentially be implemented in a short timeframe. These strategies are shown in Table 4.

Table 4: Recommended Priority Projects

Project Name	Description	Benefits
Enhanced Traveler Information	Provides predictive traveler information at key points on routes approaching US 26, alerting drivers to congestion on US 26, through the central city loop, or on Cornelius Pass Road northbound.	Provides more reliable travel time by alerting drivers of incidents, reducing non-recurring delay.
US 26 Truck Ramp Meter Bypass	Modify select US 26 on-ramps to allow freight to bypass ramp meter queues.	Potential to reduce queue-related delay by 10 to 20 minutes.
Enhanced Freeway Incident Response	Increase incident response and clearing capacity on key US 26/I-405/I-5 freight route to reduce non-recurring congestion impacts.	Reduces delays due to incidents.

Washington County Freight Study (July 2017)

Background

Washington County is the economic engine of the Portland-metro region and the state. The computer and electronics industry, which accounts for nearly half of state exports in terms of value, is centered on the western part of the Portland-metro region, primarily in Washington County. The county contains over 15 percent of the state's jobs (second highest in the state) and has the highest average wages. Given the trade-dependent nature of many businesses in Washington County, it is important to understand how freight congestion impacts these companies' ability to operate, compete, and grow.

Study Purpose and Scope

The Transportation Futures Study analyzed the future transportation needs of Washington County based on anticipated population and employment growth. It found that delays for trucks would be more than twice that for other vehicles. While that study outlined broad transportation needs for all users in the county, study partners determined that additional freight-specific data and analysis were needed to further identify and prioritize needs for trucks.

Previous studies have explored the dependence of traded sector jobs on the transportation system in the region. The purpose of this study was to identify and prioritize infrastructure problems within Washington County that impact freight. The results will inform the development of regional, state and federal funding requests and need for road improvements. They will also provide input regarding freight flows and market considerations (including cost sensitivity and urgency) to the future demand forecast for the Hillsboro Airport Master plan.

Under the guidance of the Steering Committee composed of project partners, the study:

- Reviewed existing plans, studies and data
- Conducted interviews with companies that ship or carry goods into or out of Washington County
- Analyzed recent truck operations using real-time speed and volume data.
- Evaluated and prioritized truck needs within Washington County

Key Findings

- As the economic engine of Oregon and a major exporting region, Washington County is highly dependent on freight infrastructure.
- In addition to computers and related components, plastic, wood, paper, tools, nursery, seed, fruit and tree nut products all represent significant exports produced in Washington County.
- The Portland metropolitan area has the bulk of identified delay areas and corridors in the state according to the recently completed Freight Highway Bottleneck Project (FHBP).
- Due to its relative speed and flexibility, trucks are by far the most common mode. On their own, or in combination with other modes, trucks are a part of most freight trips.
- Businesses' heavy reliance on trucks makes highway and arterial congestion a major concern for many firms in Washington County and the region. Congestion adds time to deliveries, resulting in significant costs to businesses. Most interviewed firms indicated that highway congestion was a serious impediment and complained of significant impacts from consistent, pervasive roadway congestion. A severe

national truck driver shortage, exacerbated by federal requirements and traffic delays, is impacting the ability of businesses to move goods.

- New real-time truck operations data on arterials was analyzed with truck counts in an analysis that allowed more detailed understanding of local delay and reliability issues critical to freight movement than previously.
- The limited number of routes into the county, the degree of delay and unreliability on them, and the importance of county freight to the economy make access to Washington County a statewide issue. These concerns were expressed by stakeholders and supported by the study evaluation and the statewide FHBP.
- The I-5 corridor was most often cited by stakeholders and represents the highest need in both this analysis and the statewide bottleneck study.
- The US 26 corridor near the Sylvan Tunnel followed I-5 in terms of stakeholder concerns and freight operational performance in this analysis and was also identified as a delay corridor in the statewide study.
- Many Washington County highways and arterials suffer from congestion throughout much of the day. Other key areas of freight operational delay and unreliability include portions of OR 217, OR 8, Tualatin-Sherwood Road, Cornelius Pass Road and Murray Boulevard.
- Farm to market roads near the edge of the urban area are not built for the volumes or loads they are subject to.

Stakeholder Suggestions to Improve Freight Movement

Stakeholders had a number of suggestions to improve freight movement, including the following general approaches:

- Adding HOV or truck-only lanes
- Providing incentives to encourage off-peak delivery
- Adding lanes or interchanges at bottleneck areas along specific corridors
- Expanding transit service, routes, and facilities along congested corridors
- Higher speed limits

Each of these tools offers its own set of opportunities and limitations. They might work in some locations or for some industries and not others. However, they should all be explored as part of a comprehensive approach to freight delay and reliability issues in the Portland metropolitan area.

Conclusions

This freight needs analysis was intended to provide information to decision-makers in establishing transportation funding priorities. Freight delay and reliability within and to Washington County are a major regional issue. Due to the importance of county traded

sector businesses to the economy, the freight needs identified here rise to the level of statewide significance.

As summarized, this study identified and prioritized Washington County Freight needs. This study finds that freight access to, and movement within, Washington County represents a significant cost to businesses and drag on the economy. These findings demonstrate the location of significant freight needs in and around Washington County and underscore the importance of developing and funding road improvements to meet them.

Over-dimensional trucks

Highway Over-Dimensional Load Pinch Point Study (ODOT)

Purpose
The Highway Over-Dimension Load Pinch Point Study (HOLLP) was conducted by the ODOT Freight Planning Unit, Transportation Development Division, with the goal of identifying, analyzing and ranking interstate and state highway pinch points that restrict the movement of over-dimension loads. The study was completed in May 2016. The primary purpose of the study was to develop a list of key pinch points that can then be presented to the ODOT Region and Area Commission on Transportation for project recommendations that would remove these pinch points.

Definitions
An over-dimension load is a load classification that is triggered when a load has any of the following dimensions.

1. Width greater than 8 feet 6 inches
2. Vehicle height or vehicle combination greater than 14 feet
3. Front overhang greater than 4 feet beyond front bumper
4. Load is greater than 40 feet and extends 5 feet beyond the end of the semi-trailer; or load less than or equal to 40 feet exceeds 1/3 of the wheelbase of the combination, whichever is less.
5. Vehicle combination length that exceeds those authorized on the reverse of MCTD Group Map 1.
6. Any single axle weight that exceeds 20,000 pounds, tandem axle weigh that exceeds 34,000 pounds, or gross combination weight that exceeds 80,000 pounds.

Most commonly over-dimension loads include cranes, excavators, steel plates, manufactured homes, forklifts, boats, transformers, windmill turbines, and other oversized industrial equipment.

The study highlights two primary route types that are relevant to over-dimension loads.

1. High Routes - these routes are designated as the routes required for the transport of over-dimensional loads requiring vertical clearance.

2. Reduction Review Routes (RRR) – are the highways associated with ORS 366.215 and OAR 731-012-0010. The statute states that Oregon Transportation Commission may not permanently reduce vehicle-carrying capacity of a RRR unless safety or access considerations require a reduction.

Bottlenecks or delay areas are commonly referred to as places or points where congestion frequently occurs. In relation to the study, over-dimension pinch points are those areas that become problematic due to width, length, and vertical clearance or weight constraints. For over-dimension loads these pinch points usually take the form of overpasses, narrow roadways, sharp curves, or weight-restricted bridges.

The HOLPP uses the same dimension categories to classify pinch points within the study. The three classifications offer useful information surrounding the nature of pinch points for over-dimension loads within the Oregon transportation network.

Heavy Load (HL) Pinch Point

- These are bridges along the highway which cannot support the weight of over-dimension loads. Note that the most current list of weight-restricted bridges provided by the ODOT Bridge Program shows that none of the weight-restricted bridges are graded to handle a weight greater than 60,000 pounds and as mentioned earlier, over-dimension weight loads are gross weights greater than 80,000 pounds which means that HL pinch points are all weight-restricted bridges

Vertical Clearance (VC) Pinch Point

- These are classified as areas lacking the required vertical clearance for over-dimension transport. They are based on the vertical clearance design standards **in the Oregon Highway Design Manual: 17'-4" on High Routes, 17'-0" on NHS** Non-High Routes and 16'-0" on Non-NHS and Non-High Routes. As a safety buffer, the MCTD adds an additional 4" to the actual height of any bridge unit when routing trucks and will not route any truck that doesn't meet the clearance with the buffer zone included.

Wide and Long (WL) Pinch Point

- These are points along the highway where it is difficult or impossible to move some over-dimension loads due to horizontal constraints. The study offers no dimensions for WL pinch points however, ODOT Maintenance District staff has identified WL pinch points based on their experience and history of routing over-dimension loads on the highways within their districts. Commonly these points take the form of guard rails, narrow bridges, curbs, non-removable signs, intersections, and any other horizontal constraint.

Findings

The study resulted in a High Priority Pinch Point classification system that highlights the criteria for distinguishing locations as high or low priority for action.

ODOT's High Priority Criteria:

- **WL Pinch Points -** In order to be classified as High Priority all WL pinch points within RRR segments must be separated by at least 15 miles (either direction). This helps direct focus on situations where removing a pinch point would open up a RRR to wider and longer loads. Additionally, all High Priority WL pinch points must be less than one mile in length.
- **VC Pinch Points** – In order to be classified as High Priority all VC pinch points must be at least 6" less than the design standard for that type of highway. Similar to WL pinch points all High Priority VC pinch points must separated from other VC pinch points on a RRR segment by at least 15 miles in order to focus on situations that would have greater impact if a single pinch point is removed.
- **HL Pinch Points** – At this point all HL pinch points are classified as High Priority because there are so few weight-restricted bridges on the RRR.
- **Combination Pinch Points** – These are pinch points that fall into multiple categories such as a WL/VC pinch point. In order to qualify as High Priority a combination pinch point is only required to meet the High Priority criteria for one of the pinch points.

Special circumstance can warrant a High Priority classification of a pinch point and must be documented. Any pinch point not meeting the criteria listed above are currently rated as Low Priority.

At this time 88 pinch points have been identified within the boundaries of the Portland region's metropolitan planning area. 19 of these pinch points have been classified as High Priority. 8 of the High Priority pinch points are due to WL constraints, and an additional 8 are due to VC constraints, 1 is due to HL constraints and the remaining 2 are combination pinch points. The 69 other pinch points are currently rated as Low-Priority with the vast majority (60 points) classified as VC areas.

Figure 18: Placeholder for map insert "High Priority Highway Over-Dimension Load Pinch Point locations"

While the study does not specifically address how each pinch point should be technically modified it does offer helpful insight on best practices for categorizing and prioritizing the problem areas, and a clear picture of where potential projects should take place.

Regional Over-Dimensional Truck Route Study

The Portland Freight Master Plan and the Regional Freight Plan both identified the need to plan for the efficient movement of over-dimensional freight vehicles within and through the metro region. The City of Portland, ODOT, Metro, Clackamas, Multnomah and Washington Counties agreed to work together to prepare a Regional Over-Dimensional Truck Route Study for the three county metro region.

The purpose of this study was to provide local jurisdictions with a comprehensive assessment of over-dimensional truck movements to more effectively plan for their safe and efficient routing within and through the metro region. This project identified and mapped the most commonly used and preferred routes for the safe movement of over- dimensional vehicles and documented the minimum clearance requirements to accommodate over-sized loads. Physical and operational constraints and missing gaps in the over-dimensional freight network were defined and recommended capital transportation improvements and planning-level costs for removing identified constraints were developed.

An inventory and assessment of current transportation policies and over-dimensional permitting practices was conducted to identify potential policy changes and permitting efficiency improvements. The goal was to develop a seamless over-dimensional route system that transcends jurisdictional boundaries and to provide policy guidance for accommodating over-dimensional vehicles in state, regional and local transportation system plans and local street design guidelines.

The study was initiated in October 2015 and concluded in March 2017. The Project Management Team (PMT) consists of representatives from the partner agencies to provide project oversight and guidance. The project consultant conducted the technical planning and engineering analysis, cost considerations and final report preparation. The Stakeholder Advisory Committee (SAC) composed of representatives from the over- dimensional hauling industry, and provided strategic input on all work products from the user's perspective.

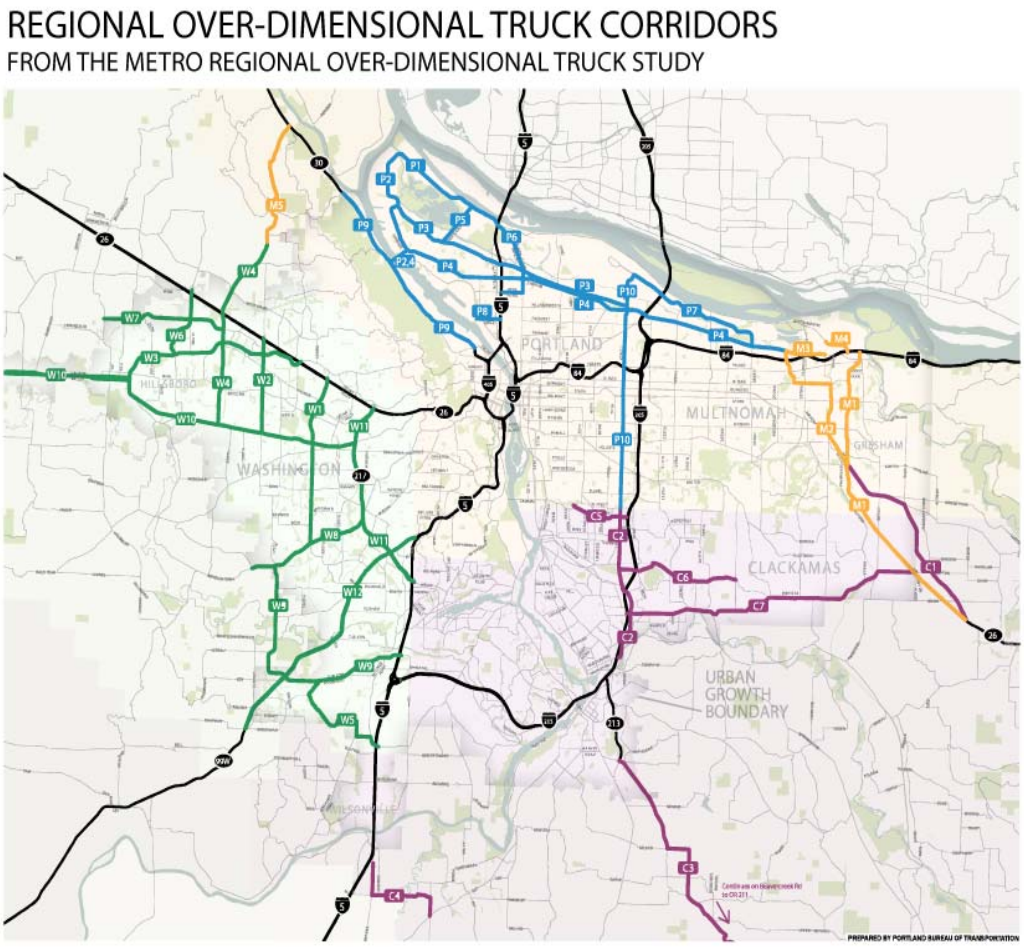
Findings

The definition of over-dimensional trucks is defined by ODOT statewide. ODOT Motor Carrier Division requires permits for truck size and loads meeting the following dimensions:

- Width exceeding 8 feet, 6 inches
- Height exceeding 14 feet
- Length exceeding 40 feet
- Gross Vehicle Weight exceeding 80,000 lbs.

Thirty-four Regional Over-Dimensional Truck Corridors were identified for this study (see Figure 19).

Figure 19: Regional Over-Dimensional Truck Corridors



20,611 Single Trip Permit (STP) records issued by ODOT between 2012 and 2015 were evaluated to identify overall width, height, length, weight and commodity type moved.

- **Commodities Moved:** Excavators, Cranes and Log Loaders account for 30% of all commodities.
- **High Loads:** 90% of all high loads were 15 feet or less. The highest load was a transformer at 18-feet, 2-inches moved between Happy Valley and Oregon City.
- **Wide Loads:** 35% of all wide loads were between 11-12 feet. Excavators accounted for 24% of wide loads between 11-12 feet. The widest load was a 25-foot steel skirt moved from Newberg to Portland.
- **Long Loads:** 60% of the loads were between 70-90 feet in length with excavators accounting for 15% of these movements. The longest load was a 225-foot heat exchanger moved from the Oregon/Washington border at I-205 to Hillsboro.
- **Heavy Loads:** 75% of all heavy loads were between 120,000-160,000 lbs., with excavators accounting for 20% of these movements. The heaviest load was a 662,212 lbs. transformer moved between Oregon City and Clackamas.

Recommended capital improvements for the City of Portland and the three counties, along with a more detailed summary of the study, are available in the "Key Freight Trends and Logistics Issues Report" (to be completed in 2018).

Industrial land supply

Regional Industrial Site Readiness – 2017 Inventory Summary

The Portland metropolitan region competes on a global scale to attract traded-sector jobs. A key factor in determining a business's likelihood of settlement is adequate land to do so. Having a site inventory of varying sizes and locations within Portland's Urban Growth Boundary plays a key role in facilitating potential economic opportunities that support a thriving region, new jobs, and increased wages.

The Regional Industrial Site Readiness Project is a report that examines the supply of large (25+ acre) industrial sites available to accommodate existing and future employers. The inventory considers industrial sites within the Portland metropolitan area Urban Growth Boundary (UGB) and select urban reserves. The objectives of the 2017 report include the following:

- Track the changes in inventory since the 2014 update
- Analyze the readiness for each site inventoried
- Inform policy makers about policy changes and investments that have influenced the development-readiness;
- Summarize investments, tax base, and jobs created from development of inventory sites; and

- Identify policy and investment actions that can ensure a consistent inventory of these vital sites into the future.

The report also introduces a tier system that assists in better prioritization of various development sites. Tier 1 sites are considered recruitment-ready for businesses expanding or locating in the region. Tier 2 sites will take longer to become development ready, but could be feasible for expansions of existing businesses and for speculative development for investors. Tier 3 sites meet the size and location requirements of the study but require complex fixed to become development-ready.

Tier 1: Development-ready within 180 days. It is anticipated that a site can receive all necessary permits; sites can be served with infrastructure and zoned and annexed into the city within this timeframe. No or minimal infrastructure or brown-field remediation is necessary and that due diligence and entitlements could be provided and/or obtained within this time period.

Tier 2: Likely to require 7-30 months to become development-ready.

Tier 3: Likely to require over 30 months to become development-ready

2014 – 2017 Inventory Changes

Since the last update to the report in 2014 the inventory of sites has decreased from 54 to 47. This change was primarily driven by a strong economic cycle which we continue to see today. Additionally, 6 new sites were added to the inventory since 2014 (1 Tier 1, and 5 Tier 3) and 13 sites were removed mostly as a result of site readiness investment and development.

The charts below compare the changes in inventory by tiers and acreage for 2011, 2014, and 2017.

Table 5: Changes in inventory by tiers and acreage for 2011, 2014 and 2017

	2011 Inventory	2014 Inventory	2017 Inventory
Tier 1	9	14	10
Tier 2	16	17	11
Tier 3	31	23	26
Total	56 sites	54 sites	47 sites

	2011 Inventory	2014 Inventory	2017 Inventory
25-49 acres	40	39	33
50-99 acres	9	10	10
100+ acres	7	5	4
Total	56 sites	54 sites	47 sites

Findings

- Between 2014 and 2017, there has been significant development of large industrial sites in the region. There are relatively few unencumbered Tier 1 industrial sites remaining in the inventory and no 50+ or 100+ acre Tier 1 sites.
- There has been slower movement between tiers than in the previous inventory update (4 sites between 2014 and 2017, versus 7 sites between 2011 and 2014).

This is in part due to the market absorption of sites, but underscores the continued need to make these site readiness investments.

- Significant challenges remain to move sites to market. This is particularly true for sites that require aggregation and High-Need Tier 3 sites.
- Site readiness investments and development since 2011 have resulted in significant investment and job creation.

Recommendations

The Portland metropolitan region continues to see a demand for larger industrial sites ranging from 50 to 100+ acres. The 2017 inventory shows that there is a deficiency of Tier 1 sites of this size, and the challenges of moving Tier 2 and Tier 3 to market readiness. An inability to meet this need will lead to lost opportunities for the region.

The report recommends policymakers consider policy action and investments to address industrial site readiness challenges and development hurdles. The report divides recommendations into Regional, Local, and State actions.

Local and Regional Site Readiness Actions

1. Engage the Oregon Economic Development Department, Oregon Economic Development Association, local jurisdictions, private property owners, and developers in efforts to make investments in industrial sites needed to move these sites to market.
2. Actively work to find ways to aggregate 13 industrial sites with multiple property owners to realize the market potential of these sites. This is critical to realizing the potential of Coffee Creek, Meek Subarea and other industrial sites in the region.
3. Support local jurisdictions in evaluating the sites that require state and local legislative actions (e.g., annexation, zoning, and concept planning) and identify the timeline for and feasibility of completing this work. Metro has invested Community Planning and Development funds in the past to support such efforts.
4. Evaluate Tier 3 High-Need sites to determine if there is a path for development. If not, consider removing them from the inventory or creating a Tier 4.
5. Proactively work on solutions to the Lower Willamette cleanup to remove the cloud over the properties in the Portland Harbor.
6. Apply brown-field tools approved by the legislature to brown-field redevelopment of industrial lands (Brownfield Tax Abatement Program and Land Banking Authority).
7. Actively work on regional and local infrastructure financing solutions that impact 60% of the industrial sites in the inventory. Metro's Economic Atlas may help identify strategic infrastructure investments benefitting the region's industrial and employment lands. Local infrastructure needs could potentially be packaged with State infrastructure financing to fund local/regional projects through the West Coast Infrastructure Exchange.

8. Support regular updates of the inventory and track investments from sites that have been developed. Consider expanding the inventory to sites of 15 acres or more to reflect shifting market demand.

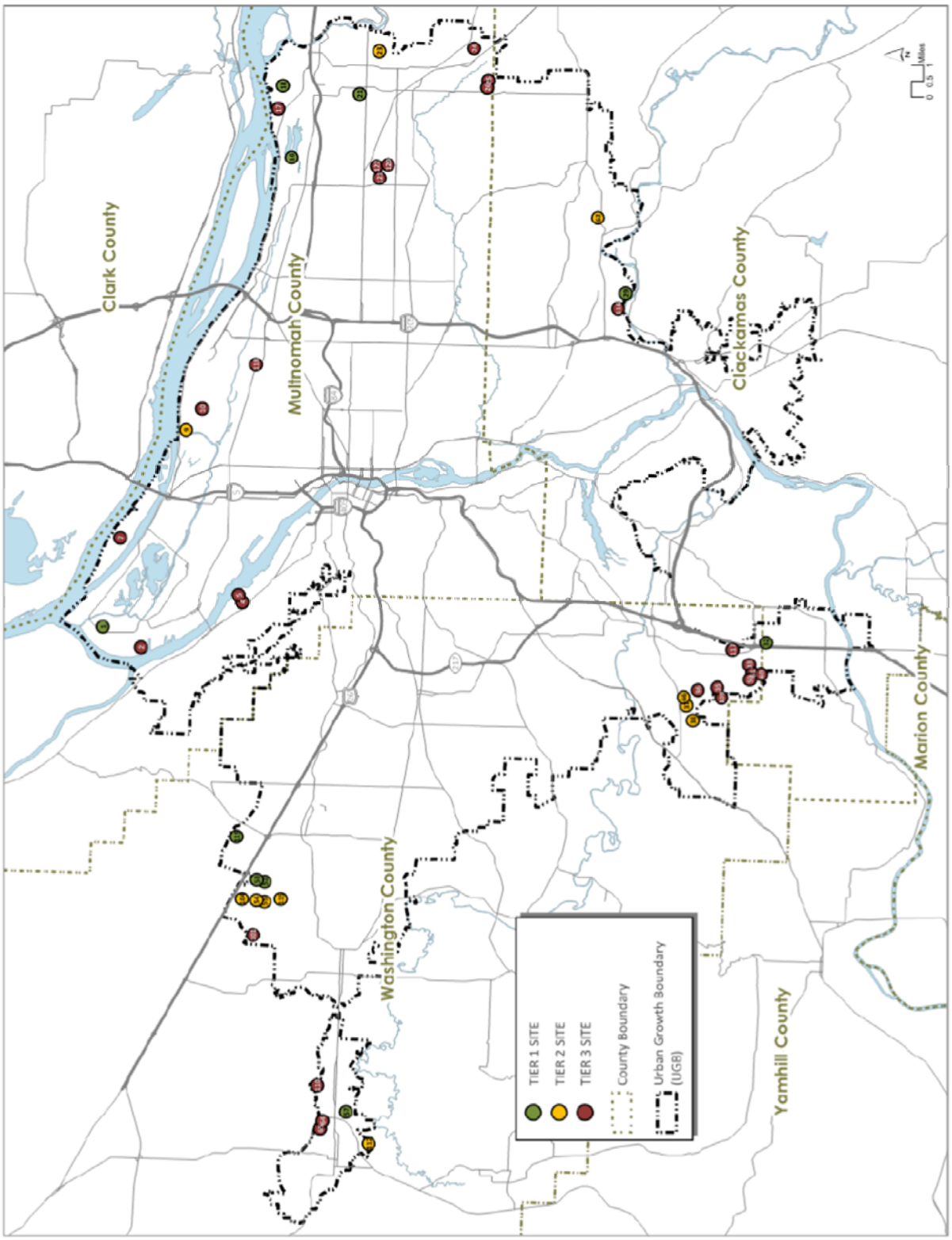
State Legislative Actions

9. Advocate for new tools and funding to support brown-field cleanup and redevelopment. This includes but is not limited to re-capitalization of the Oregon Economic Development Department's Brownfield Revolving Loan Fund and passage of Brownfield Tax Credit.
10. Support state loan funding for the Industrial Site Readiness Program and Special Public Works Fund. The Industrial Site Readiness Program was enacted in 2013 without authorization for loan funding. The Special Public Work Program is oversubscribed and underfunded.
11. Continue to support the Regional Solutions Teams that provide coordinated state attention to facilitate solutions for sites with complex issues involving multiple agencies. The Metro Regional Solutions Team played a key role in addressing site readiness issues in Troutdale, Gresham, Clackamas, and Hillsboro in the 2014-17 inventory cycle.

Local Development Actions

12. Evaluate the potential for new or expanded enterprise zones or other local or state incentives to help secure targeted development.
13. Encourage local communities to explore an expedited permitting process to address market expectations of issuing construction permits. Several communities with development wins in the 2014-2017 inventory cycle have expedited permitting programs in place (e.g., Hillsboro, Gresham).

Figure 20: Regional Industrial Site Readiness - Map of Tier 1, 2 and 3 Sites in 2017



CHAPTER 5

FREIGHT GENERATION IN THE REGION

5.1 Manufacturing, warehousing and distribution

The Portland metro region is home to a number of traded sector firms engaged in a broad array of activities. These firms bring wealth from outside the local economy into the region, helping communities to prosper. All of these enterprises have unique goods movement needs, some local, others national or international.

Unlike many areas of the country which have witnessed a substantial decline in manufacturing/industrial employment, the region has experienced some fluxuations, but overall growth in the trade-related sector of the economy over the last 15 years. This has created a need to efficiently deliver the materials needed for production (domestically and internationally) and to cost effectively ship finished products. Manufacturers in the region assemble products from components delivered from around the globe and ship components for assembly internationally. The mobility needed to support commerce in the region is as diverse as the commerce itself.

Manufacturers and shippers from throughout Oregon and Southwest Washington depend on the Portland metro region's warehousing, distribution, logistics, customs and multimodal goods movement infrastructure to move raw materials, semi-finished and finished products. In the summer of 2017, there were more than 92,000 jobs in Transportation, Warehousing, and Wholesale Trade, within the 7-county, Portland-Vancouver-Hillsboro Metropolitan Statistical Area (MSA). In the trade-related sector (includes manufacturing, wholesale, retail, transportation and warehousing), the total in 2017 rises to about 337,000 jobs within the same MSA[14].

These activities are spread throughout the region, with concentrations in Rivergate, the Columbia Corridor, Sunset Corridor, Swan Island, Clackamas-Milwaukee, Springwater-Damascus, inner Eastside, North Wilsonville-Tualatin-Sherwood, Beaverton-Tigard, Beavercreek and Northwest Portland industrial areas.

[14] Current Employment Statistics (CES) Nonfarm data

5.2 Intermodal facilities

In 2016 the ports of Portland and Vancouver hosted nearly 1,000 ocean-going ships. The Port of Portland alone hosted 678 ships that year. These vessels transported 12.7 million metric tons of cargo to and from public and private facilities located in the Portland-Vancouver Harbor. Another 6.1 million tons of inland barge cargo also moved through these facilities. In total, $14 billion in foreign trade moved through Portland Harbor in 2016. Much of this cargo is transported beyond the Portland metropolitan area, through key truck and rail corridors.

In addition, the Port of Portland operates the largest international airport in Oregon. It is the hub for the vast majority of air freight activity in the Portland metro region, western Oregon and Southwest Washington. Approximately 231,298 tons of domestic and international air freight shipped through Portland International during 2016.

5.3 Regional Goods Movement

Highway and roads

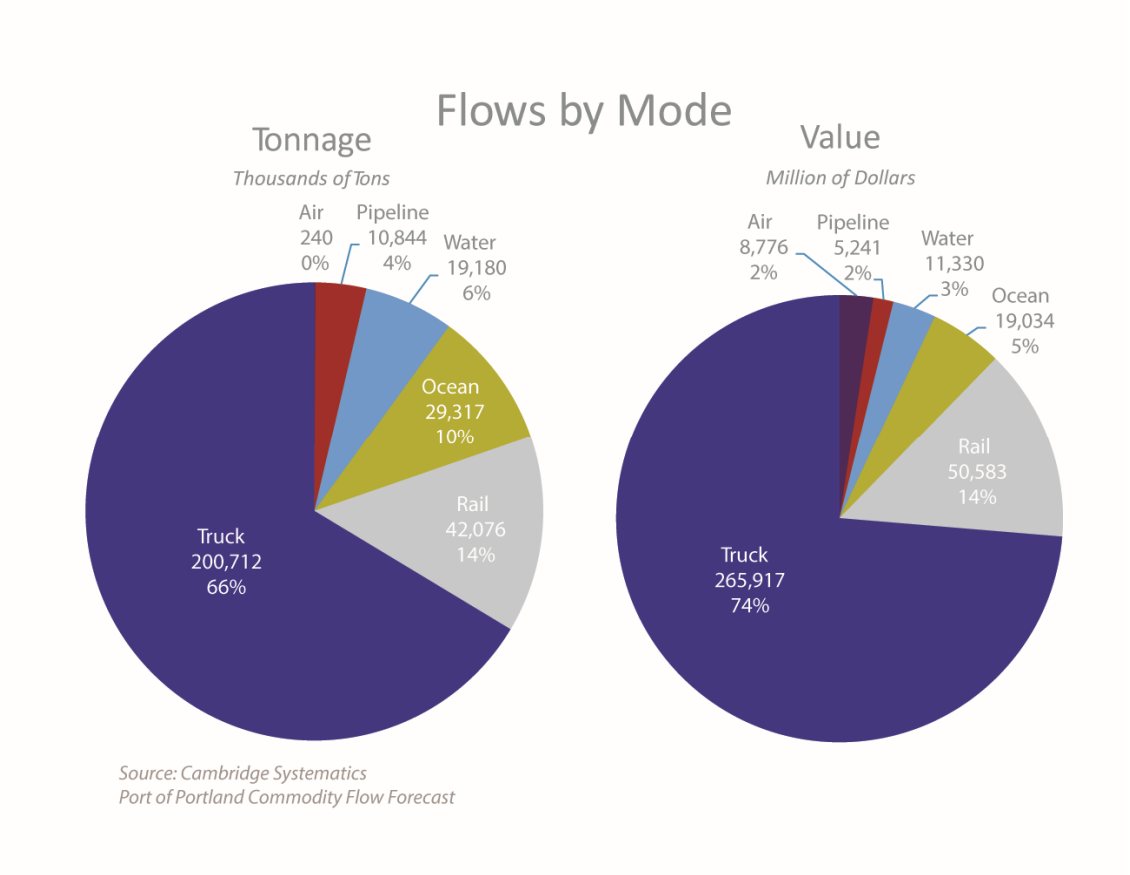
Trucks will remain the predominant mode of freight transport for the foreseeable future, due to their flexibility, speed, adaptability and availability. And though more than 90 percent of total regional truck trips begin and/or end within our region, as much as 52 percent of the total truck traffic entering the region via the interstate system is through traffic[15]. This reflects the importance of

[15] Figures obtained from 4,159 roadside intercept surveys reported as *Task 10, Portland Freight Data Collection Phase II, Final Summary Report* (March 2007) prepared for the Portland Freight Data Collection Team.

our stewardship role for maintaining the through-put efficiency of the interstate freeway system for national freight movement, but also provides a basis for requesting national assistance.

Measured by value, 74% of the commodities traveling in the Portland-region moved by truck, and about 14% of the commodities moved by rail.[16]

Figure 21: Commodity Flows by Mode



Maintaining access to, and adequate capacity on, designated freight corridors, and the National Highway System (NHS) within the region will remain critical to efficient goods movement. Performance of NHS roads within the region varies, but there are locations with regularly recurring chokepoints. It is not unusual for these chokepoint locations to experience frequent failures, particularly during peak weekday travel times, greatly reducing overall system efficiency and reliability.

[16] Port of Portland Commodity Flow Forecast, March 2015, using 2007 FAF3 data

Rail

Class 1 railroads like the Union Pacific rail yard in North Portland are experiencing capacity constraints.

Class 1 rail lines[17] operating in the Portland metropolitan area (BNSF Railway and Union Pacific Railroad) have been capacity-constrained due to several long-standing and well documented historical factors. These constraints will worsen as freight volumes at the region's ports and intermodal facilities increase. Capacity chokepoints for the Class 1 railroads in the Portland metropolitan area have primarily centered on the Portland Triangle, located in the industrial/port areas of North Portland and Southwest Vancouver.

Issues in the Portland Triangle area include inadequate siding lengths (Class 1 railroads are now fielding up to 8,000 foot long unit trains), rail bridges with inadequate capacity and lowered sufficiency ratings, at-grade rail crossings, sidings and mainline track sections that are over capacity. Other Class 1 capacity constraints within the region include switch control at the Steel Bridge and inadequate rail and intermodal yard capacity for current and future needs. Outside the region, railcar clearances and increasing weights will need to be addressed, as the Class 1 railroads look to longer trains and heavier carloads to increase their operating efficiency and revenues.

Short line rail operators have taken over many of the local and regional rail functions formerly performed by the Class 1 railroads. Rail car weights are a critical issue for short line railroads. The Class 1 railroads are now considering rail car weights above 286,000 pounds, which will exceed the carrying capacity of many short line tracks in the region. Assisting regional short line railroads with track upgrades could reduce the risk of derailments, a potential public safety issue and certainly a productivity issue for the railroads. It also keeps trucks off the road. The short lines are also having to make-up more trains in their yards, which have limited capacity, before delivering them to the Class 1 rail yards. Assisting short line railroads requires government to show a clear public benefit, since these facilities are privately owned and operated.

[17] Railroads are classified according to their revenue; following decades of decline and mergers, there are now seven Class 1 railroads—constituting largest companies--currently operating in the United States. Class II railroads are also known as regional railroads; Class III includes the short line railroads.

Government and the railroads have historically cooperated to implement rail crossing safety improvements. The Class 1 and short line railroads have multiple at-grade crossings of their lines in the region, limiting train speeds and increasing the risk of conflicts between trains, vehicles, pedestrians and bicycles. Improving, eliminating, or grade separating at-grade crossings improves safety as the number and size of trains increase. Crossing improvements increase rail and road system productivity by helping longer trains clear crossings more quickly. Crossing improvements are the first step in applying for quiet zone status with the Federal Railroad Administration.

Air Cargo

Air cargo is expected to increase its market share in the region.

Combined air cargo providers generally operate on a hub-and-spoke system, where freight is picked up at airports throughout the country in the early evening, flown back to a central destination to be sorted and then reloaded and flown to its final destination in the early hours of the morning for next day delivery. In order for this system to work, schedules must be maintained. This generally places air freight carriers' trucks on the road during evening peak hour traffic.

While traffic flows on the roadways immediately adjacent to Portland International have improved within the last decade, trucks carrying air freight to the airport during the evening peak hour face increasing congestion on several area highways leading to the airport. I-205, I-84, I-5, I-405 and US 26 all serve locations generating air freight cargo but have failing evening peak hour level of service.

Several traded sector manufacturers within the region are heavy users of air freight. Frequent roadway congestion forces many of these users to move shipping deadlines up, causing firms to lose valuable production time and increasing their production costs. Many shippers in the region were disappointed when direct air freight connections to Asia were lost in 2013 when Asiana Airlines stopped providing cargo service from Portland to Seoul, Korea. Some shippers need to truck their shipments to Sea-Tac or San Francisco International Airports to make their desired connections.

New air cargo service was restored in November 2016, when Cathay Pacific Airlines began to provide twice-weekly service to Portland as part of a route that begins and ends in Hong Kong. Air cargo service is more expensive and generally reserved for high-value, time sensitive and perishable goods. [18] In 2015, air freight carriers moved 228,428 tons of cargo

[18] The Oregonian/OregonLive, July 14, 2016

through Portland International Airport. East Asia markets accounted for just over half of Oregon air exports.[19]

In May 2009, Portland International Airport began to implement a project to extend its north runway, as well as a complete overhaul of its south runway. The south runway rehabilitation was completed in 2011. The north runway extension added 1,825 feet to the runway and was completed in 2013 (Port of Portland website – April 8, 2013) With these improvements runway and taxiway capacity at the airport should be adequate to meet the needs of air freight carriers through the next decade, based on recent statements by the Port of Portland.

Marine

Modern commercial navigation of the Columbia River began in 1877, when Congress approved dredging a navigation channel between the Portland-Vancouver area and the mouth of the river in Astoria. Currently, almost 1,000 ocean-going vessels call on the Portland-Vancouver Harbor each year. Navigation channel depth on the Columbia River continues to be the limiting factor on the size, and therefore the number, of ships that call on the Portland-Vancouver Harbor. Channel deepening has been pursued for several decades, balanced by the need to protect various fish stocks migrating on the river.

The ports of Portland and Vancouver, as well as the other ports located along the lower Columbia River, lead the nation in the shipment of grain. They also ship large quantities of other bulk agricultural commodities from Oregon, Idaho and Washington to the rest of the world. The region's ports will still manage to grow by moving a wide range of marine cargoes, such as energy and transportation project related materials, manufactured goods, automobiles, agricultural and mining related products and fuel. The deepening of the Columbia River navigation channel to 43 feet will enable more cargo to flow into the ports of Portland and Vancouver. While still only able to accommodate small to medium-sized container vessels, the new channel depth is not a limit for other cargoes such as autos and bulk cargo. Since completion of the channel deepening in 2010, freight facilities along the channel have completed over $1 billion in investments in new and expanded facilities.

The ports generate significant volumes of truck and rail traffic in the West Vancouver and Rivergate areas. Congestion during peak commute hours adversely impacts these truck movements. Intermittent congestion also impacts the Class 1 and short line railroads serving the area.

Loss of container service at Terminal 6

Marine container service is critical to Oregon and regional shippers. Terminal 6 has served a geographic and community market in Oregon, Idaho and SW Washington. In 2014, Terminal 6 captured 53 percent of the Oregon exports and imports market, with the remaining cargo moving through Puget Sound ports by rail or truck.

[19] Port of Portland

The Port of Portland's Terminal 6 lost container service in 2015. Since that time, there has been a great deal of volatility among container carriers, and a change in the operating structure at the terminal. To respond to the changing dynamics, the Port hired a national consultant team and engaged an industry leader committee to determine the Port's future role in container shipping. This assessment should be complete by early 2018.

Terminal 6 has always been a multi-use facility that can handle oversized project cargo and containers with an on-dock intermodal yard. The terminal is also home to the Port's successful auto business, which includes Ford exports and Hyundai and Honda imports. Large project cargo, such as steel slabs, has previously moved through the terminal. Port of Portland is looking at short term ways to help support the industry get goods to market.

On March 31, 2017 the Port of Portland and ICTSI Oregon terminated their lease agreement at Terminal 6. The Port of Portland is working on a new plan to develop and manage carrier service for Oregon and Pacific Northwest shippers.

Even absent container activity (as is the case today) there is still cargo activity (and related rail and truck traffic) at the terminal. During the life of the RTP we would expect the volume of that activity and the related truck and rail movements to increase.

Pipelines and pipeline terminals

The Olympic Pipe Line Company, operated by BP Pipelines – North America, is a 400-mile interstate pipeline system. The pipeline runs from Blaine Washington to northwest Portland. The system transports gasoline, diesel, and jet fuel. The Olympic Pipe Line transports about 65 percent of the petroleum products that Oregon uses. The pipeline provides approximately 1.9 billion gallons per year to Oregon.

Regional distribution occurs from the tank farm through a Chevron owned pipeline to Portland International Airport and through the Kinder-Morgan pipelines to users and distributors throughout the region. Maintaining good quality access to the tank farm facility is critical, particularly in light of a recent at-grade rail crossing closure on an access road to the tank farm.

The Williams Northwest Pipeline transports natural gas products to northwestern Oregon and Southwest Washington. Northwest Natural Gas operates a private natural gas network that connects to the Williams Northwest Pipeline and radiates through and beyond the Portland metro region. This pipeline network delivers gas directly to end users within and beyond the Portland metropolitan area.

River/ Barges

As a critical west coast hub, Portland area must maintain well-functioning river ports.

The Columbia Snake River system is a vital transportation link for the states of Idaho, Oregon and Washington. The economies of these three states rely heavily on the trade and commerce that flows up and down one of the most important commercial waterways in the Northwest. River transport of bulk commodities, like wheat, is the most efficient way to move product to and from the ports. In 2014, Oregon exported $209 million worth of wheat, making it the second most valuable commodity export in the state. Approximately 85% of Oregon wheat is exported, largely to Pacific Rim countries.

In addition to wheat, petroleum products, mineral bulks and many more commodities are exported through this trade gateway. More than 4 million tons of petroleum products are received at terminals in Portland each year and approximately half of that volume is barged upriver to inland ports. Oregon is also the top mineral bulk exporter on the west coast and shipped over 5.7 million tons of mineral bulks out of the Port of Portland in 2014.

On the Columbia Snake River system the deep draft channel is 43 feet deep and runs from Astoria to the marine port facilities in Portland (105 miles). In 2015, over 44 million tons of international trade was carried in the deep draft channel. It also carried at least 24 billion dollars in cargo value.

The inland navigation channel runs from Portland/Vancouver to Lewiston, Idaho (360 miles) and is 14 feet deep. In 2014, barges carried over 9 million tons of commercial cargo

on the inland navigation channel. This part of the river represents an important gateway for Northwest wheat and forest products.[20]

Barge operators on the Columbia/Snake River system use equipment specifically constructed to operate in the locks on those rivers, adding significantly to their capital costs. It should be noted, however, that most import and export shippers prefer to use truck and rail for any higher value products moving through the ports.

The primary limiting factors to barge movement in the region are the BNSF rail and I-5 bridges crossing the Columbia River and the maintenance of navigable locks on the Columbia and Snake rivers.

5.4 Goods Movement and Land Use

While the success of the region's economy is directly tied to its ability to efficiently move freight, it is true that freight movement and operations can potentially produce adverse impacts on local communities in the form of:

- increased emissions, noise and vibration, lighting and safety concerns
- impacts to land uses, community access and bicycle and pedestrian movements
- competition for highway and parking capacity
- impediments to visual quality and redevelopment efforts

These concerns are likely to increase over time as freight volumes increase. Many of the typical complaints voiced regarding truck and rail operations could be minimized or avoided with thoughtful and appropriate land use planning, which, like a good fence, makes better neighbors. It's important to note that these types of impacts are not the exclusive domain of freight operations – highways, transit and other transportation systems and services, even hospitals and schools – can engender comparable concerns over impacts to nearby residents.

On the other side, freight carriers and shippers can themselves be impacted when communities seek to restrict access by trucks on certain streets, limit night-time operations, reduce the number of truck loading zones, increase water recreation activities and public access within working waterfront areas, or when communities seek to use a freight railroad's track for passenger rail service. As shippers' supply chain logistics continue to evolve, the definition of "state of the art" warehousing and distribution centers changes as well. Larger, increasingly truck-biased facilities are becoming the new standard.

Certain key regional intermodal rail to truck transfer facilities are quickly reaching their capacity and are constrained by the physical dimensions of their facilities. A regional discussion regarding retaining or restoring rail access into industrial areas should occur

[20] Pacific Northwest Waterways Association - Columbia Snake River System Facts 2016

among the warehousing, manufacturing and distribution sectors, local governments and the short line rail operators.

There has been a demand, at times, for conversion of industrial property to mixed-use residential. This is often incompatible with surrounding industrial operations and freight movement. Appropriate models of residential and commercial development should be planned for truck and rail corridors and areas adjacent to industrial sanctuaries to preserve the effectiveness of truck and rail corridors for industrial and freight use. From the viewpoint of freight carriers and shippers, allowing new, incompatible land uses into industrial areas impedes business operations and access, resulting in higher operating costs, reduced safety and efficiency.

There is often fierce competition for land, a finite resource. Citing, protecting and redeveloping industrial areas for industrial uses is in keeping with the goal of creating and preserving industrial sanctuaries in the 2040 Growth Concept, but managing and balancing competing land uses will continue to be difficult as the region grows. Maintaining reliable multi-modal transport options to our industrial areas is critical, particularly truck and rail connections. Providing rail service is becoming particularly difficult as rail operating practices continue to change rapidly.

CHAPTER 6

TECHNOLOGY FOR SUSTAINABLE FREIGHT TRANSPORT

6.1 Innovation and technology in freight transportation

Vehicle-to Infrastructure (V2I) is the next generation of Intelligent Transportation Systems (ITS). V2I technologies capture vehicle-generated traffic data, wirelessly providing information such as advisories from the infrastructure to the vehicles that inform the driver of safety, mobility or environmental-related conditions. The State of Oregon and local agencies are likely to install V2I infrastructure alongside or integrated with existing ITS equipment. The majority of V2I deployments may qualify for similar federal aid programs as ITS deployments, if the deploying agency meets certain eligibility requirements. Deploying V2I technologies in freight trucks and the region's roadway infrastructure will be of key importance for improving freight mobility, reliability and safety.[21]

The following definitions of V2I communications deployment help the region better understand how useful different application of connected vehicle (CV) technology will be in improving commodity movement within the next five years (short term):

- **V2I Safety (V2I):** Safety applications that help truck drivers anticipate and respond to potentially unsafe conditions to help avoid incidents and delays.
    - **Curve Speed Warning (CSW)**: Alerts drivers who are approaching curves at speeds higher than the posted advisory speed.
    - **Spot Weather Impact Warning (SWIW):** Warns drivers of local hazardous weather conditions by relaying management center and other weather data to roadside equipment, which then re-broadcasts to nearby vehicles.
    - **Reduced Speed/Work Zone Warning (RSWZ):** Utilizes roadside equipment to broadcast alerts to drivers warning them to reduce speed, change lanes, or come to a stop within work zones.
- **Agency Data:** Applications that focus on communicating agency data to connected vehicles (CVs) or using CVs to collect data that agencies can use to plan and manage the transportation system.
    - **Freight Networks:** Transmits freight network routes and information (speed limit, capacity, etc.) to truck drivers.
    - **Work Zone Traveler Information:** Monitors and aggregates work zone traffic data for transmission back to truck drivers.
    - **Probe-enabled Traffic (Freight) Monitoring:** Utilizes communication technology to transmit real-time traffic data between vehicles and to agencies via roadside equipment.

[21] USDOT – Intelligent Transportation Systems- Vehicle to Infrastructure (V2I) Deployment Guidance

- **Road Weather:** Applications that help truck drivers anticipate and respond to severe weather conditions and events.
    - **Motorist Advisories and Warnings (MAW):** Uses road-weather data from connected vehicles to provide information to travelers on deteriorating road and weather conditions on specific roadway segments.
    - **Weather Response Traffic Information (WRTINFO):** Uses connected vehicle data and communications systems to enhance the operation of variable speed limit systems and improve work zone safety during severe weather events.
- **Mobility:** Applications that enhance mobility, increase efficiency, and reduce delay of freight vehicle travel.
    - **Freight Signal Priority (FSP):** Provides signal priority to freight vehicles along designated freight corridors.
    - **Dynamic Freight Routing:** Determines the most efficient route, in terms of avoiding congestion or minimizing travel time or emissions, for freight vehicles, and transmits this information to truck drivers.
- **Smart Roadside:** A set of applications to be deployed at strategic points along commercial vehicle routes to improve safety, mobility, and efficiency of truck movement and operations on the roadway.
    - **Wireless Inspection**: Utilizes roadside sensors to transmit identification, hours of service, and sensor data directly from trucks to carriers and government agencies.
    - **Smart Truck Parking:** Provides information such as hours of service constraints, location and supply of parking, travel conditions, and loading/unloading scheduling to allow commercial drivers to make advanced route planning decisions.[22]

In the long term (more than five years), the region, state and local agencies will need to acknowledge, monitor, study and plan for the impacts of driverless vehicles, changes in the demand for distribution centers, and the decline in retail stores due to on-line ordering of goods and services.

6.2 Going green

There are at least two variables that every commercial carrier must come to grips with: fuel cost and fuel use. The former frequently dictates the lengths to which a carrier will go to conserve fuel, while the later directly impacts the production of greenhouse gases and particulate matter 2.5 emissions[23]. The goods movement industry is responding to the

[22] FHWA ITS Joint Program Office website

[23] *Particulate matter smaller than 2.5 microns have been shown to affect human health.*

prospect of sustained higher fuel costs and tightening emissions standards. Tools being used to improve power-train operating efficiency and reduce stationary idling of truck diesel engines include:

- clean diesel technologies, more efficient power-trains and improved aerodynamics
- low sulfur and bio-diesel fuels
- on board auxiliary power units
- parking area power and HVAC hook-ups for trucks
- ongoing and innovative operational changes that reduce the carbon footprint of freight

Every operator of commercial vehicles, be they aircraft, marine, rail or truck, has grown increasingly sophisticated at load, route, operator and vehicle optimization in an effort to minimize equipment downtime and maximize profit. Recent increases in the cost of fuel have only intensified efforts to increase operational efficiencies.

Oregon's Clean Diesel Initiative and other efforts to promote clean diesel have translated into benefits for Oregon's freight-oriented businesses. Older diesel engines are less efficient and pollute more than newer engines. They use more fuel and require more maintenance. However, upfront costs of replacement are a financial burden for businesses.

The Clean Diesel Initiative provides funds to local businesses in the form of matched dollars, grants and low interest loans to initiate retrofits or diesel engine replacements. This initiative has had the benefits of cleaner air and supporting a stronger economy.

A federal lawsuit settlement requires Volkswagen (VW) to pay $2.9 billion to a trust fund to be distributed to states, the District of Columbia and Puerto Rico. The initial allocation to the State of Oregon, based on registration share of Volkswagen diesels by state, is approximately $72.9 million. The funds are to be used over a 10 year period to support a defined list of projects intended to offset the excess air pollution created by Volkswagen's cars.

Oregon's SB 1008 provided authority and initial direction to the Department of Environmental Quality (DEQ) to replace or retrofit at least 450 school buses. Other VW fund eligible mitigation actions depend on further actions in future legislative sessions. When these priorities are identified and authorized, the Mitigation Plan will be amended.

Four hundred and fifty is the estimated number of older diesel buses that would still be in the fleet by 2025 without the funds, which is the state's target year to eliminate polluting diesel school buses. Over the next four years, DEQ will offer funding to school districts to scrap/replace or retrofit exhaust controls until the target of 450 buses is reached.[24]

[24] DEQ Fact Sheet on Oregon's Initial Use for the Mitigation Fund

The public sector needs to complement these efforts by optimizing its own facilities and strategies to gain maximum through-put capacity and efficiency where it matters most. This effort needs to include multi-jurisdictional coordination and ongoing participation from the private sector goods movement community. The challenge of increasing the capacity of the goods movement system while remaining environmentally sustainable will require close coordination and cooperation between the private and public sectors.

6.3 Transportation system management

Several tools are available for transportation system management on the corridor level. These tools include variable message signs, traveler information systems, incident management and response, traffic signal progression, ramp metering and demand (traffic volume) responsive signal timing. Truck signal priority might also be considered in certain situations.

The public sector would benefit by managing its roadway infrastructure with the understanding that roadway capacity is valuable and costly to expand. For example, managing roadway performance through congestion pricing can include electronically charging road users a fee for using a road that might vary depending on changing real-time demand for roadway capacity throughout the day, with higher prices charged at periods of peak travel demand. Market-based road user fees, if properly implemented, can free up scarce road capacity for both passenger and freight needs, and provide revenue for alternative transportation and/or improvements to existing facilities.

Weigh-in-motion scales have been in use for many years, allowing trucks to bypass conventional truck scales, saving time, fuel and wear. Weigh-in-motion systems could be improved through the use of a single, common transponder system for commercial vehicles operating throughout several western states.

Some industrial areas within the Portland metro region have freed up roadway capacity by forming transportation management associations. These associations can facilitate and promote enhanced pedestrian, transit, carpooling and bicycle alternatives to the daily commute. These associations also work with employees to tailor transit services to their work shifts and with employers to facilitate staggered shifts, compressed work weeks and work-from-home programs. These efforts can reduce single occupant vehicle travel within industrial areas during critical peak travel times.

CHAPTER 7

FUNDING FREIGHT TRANSPORTATION NEEDS AND PRIORITIES

7.1 The transportation funding challenge

HB 2017 provides new state transportation resources

HB 2017-10, known as Keep Oregon Moving, was passed by the Oregon Legislature in 2017 and is the largest transportation investment in Oregon's history. It will generate $5.3 billion in total revenue over ten years that will fund various types of transportation projects around the state. About half of the funds will be distributed to local governments to fund local road and street maintenance and improvements, while the rest will be provided to the State Highway Fund to fund different types of projects around the state. For freight this includes:

- Bridges and highways – The majority of the State Highway Funds will go towards repairs and upgrades to bridges and highways to make them safer and more resilient to a major earthquake.
- Connect Oregon program – Connect Oregon will receive funding for multimodal projects, including rail, marine, aviation, and bicycle/pedestrian projects. Two specific projects are included in Keep Oregon Moving to help move freight from trucks to trains, which will decrease freight congestion on highways. However, neither project is located in the Portland region.
- ODOT's State Transportation Improvement Program (STIP)

Portland Region Projects

A portion of ODOT's funding is dedicated to specific projects around the state, with several in the Portland metro region. These projects will primarily address congestion and travel reliability of both passenger and freight vehicles. A description of the projects and their cost estimates are listed below:

- I-5 Rose Quarter ($30 million per year) – I-5 through the Rose Quarter has been identified as one of the most congested bottlenecks in the country. $30 million per year will be taken off the top of the State Highway Fund to add an auxiliary lane in each direction between I-84 and I-405, as well as build new bicycle and pedestrian connections across I-5 and I-84. The project aims to address growing congestion, increase travel reliability for passenger and freight vehicles, and enhance neighborhood connectivity.
- Oregon 217 ($98 million) – ODOT will build new auxiliary lanes south from Beaverton-Hillsdale Highway to Oregon 99W, and north from OR 99W to Scholls Ferry Road. The goal of this project is to address congestion and increase travel reliability.
- I-205 corridor bottleneck project ($15.5 million) – An auxiliary lane will be added on the northbound stretch of I-205 from Powell Boulevard to the I-84 west

interchange. It is estimated that this project will reduce the frequency of crashes by nearly 30%, in addition to providing more reliable travel times.

- I-205 active traffic management project ($15.2 million) – This project will use technology to provide travelers with real-time information on travel times, congestion, crashes, and other hazards. A similar system was implemented on OR 217, which resulted in a 21% decrease in crashes in the first year of use.

Jurisdictional Transfers

Keep Oregon Moving also includes several jurisdictional transfers of highways, with two in the Portland region. These transfers seek to place highways under the jurisdiction which can best control and manage the facilities. The transfers for the Portland region are:

- Cornelius Pass Road between US 30 and US 26 will be transferred from Washington and Multnomah counties to ODOT.
- Powell Boulevard between I-205 and the Portland city limits will be transferred from ODOT to the City of Portland. Keep Oregon Moving also allocated $110 million to upgrade this section of Powell Blvd.

2015 Federal Transportation Bill (FAST Act)

The current federal transportation act (2015) specifically addressed freight movement and provided federal money to the states along with federal grant opportunities to fund freight and goods movement projects.

The FAST Act, signed into law in December 2015, authorizes more than $305 billion in transportation investments over fiscal years 2016 through 2020. It builds upon Moving Ahead for Progress in the 21st Century Act (MAP-21) enacted in 2012. There are three primary goals of the FAST Act: Improve mobility on highways; create jobs and support economic growth; and accelerate project delivery and promote innovation. Highlights from the bill and its impacts to Oregon include:

Highway Funding – Oregon will see a five percent increase in transportation funds as a result of the Act – rising from $482 million per year to $507 million in FY 2016, and then rising two percent each subsequent year.

Freight Funding – Two new programs were created for planning and funding of freight mobility projects:

- **National Highway Freight Program –** Provides a new annual funding stream to states to address freight projects on the national highway system. In the first year of the program, ODOT received $14.5 million, increasing to $19 million by FY 2020.
- **Nationally Significant Freight and Highway Projects Program –** Funds a new competitive grant program to fund large freight and highway projects, and is referred to as the Fostering Advancement in Shipping and Transportation for the Long-term Achievement of National Efficiencies or FASTLANE program. This

program was authorized at $4.5 billion for years 2016 through 2020, with $800 million for FY 2016 to be awarded on a competitive basis. MPOs, local governments, ports, and tribal governments are all eligible to apply for these funds. Large projects must cost a minimum of $100 million, and the federal grant funds can make up a maximum of 60 percent of the total cost. However, 10 percent of the program budget is set aside for smaller projects, as well as multimodal projects. Large projects are eligible for a minimum award of $25 million, and small projects, which are below the minimum large project threshold, are eligible for a minimum award of $5 million.

Surface Transportation Program – The Surface Transportation program is changed to the Surface Transportation Block Grant Program (STBGP) under the FAST Act. Accordingly, there are two updates:

Increased local funding for large regions – Regions with populations over 200,000 will see an increase in the availability of funds from the STBGP from 50 percent at present to 55 percent over the course of the five-year bill.

Transportation Alternatives – Transportation Alternatives funds bike, pedestrian, and demand management projects. Previously a standalone program, Transportation Alternatives is now placed in the STBGP.

Public transit – Oregon saw a five percent increase in federal transit funding, receiving $98 million in FY 2016. The Buses and Bus Facilities Competitive Grant program was reinstated under the FAST Act.

Surface transportation system funding alternatives – A new competitive grant program, was funded at $15 million in FY 2016, and was created for states and multi-state groups to explore alternative funding mechanisms for the Highway Trust Fund (HTF). Currently funded primarily through the gas tax, the HTF is seeing reduced revenue as the fuel efficiency of vehicles has increased. The grants require states and multi-state groups to demonstrate a user fee based funding structure that maintains the long-term financial health of the HTF. Oregon was awarded nearly $5 million for two grants in FY 2017 to improve the state's innovative per-mile road usage charge program and launch a pilot of the program in partnership with the State of California.

Funding sources

The following funding sources are currently available to the region.

Federal funding sources or programs (FHWA programs, unless otherwise noted):

- **Surface Transportation Block Grant (STBG) Program** (decisions on which projects are allocated funds are made at the regional level)
- **National Corridor Infrastructure Improvement Program** (decisions on which projects are allocated funds are made at the regional level)

- **Congestion Management and Air Quality Improvement Program**
- **Transportation Infrastructure Finance and Innovation Act (TIFIA)**: Allowed the creation of state infrastructure banks through a federal credit. This is federal credit assistance for highway, transit, passenger rail, some freight rail, intermodal facilities, and some modernization to port terminals.
- **Freight Intermodal Distribution Pilot Grant Program:** This program is for intermodal projects that relieve congestion, improve safety and facilitate intermodal trade.
- **Railway-Highway Crossing Program:** Elimination of Hazards and Installation of Protective Devices at Rail-Highway Crossing
- **Maritime Administration (MARAD)**: Marine Highway Grants potentially support projects at marine terminals on the Columbia and Willamette Rivers. Projects need eligibility for funding by being included on a designated project list. MARAD also funds shipyard improvements with Small Shipyard Grants.
- **Army Corps of Engineers (ACOE):** Columbia River channel maintenance is administered by ACOE. The Port of Portland maintains the channel navigation and gets reimbursement from ACOE.
- **Federal Aviation Administration (FAA):** Airport Improvement Program Grants provide funding for runway construction and rehabilitation, taxiway construction and rehabilitation, airfield improvements (lighting, signage, etc.) and other airport capital improvements.

State funding sources

The following list of funding sources is generally administered through ODOT:

- **Oregon Gas Tax/Vehicle Registration Fees**.
- **Oregon Weight Mile Tax:** Charged to trucks weighing over 26,000 pounds, the tax is the primary source of tax revenue raised by trucks in the state. Weight Mile Tax receipts are primarily directed at roadway maintenance and system preservation efforts throughout Oregon, with a smaller amount allocated to administering the program.
- **Oregon Energy Income Tax Credit:** The Oregon Department of Energy offers a tax credit for businesses that invest in reducing energy consumption. Under this program transportation projects that reduce the number of single-occupancy vehicle trips are eligible for the credit. The credit covers up to 35 percent of eligible project costs.
- **Connect Oregon**: Funded through lottery proceeds, this effort has focused on projects that enhance intermodal connections and improve freight mobility for several modes, including aviation, marine and freight rail.

- **Immediate Opportunity Fund:** The purpose of the Immediate Opportunity Fund (IOF) is to support primary economic development in Oregon through the construction and improvement of streets and roads. One of IOF's project types is specific to funding"preparation of regionally significant industrial areas" (type D).[25]

The Connect Oregon program has shown that government and the private sector can collaborate successfully. These programs have delivered tangible benefits to freight movement within the Portland metro region and the state. The program has proven particularly useful in funding much needed projects for off-highway modes. Dedicating the loan revenues from the Connect Oregon program into a revolving fund could help the program be more self sustaining.

Local funding

Local jurisdictions within the region have local funding sources such as gas tax, parking fees and system development charges. These funds are not specific to freight projects, but help build and maintain the overall system, including the regional freight network.

Funding history

Prior to the increase from federal and state tax bills, revenue for transportation was in decline for many years.

Nationally, funding for transportation projects has become scarce. The need to replace aging transportation infrastructure and expand facilities in areas of the country experiencing growth has exploded. The private sector portion of the goods movement community has been making great strides in adopting sustainable technologies and wringing efficiencies out of their respective portions of the goods movement system. The public sector must also effectively weigh policies, programs and investments to achieve the maximum benefit for the goods movement system, particularly during a time of uncertain funding for transportation.

Accounting for inflation, public sector funding for transportation infrastructure, particularly targeting freight movement, had diminished across the United States over time. Even with recent federal recovery efforts and state legislation, competition for available funds will increase, and most road funds are likely to be funneled into critical safety projects. For most of the first decade of this century, the cost of construction materials had risen significantly on the global market, greatly increasing the cost to construct infrastructure improvements. Simply put, costs to construct improvements having been trending upward rapidly, while available revenues to pay for them had been declining. Deferred maintenance and delayed projects have cost individuals and businesses in terms of lost time and opportunities, increased vehicle wear and tear and threatened or lost jobs. The prior lack of investment in the US transportation infrastructure has weakened our ability to compete globally against China, India and the European Union, all of which are investing heavily in transportation.

[25] ODOT Immediate Opportunity Fund Policy Guidelines – March 19, 2015.

The successful implementation of any programs or projects in these times requires coordination at all levels of government with the business community to address the immediate and long term freight transportation funding needs.

CHAPTER 8

FREIGHT ACTIONS

8.1 Linking Freight Policy and Issues to Investments and Action

This chapter includes a "tool kit" of freight actions that respond to a broad range of needs and issues clustered around the seven policies in Chapter 3. Chapter 8 constitutes the regional freight action plan.

Many of the actions described are foundational activities that hold the regional freight action plan together – planning, coordinating, research and policy making and take place on both an ongoing and cyclic basis. The current list of efforts will need to find staff, time and funding resources, whether that includes Metro, members of the freight, goods movement and economic development community, or other agencies or organizations. The 2010 Regional Freight Plan had a longer list of freight action items that has been winnowed down into a smaller selection of important, achievable near-term actions, and a few long term actions that will require additional scoping and determining the availability of staff time. The near-term action items should be achievable within the next 5 years and the long-term actions would take longer than 5 years.

Achievable near-term action and long-term action items are included and recommended for implementation to support the approved regional freight and goods movement policies. Each of the freight action items is associated with one of the seven regional freight and goods movement policies (Policies 1 to 7).

The 2018 RTP Freight Projects and Programs are included in an appendix to this freight strategy and are also included by reference as part of Action 6.1

8.2 Policy 1. Plan and manage our multimodal freight transportation infrastructure using a systems approach, coordinating regional and local decisions to maintain seamless freight movement and access to industrial areas and intermodal facilities

This policy, as well as its related actions, speaks to Metro's mission as the metropolitan planning organization for the Portland metro area. Actions described below will give us better freight and goods movement data and will guide planning efforts to ensure that freight considerations are in mind, and to implement a multimodal plan that facilitates freight movements required for a vibrant regional and state economy.

Near-term Actions:

- **1.1: Better define, preserve and enhance freight function in mobility corridors**

  In general, the freight mobility function is addressed as part of the regional mobility corridors. Define, preserve and enhance the freight function of the freight network within individual mobility corridors by evaluating deficiencies. Address freight

operational needs on the regional freight network with project improvements in freight corridors that should ensure continued freight access and mobility as a primary outcome.

- **1.2: Maintain private sector cooperation with Metro's planning and technical coordination, and with goods movement policy**
    - Areas where the private sector and government agencies could provide value to Metro include:
        - Implementation of the Regional Freight Strategy
            - Review, assist, comment, contribute and/or lead various elements of the action plan
            - Contribute to future freight strategy refinements and updates
    - Regional planning efforts
        - System planning, modeling and analysis
    - Freight access/industrial land aspects of land use planning
        - Input into selecting and carrying out regional corridor refinement plans
        - Metropolitan Transportation Improvement Program (MTIP) funding and project selection processes
        - Provide input into Connect Oregon criteria and selection
        - Development of analytical tools, data bases, performance measures and policies
        - Prioritization of investments and projects with a freight and economic development perspective
        - Metro's freight program staff will participate on effective local, state and national freight-relevant organizations, such as the Portland Freight Committee, the Columbia Corridor Association, ODOT's statewide freight planning group, and the Oregon Freight Advisory Committee
        - Assisting localities with transportation system plan (TSP) freight components
    - Freight and goods movement, jobs and economic development
        - Develop policy and business support for transportation funding initiatives, including possible fees or pricing strategies

        - Define economic development context and goals for freight and goods movement policies and investments
        - Support for broad regional prosperity and environmental justice with an economic development strategy
    - Sustainability
        - Greening freight and industry while promoting sustainable jobs and economic growth
        - Greenhouse gas and other environmental impact reduction strategy development
    - Public education and stakeholder engagement
        - Feature freight issues in periodic Regional Snapshots and the Snapshot speakers series (as defined in Action 3.2)

- **1.3: Continue baseline freight and goods movement data collection and reporting activities**

    - Keeping current in an environment that is volatile, in an era which is increasingly unpredictable, is as challenging as it is essential. This recommended action ensures needed support for ongoing data collection and necessary expansions to existing efforts, such as PORTAL, ensuring updates to the commodity flow forecast, continuing to seek more detailed freight and goods movement flow data at the regional level, etc. Freight and business stakeholder interviews should be held periodically to provide early detection of problems and opportunities affecting the flow of goods and our regional economy. Collecting data sufficient to support other tasks, enabling the region to assess a wide variety of outcomes, including jobs creation, value/tons moved, economic impacts, cost of delays, emissions, energy use, neighborhood impacts and others associated with freight movement. In addition, new goals and programs for greenhouse gas reduction, and a regional congestion pricing pilot program, will change regional data needs.

- **1.4: Coordinate research, modeling and planning with Oregon Department of Transportation (ODOT)**

    - Coordination with ODOT is sufficiently important to be called out specifically. All efforts in recommendation 1.4 should include ODOT as a partner. Metro staff will work with ODOT's freight planners and the Washington Department of Transportation to consult and coordinate with respect to the statewide freight plan as well as periodic updates

to the National Highway System/National Network freight designations.

Long-term Actions:

- **1.5: Develop and conduct freight and goods movement research program**

  - In general, freight is a less well understood component of the regional transportation system; many regions are struggling to improve and integrate such tools as basic freight data, performance measures and analytic and modeling tools. The Regional Freight Strategy distinguishes between the specialized needs for moving industrial/agricultural commodities through and beyond the region and the day-to-day needs of urban goods movement within the region's mobility corridors and 2040 centers. Yet this distinction requires the use of analytical tools which can shed light on those two categories of goods movement within our region. It also requires close coordination between Metro and ODOT.

In order to develop and/or refine freight-relevant analytical tools that can help Metro and its partners better predict, manage and invest for freight and goods movement; these elements of a research program should be considered:

- Continuing to develop the regional freight model
- Developing explicit linkages between improvements to freight components of Metro's regional model and the Oregon statewide model, focusing on enhancing the regional distribution component
- More fully incorporating freight trip time reliability performance measures into Metro's transportation and land use planning and project prioritization criteria
- Finding and evaluating solutions for reliability and economic impacts for the next RTP update
- Exploring multiple data sources on the impacts that on-demand delivery (via Amazon, FedEx and other home deliveries) is having on transportation demand, and identifying ways to keep goods moving efficiently
- Seeking funding for desired elements of a research program through existing and new programs, as appropriate

8.3 Policy 2. Manage first-rate multi-modal freight networks to reduce delay, increase reliability, improve safety and provide shipping choices

This category comprises the first step to improved freight and goods movement operations on the existing system and includes preservation, maintenance and operations-focused

projects and associated planning and coordinating activities. It focuses on using the system we have more effectively.

Near-term Actions:

- **2.1: Assess need to develop and fund better incident management and traveler information**

    - Real-time travel information (focused on truckers) to avoid incidents and find detours is increasingly important, particularly to improving reliability performance. Incident clearing resources and regionally coordinated efforts to manage incidents must be sufficiently funded. This action item would direct attention on deficiencies to be addressed.

- **2.2: Continue support for use and expansion of ITS system management tools**

    - Begin to address need for 24/7 congestion mapping for the multimodal freight system, among other needs. Support PORTAL's program of real-time traffic delay; provide GPS active (in cab) truck route management, electronic routing and signage.

- **2.3: Support workforce access to the region's industrial jobs through Metro RTO/TDM programs**

    - The regional freight work group recognizes the need for Metro's transportation demand management programs and supports non-auto mobility choices for workers to get to their jobs. If options are limited in certain industrial areas, deficiencies will be highlighted for the region to address. Efforts to improve alternative transportation options for workers will include partnering with TriMet and other service providers to ensure adequate transit service frequency and good access to high employment areas.

Long-term Actions:

- **2.4: Identify key mobility corridors for testing and development of Connected Vehicle (CV) infrastructure and other ITS strategies**

    - Key mobility corridors for testing would be identified by the freight functions of roadways within the corridors and the truck usage of those roadways. Coordination with the state, counties and cities would be required to develop which types of CV infrastructure would be used, and for the selection of a few key mobility corridors and roadways for testing and implementation. The testing will include an analysis of the types of changes to the infrastructure and the types of trucks impacted.

Metro will monitor developments in, and the impacts of implementing connected vehicle technology to inform future freight planning efforts and to maintain our competitiveness in goods movement.

8.4 Policy 3. Better integrate freight issues in regional and local planning and communication to inform the public and decision-makers on the importance of freight and goods movement issues

To gain public support for projects and funding of freight initiatives, and to help the public and elected officials make wiser land use and transportation decisions, a program of public education is required.

Near-term Actions:

- **3.1: Establish stakeholder outreach program**

  - Make use of an ongoing relationship with the freight community to provide topical and informative briefings to Metro's various audiences. The Portland Freight Committee and the Oregon Freight Advisory Committee (in which Metro participates) are the current groups to provide outreach to. Metro will provide additional outreach to the broader freight community, along with outreach to MPAC, JPACT and interested elected officials.

- **3.2: Provide support for topical fact sheets, and other published media that expands awareness of freight issues**

  - The Regional Snapshots are a series of quarterly web publications that provide readers with an approachable, engaging "State of the Region" update on a major topic of interest, such as jobs, housing, transportation, or the economy. The Snapshot tells the story of greater Portland through interactive charts, graphs, personal stories, interviews, videos, and profiles of places across the region.

    The Snapshot Speaker Series is a complement to the online Snapshot that dives deeper into the issues discussed in each edition. They feature topical experts from across the nation who can share best practices and lessons learned with our local policymakers and other stakeholders, and can be any of a wide range of formats including walking tours, panel discussions, and workshops.

    The Regional Snapshot program will be used to provide a spotlight on freight issues with periodic web topics and speakers. A key topic to articulate better is the link between freight and goods movement investments and environmental justice (reducing hot spot congestion and pollutants) and economic equity (good, family wage jobs in one of

the few sectors that do not always require higher education). Another topic would be how to reduce idling of freight and passenger vehicles in order to reduce harmful pollutants. Freight planning and presentations should be provided regularly so the public can stay informed on freight needs and issues.

- **3.3: Coordinate with Economic Value Atlas work which includes the economic development community**

    - Metro will continue to reach out to the economic development community, including the Portland Business Alliance, the Columbia Corridor Association, West Side Economic Alliance and others. Metro staff will work with these partners, and the Economic Value Atlas program, to support an economic development strategy for the region that is coordinated with infrastructure investment that supports freight, transit, equity and other economic issues.

8.5 Policy 4. Pursue a sustainable, multi-modal freight transportation system that supports the health of the economy, communities and the environment through clean, green and smart technologies and practices

This category of issues and solutions deals with traditional nuisance and hot spot issues associated with "smokestack and tailpipe" problems, but it also recognizes the many current contributions and new opportunities for the evolving green freight community to be part of the larger environmental and economic solution set required in these times, including greenhouse gas curtailments.

Near-term Actions:

- **4.1: Provide useful "green freight" links from Metro's freight program webpage**

    - This would be a web resource that could provide information on best practices in sustainable freight, and direct our regional stakeholders to useful local, state and national programs and resources. This web resource would help identify what emission and greenhouse gas reductions can be expected from regional freight and goods movement activities. This action would be covered under Metro's Regional Snapshot program web page.

- **4.2: Pursue greenhouse gas and other pollutant reduction policies and strategies for freight that transitions the region to lower or zero emission freight vehicles and equipment**

    - Explore how local government and private industry can collaboratively reduce the emissions produced by trucks and still have shippers and

freight carriers meet their customer's needs. Research into this action should identify strategies, projects or programs that best meet transportation, safety and air quality goals that are synonymous with efficient goods movements. Metro will work with DEQ and other regional partners to explore and define potential environmental benefits in the following areas:

- Procedures for measuring greenhouse gas impacts of freight and evaluating the net greenhouse gas impact of freight projects;
- Programs, policies and projects for cost-effective net reduction of greenhouse gas and other pollutants, such as industrial symbiosis (businesses sharing resources and possibly using neighbors' waste products in their processes), incentives for zero/low emission delivery vehicles and alternative fueling stations, public/private urban consolidation centers, off-hours delivery programs; and
- Leveraging and possibly expanding diesel retrofit programs, and promoting diesel engine idling reduction regulations at the state and local level.

Note: Metro staff will be asking the Oregon Department of Environmental Quality (DEQ) to take this action as part of their work program.

- **4.3: Incorporate updated DEQ diesel emissions inventory data into regional and local freight plans**
  - Diesel emissions inventory data will be useful for tracking progress on reducing diesel emission at the regional and local level, and for indentifying locations where elevated diesel exhaust is considered a health risk to residents and employees in these areas. DEQ is currently contracting to update the inventory of off-road diesel equipment. This is important to include as a regional freight strategy action that is part of the RTP update since local transportation system plans must be consistent with the RTP.
- **4.4: Support and partner with local jurisdictions to develop policies to phase out older and dirtier diesel truck engines and diesel equipment used in the transport of freight**
  - Older diesel engines are less efficient and pollute more than newer engines. They use more fuel and require more maintenance. However, upfront costs of replacement are a financial burden for businesses. Metro will partner with local jurisdictions and the State of Oregon to expand programs that

provide incentives for retrofitting or replacing these older diesel engines. Metro will support funding for efforts like the Clean Diesel Initiative that provided funds to local businesses in the form of matched dollars, grants and low interest loans to initiate retrofits or diesel engine replacements.

8.6 Policy 5. Protect critical freight corridors and access to industrial lands by integrating freight mobility and access needs into land use and transportation plans and street design

Jobs are an important element of quality of life for the region. With that fact in mind, this category targets land use planning and design issues that can affect the ability of freight, goods movement and industrial uses to live harmoniously with their neighbors. Freight-sensitive land use planning includes everything from long---range aspirations for freight and industrial lands to short-term and smaller scale design and access issues.

Near-term Actions:

- **5.1: Continue to implement land use strategies to protect existing supply of industrial land**

    - Staff will identify lessons learned from previous efforts in the region and look at the most effective ways to protect high-value industrial land and prioritize and protect the value of freight investments to serve such areas. Protecting existing industrial land is part of the Urban Growth Management Functional Plan. This action will also focus on the economic impacts of failing to preserve and serve industrial lands. This will be tied in with Action 3.3 above.

- **5.2: Provide a freight perspective to the revision of Metro's 'Creating Livable Streets' design guidelines**

    - Moving and delivering goods is a key function of the region's highways and streets. Integrating freight and goods movement into our livable communities as they develop will require special roadway design considerations.
    - As Metro updates its latest edition of "Creating livable streets: Street design guidelines for 2040", Metro will address the recommendations in the "Truck and Street Design Recommendations Technical Report" (May 2007). The update will coordinate with regional stakeholders to ensure that design guidelines on regional intermodal connectors and other key freight roadways keep in mind freight considerations.
    - Metro will ensure appropriate freight and goods movement representation on the technical work group that will provide input on the revision of the guidelines.

Design Elements and Consideration for Freight

To be completed later.

Long-term Actions:

- **5.3: Examine need for additional industrial land and the availability and readiness of industrial lands**

    - The region must ensure a continued adequate supply of appropriate industrial land. In addition to internal coordination between Metro's planning and land use staff, and coordination with local jurisdictions and industry sectors, an understanding of how cities and counties have been successful in maintaining and improving the availability and readiness of industrial lands will be pursued. Metro currently tracks the availability and readiness of industrial tracks in the region that are 25 acres or larger, through the Regional Industrial Inventory Project.

8.7 Policy 6. Invest in our multi-modal freight transportation system, including road, air, marine and rail facilities, to ensure that the region and its businesses stay economically competitive

This category of solutions focuses on planning and building capital projects and developing the funding sources, partnerships and coordination to implement them. It includes the list of regional freight project priorities attached as Appendix B to this report, identifying a wide range of projects from preservation and maintenance to major facility construction.

Near-term Actions:

- **6.1: Work toward implementation of the RTP freight priority projects**

    - Advocacy for the prioritized list of regional freight projects within the approved RTP project list will be needed. This will include supporting funding needs and initiatives to build desired projects. In general, consistent with the message presented throughout this action plan, major investments for freight-oriented preservation, management and "build" projects should focus on:

        - Carefully evaluating what, where and when the freight problems occur (e.g., noting that they do not always coincide with the commute peaks)
        - Addressing core throughway system bottlenecks with substantial freight impacts, to improve truck mobility in and

through the region. Examples include the Columbia River Crossing, the I-5 Rose Quarter, I-205 South and Highway 217.

- Improving and protecting the throughway interchanges that provide access to major industrial areas, particularly: I-5/Marine Drive and I-5/Columbia Blvd serving the Columbia Corridor and Rivergate industrial areas, I-205/OR 212 serving the Clackamas and Milwaukie industrial areas, and I-205/Airport Way serving Portland International Airport and east Columbia Corridor industrial areas
- Improving arterial connections to current and emerging industrial areas
- Ensuring safe transport of hazardous loads with a regional routing strategy
- Looking beyond the roadway network to address critical marine and freight rail transportation needs such as maintenance of the Columbia River channel and upgrading main line and rail yard infrastructure

- **6.2: Strengthen the tie between project prioritization and the framework for freight performance**

  - Metro recognizes that, while autos and trucks must share the same network, auto trips can more easily be diverted off the highway system via a number of satisfactory existing or planned alternatives, including high capacity transit, a supporting bus network, and regional and corridor bicycle and pedestrian systems in various stages of completeness. Thus, the dependence of trucks and truck-related commerce on the regional freight network should be recognized as a factor in roadway project prioritization. This action item relies in part on improving the understanding and rigor of freight-related performance measures within Metro's modeling protocols: are we measuring what is relevant to know about freight? In addition, this action depends on technical staff and the freight/jobs/economic development community's ability to articulate fact-based net benefits of strategic goods movement and business-friendly investments and to compete effectively for regional dollars and attention within the decision-making structure of their respective local jurisdictions.

- **6.3: When appropriate, focus regional funds on large capital projects**

    - Based on solid performance measures and other indicators of need and effectiveness, fully vetted through regional planning processes, it makes sense in some cases for the region to focus its funding on one large project. ODOT's Freight Highway Bottleneck Project and delay area point to I-5 from I-84 to the Columbia River Bridge, and other locations in the region that may require major capital projects. Some examples are the throughway system bottleneck projects listed in Action 6.1.

- **6.4: Make strategic incremental improvements when large capital projects are unfunded**

    - When funds are not available for major system improvements, make incremental improvements to those facilities through less costly strategies using tools such as intelligent transportation systems, transportation system management and transportation demand management. Also, phase larger improvements, or ensure that projects move along through completing preliminary engineering, right-of-way acquisition or other steps toward construction.

- **6.5: Ensure that unfunded freight projects are on an aspirational or strategic RTP project list**

    - The region should be prepared to ensure that unfunded projects could at least be considered if unusual, one-time, or new funding sources become available.

- **6.6: Develop a regional freight rail strategy**

    - Many hopes are pinned on the potential for regional freight rail to accommodate a greater share of the future demand for goods movement capacity. However, there is a lack of depth in understanding from an operational or investment perspective how that potential could be realized. For example, the I-5 Trade and Capacity studies indicated that there was adequate capacity for the existing level of passenger train frequency along the north/south corridor. However, that capacity would be at the expense of freight train operations for both UP and BNSF region-wide, creating hot spot congestion, minimizing the possibility of growing freight rail commerce and degrading freight rail service throughout the Pacific Northwest; resulting in more trucks on the region's highways. The Portland metro region is committed to a variety of passenger rail modes and must reckon with the interactions with the freight rail system.

In addition, regional demand and support for pedestrian and bicycle trails, frequently puts pressure on existing freight rail capacity and operations. Issues of freight rail capacity, liability, safety, cost and efficiency must be balanced with other regional goals, based on common factual understanding of the underlying issues.

This action calls for a consultant-assisted technical regional rail study that would provide a foundation for developing the policy framework described earlier, and could incorporate that work as part of the study. Development of the strategy could include evaluation of public ownership and control of current or potential future passenger rail routes within the region or state, as part of a regional freight management strategy.

In addition to Metro's local jurisdictional partners, Class 1 railroads, the regional short line operator, TriMet, ODOT Region 1, ODOT Rail Division, the Ports and major shippers/customers would be critical stakeholders.

Long-term Actions:

- **6.7: Develop policy and evaluation tools to guide public investment in private freight infrastructure, focused on rail projects**

  - When staff capacity allows, more clearly define private and public sector roles, including incorporation of the identified state role in freight infrastructure planning and investment that is emerging from the statewide freight planning effort. This planning and analytical effort would answer the question "what are we trying to do with our freight investments?" And it would yield practical and usable performance measures and investment guidelines for public development of freight assets or services, when they are wholly or partially private. It would also help to correctly phase developments, based on public benefits, and identify equitable funding strategies. Rail/roadway grade separation projects and a short-line investment strategy could be key focus areas for such policy development.
  - Public investment could be appropriate, for example, when it:
    - Leverages private investment
    - Allows progression of a needed project that would otherwise not occur for a relatively modest investment
    - Involves a facility's yard or terminal but has regional impacts
    - Pays for intermodal links

- Creates new passenger capacity by solving freight bottlenecks
- Preserves or creates jobs, generates wealth and taxes
- Allows for more competition, modes or choices to shippers, businesses or consumers
- Increases overall benefits more than it improves any single mode or facility

Note: private investment in public infrastructure—apart from development fees—should also be part of this policy discussion.

8.8 Policy 7: Eliminate fatalities and serious injuries caused by freight vehicle crashes with passenger vehicles, bicycles, and pedestrians, by improving roadway and freight operational safety

This category of policy and design solutions focuses on addressing the issue of eliminating fatalities and serious injuries due to freight vehicle crashes with passenger vehicles, bicycles and pedestrians.

Near-term Actions:

- **7.1: Promote and advocate with the cities and counties for the implementation of truck side guards on large freight trucks providing public services (i.e. sanitation and recycling), consistent with USDOT specifications.**

  - Side guards are safety equipment used on large trucks to reduce fatalities and major injuries with side impact crashes. Large cities across the United States are identifying side guards as a proactive way to provide a safer atmosphere for cycling and walking next to large trucks within increasingly dense urban areas.
  - City of Portland Bureau of Planning and Sustainability has committed to coordinate a pilot project to install side guards on 18 sanitation (garbage) and recycling trucks operating in Portland. As of November 2017, the city had overseen the installation of side guards on three trucks.
  - Metro will work with the City of Portland Bureau of Planning and Sustainability to promote the completion of the pilot project, and consider expanding the project to more sanitation and recycling trucks. Metro will advocate for the city to consider a program that eventually begins the installation of side guards on all large trucks that the city has control over through licensing and franchises for city services. Metro may also consider a pilot project like the one at the City of Portland for

the large trucks that handle the Solid Waste Disposal and Transportation services from Metro's two transfer stations to one or two landfills outside the region.

- Metro will reach out to Clackamas, Multnomah and Washington counties, and other larger cities in the region to see if there is interest in starting pilot projects to install side guards on large sanitation and recycling trucks operating within their jurisdiction.

- **7.2: Develop design guidance for identifying and prioritizing improvements to regional intermodal connectors that should have bike and pedestrian facilities that are separated from the roadway, and other design treatments to enhance the safety of non-motorized modes.**

  - As Metro updates its latest edition of "Creating livable streets: Street design guidelines for 2040", Metro will coordinate with regional stakeholders to identify design guidelines on regional intermodal connectors and other key freight roadways that enhance the safety of non-motorized modes (see Action 5.2).
  - Due to the volume and size of trucks on the regional intermodal connectors, the design guidance will likely be separation of the bike and pedestrian facilities from the roadway and parallel roads or alternative routes that are separate from the intermodal connector to enhance safety.
  - Once the design guidelines on regional intermodal connectors and other key freight roadways have been established, Metro will develop criteria for identifying which of these freight roadways has the greatest need for improvements that enhance safety for non-motorized modes. Potential criteria could include a history of locations with serious crashes, the number of daily trucks, the percentage of truck traffic, number of daily bike trips, number of daily pedestrian crossings at key intersections, and proximity to schools and other facilities that generate bike trips and pedestrian activity. Once the freight roadways and intersections with the greatest needs are identified, Metro would coordinate with the counties and cities to develop multimodal freight safety projects that would be included in the Regional Transportation Plan. Projects that enhance the safety of bicyclist and pedestrians could include off-street multi-use paths, or truck aprons and other intersection safety improvements.

CHAPTER 9

IMPLEMENTATION

9.1 Implementing Adopted Freight Plans

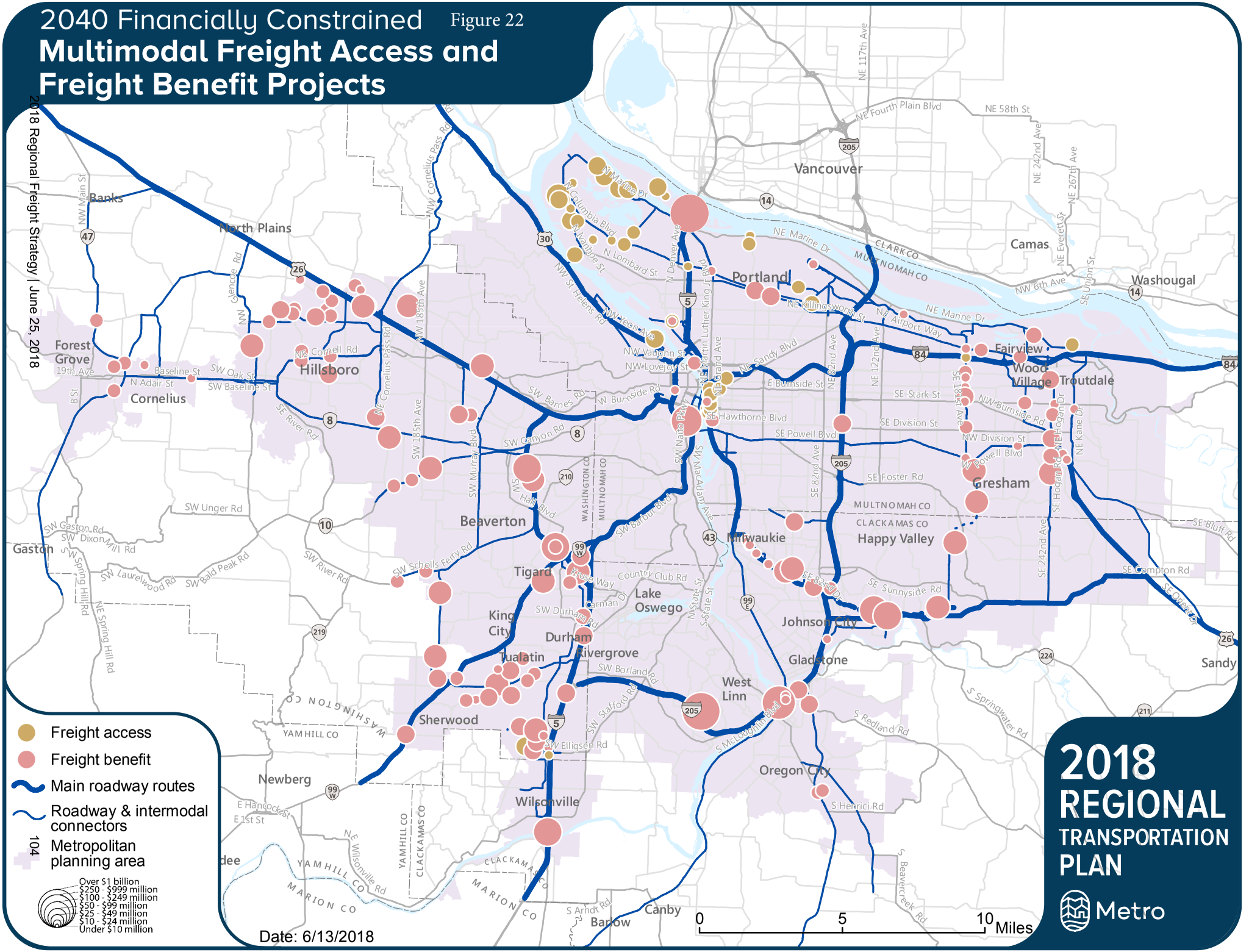
In addition to regional policy and program development and implementation, concrete freight related projects must be built when they are needed to ensure that the goals of the Regional Freight Strategy are met.

9.2 RTP Freight Projects and Programs

Appendix A is a list of all 2040 RTP Freight Projects that were nominated by ODOT, the Port of Portland, Clackamas, Multnomah and Washington counties, and the cities within the region that represent round 2 of the RTP call for projects. Freight projects are defined as all those RTP projects with an investment category of "Freight" or "Throughways", and some of the "Roads and Bridges" category. "Throughway" projects are considered to be freight projects since they are on the interstates and state highways within the region and are also the main roadway routes on the Regional Freight Network map. Under the "Roads and Bridges" category, freight projects are on facilities that are on the Regional Freight Network map, or are projects that provide freight access to intermodal facilities and/or industrial areas. The Regional Freight Work Group reviewed the investments under "Roads and Bridges" to ensure the projects met the criteria for being a freight project.

Figure 22 maps out the 2040 Financially Constrained Freight Projects from Appendix A.

2040 Financially Constrained Figure 22
Multimodal Freight Access and Freight Benefit Projects



9.3 Freight data collection and analysis

Portland State University's Intelligent Transportation Systems Laboratory has begun a project to produce truck travel time estimates using the transponder information from ODOT's Green Light weight-in-motion system. The system can supplement Trip-check's traveler information system as well as help calculate key freight measurements by linking the other data collected by the weigh stations to the travel time estimates. The ITS lab at PSU houses and maintains the Portland Oregon Regional Transportation Archive Listing. PORTAL collects data from all of the in-bed loop detection sensors in the Portland area as well as free floating dynamic sensors that can be placed in TriMet buses or other vehicles. The archive also collects weather and incident reports, all of which can be accessed in a variety of methods to help monitor and evaluate traffic improvements and patterns.

Commodity Flow Forecast (Port of Portland)

Metro has deployed commodity-flow based truck models for almost 20 years. These models have utilized federal data on national and international commodities movement based on the Freight Analysis Framework (FAF) that informed Metro and the Ports of Portland and Vancouver. The FAF is produced through a partnership between Bureau of Transportation Statistics (BTS) and Federal Highway Administration (FHWA), and integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by all freight modes of transportation. The current model is based on FAF3, which utilized data gathered from the 2007 Commodity Flow Survey (CFS), together with data from several other sources.

The Port of Portland Commodity Flow Forecast was developed and completed by Cambridge Systematics in 2014 and 2015. The overall purpose of the Commodity Flow Forecast was to develop a commodity flow database that used the FAF3 data and produce a future forecast that is sensitive to the unique commodity movements within and coming out of the Portland-Vancouver Region. The region consists of six counties: Clackamas, Columbia, Washington, Multnomah and Yamhill in Oregon, and Clark County in Washington State. Several other sources for regional commodities movement unique to the Portland-Vancouver Region were also uses for the forecast.

The Port of Portland Commodity Flow Forecast produced a set of 2007 base year data. The inputs to the base year volumes of commodities were adjusted for auto imports and waste and scrap material, based on available local data. Flows of commodities by direction (inbound, outbound, and within the region) were identified for both tonnage and value. Flows of commodities by trade type (domestic, imports and exports) were also identified for tonnage and value. The top domestic, import and export commodities were also identified for tonnage and value. The top domestic products by value are electronics at 11%, mixed freight (restaurant supplies, grocery food and supplies, and office supplies) at 9%, machinery at 9%, gasoline and other fuels at 8%, and motorized vehicles at 8%. The top imported products by value are motorized vehicles at 32%, gasoline and other fuels at 13%, and machinery at 10%. The top exported products by value are cereal grains at 14%,

other agricultural products at 9%, machinery at 9%, motorized vehicles at 9%, electronics at 8%, and transportation equipment at 8%.

The Commodity Flow Forecast also produced a set of 2040 future year data. Adjustments were made to future volumes for cereal grains, auto imports, non-metallic mineral products and precision instruments based on more localized forecasts that are more accurate. Flows of future commodities by direction and by trade type, with growth rates, were calculated for 2040 by both tonnage and value.

Economic Value Atlas

In 2017, Metro initiated efforts in support of economic development activities by working together with key partners and stakeholders to develop an Economic Value Atlas (EVA). The EVA will provide tools and analysis to better align planning and public investments to strengthen the regional economy. It will provide a picture of the regional economy that will be used to align and help inform future investment decisions by defining outcomes that will support the economy across the region. Economic data in the EVA can also help identify future investment areas, where regional attention can support local partners to establish needed infrastructure, strategies, or policy changes to create beneficial economic outcomes.

This project will provide a solid data foundation for key regional activities such as:

- Defining potential areas for partners to collaborate and develop shared investment strategies in support of economic and workforce development.
- Providing a data driven picture of the regional economy to align investments that achieve the coordinated vision of Greater Portland 2020, the 2040 Growth Concept and the Regional Transportation Plan.
- Pin-pointing areas of focus for regional investment to bridge local and regional economic development aspirations.
- Outlining a path to pursue policies, actions and investments that help secure these outcomes.

A set of desired regional principles specific to economic outcomes for people, businesses, and places are being identified by the Economic Value Atlas Task Force. The Task Force includes economic and workforce development organizations, industry sector representatives, social equity focused organizations, and organizations representing interests across multiple types of infrastructure; creating a broad base of partners interested in building an inclusive regional economy. A technical work group has been formed to establish quantifiable criteria and a method to visually exhibit economic conditions among communities across the region, to understand how infrastructure investment, land use strategies, and business or workforce development activities may be targeted to advance desired economic outcomes locally and regionally.

New Regional Freight Model

The new Metro Freight Model is designed to replace the current trip-based truck model previously developed. The model simulates movement of individual shipments throughout the supply chain, including both direct shipments and shipments traveling through transshipment facilities. Shipments are allocated to trucks of various classes, and the movements of all freight vehicles are simulated over the course of a typical weekday. The freight model development project included an array of participants including Metro, the Oregon Department of Transportation (ODOT), the Port of Portland, and local agencies throughout the region.

The freight model development project was completed in February 2018. Since completion of the project did not occur until early 2018, the new Metro Freight Model has not been used for any of the regional freight system evaluation measures or any other analysis within the 2018 Regional Freight Strategy.

The primary objectives of the project are to:

- Develop tools to enable a more comprehensive analysis of infrastructure needs and policy choices pertaining to the movement of goods;
- Develop more detailed network assignments by truck type to support regional environmental analysis, as well as local traffic operations and engineering analysis;
- Develop freight forecasts that are responsive to changes in economic forecasts, changing growth rates among industrial sectors, and changing rates of economic exchange and commodity flows between sectors; and
- Replace the trip-based truck model with a more realistic tour-based model.

Current Model

The current truck model is based on commodity flows, a method deployed by Metro for almost 20 years. The trips in the current method are modeled as simple one-way trips and do not include service vehicles or parcel delivery. These models use data based on the Freight Analysis Framework (FAF) and are prepared under contract for Metro, Port of Portland, and Port of Vancouver. The most recent update was in 2014 using FAF3 (2007) data. In the current model commodities are either produced in the region, or enter the region via external highway cordon, marine port, rail yard, or air freight facility at Portland International Airport. For each long haul mode, a certain proportion is assumed to utilize trucks for a portion of the journey. Each group of commodities is associated with a group of employment types. Truck-borne commodities are distributed to Transportation Analysis Zones (TAZ) on the basis of TAZ employment. TAZ commodities are apportioned to heavy and medium trucks.

New Model

The new Freight Model was geared at filling in the gaps seen in the current model. It represents a new generation of "hybrid" models that micro-simulate both commodity supply chains and local truck tours. Similar applications have been successful in Chicago, Baltimore, Phoenix, and the State of Florida. With the addition of new truck behavior data the model is able to simulate truck movements. Truck data was obtained by GPS traces of truck movements by vehicle class, dispatch data maintained by businesses, and detailed business establishment surveys with truck itineraries. In addition to all the above improvements the new Freight Model has the ability to take a more holistic approach to modeling. It has the ability to focus on major regional export sectors and produce data to evaluate the economic costs of bottlenecks.

The new model is no longer restricted to route diversion only, it includes Long-Haul freight mode choice and additional responses including:

- Time and frequencies of deliveries
- Number and length of tours
- Number of stops that can be made per tour
- Number of trucks needed to serve all customers

The new model also expands the truck classes to include light, medium, and heavy. It has the ability to track commodities by Standard Classification of Transported Goods (SCTG) groups and the ability to track value by type of good, such as time-sensitive shipments. The new model also incorporates non-freight trucks, an option unavailable in the current model. It includes both service trucks and mail/parcel delivery trucks which are believed to account for over half of local truck VMT.

Regional Benefits

The new model will allow for improved ability to evaluate cost of congestion and benefits of freight improvements. It will offer a clearer understanding of land use policies such as the role of warehousing and distribution in the process, and a better understanding of truck related environmental impacts which could lead to an increase in our freight system efficiency.

A complete summary of the new freight model is included as Appendix C of this Regional Freight Strategy.

9.4 Future Freight Studies

In October 2017, the Regional Freight Work Group (RFWG) discussed the need for future freight studies that should be called out in the 2018 Regional Freight Strategy. The RFWG discussed the need for the following four possible future freight studies:

- Regional Freight Rail Study
- Kenton Rail Line Study
- Willamette River Channel Deepening Study
- Regional Freight Delay and Commodities Movement Study

The RFWG recommended that the Regional Freight Rail Study, which was identified in the 2014 RTP as needed, should be included as a future freight study.

The RFWG did not make a recommendation on the Kenton Rail Line Study. This study was generally defined as a way to determine which at-grade railroad crossings of the UP Kenton main rail line, that runs from the UP Seattle main line at Columbia Boulevard and N. Hurst Avenue east to the Sandy River (just southeast of the Troutdale Airport), should be grade separated.

The RFWG did not make a recommendation on the Willamette River Channel Deepening Study. The Port of Portland later determined that the deepening of the channel was not suitable for study within the next 10 years and should not be included in the 2018 Regional Freight Strategy.

The RFWG recommended that the Regional Freight Delay and Commodities Movement Study should be included as a future freight study. The descriptions of the two studies that the RFWG recommended are included in the remaining part of this chapter.

Regional Freight Rail Study

The study should seek to identify and produce increases in rail capacity, safety, land use compatibility and operational efficiencies; which is important to our long-term economic and environmental sustainability, and will help to maintain the region's competitive advantage in a global marketplace.

Regional Freight/Passenger Rail Study - Expected Outcomes

Some of the potential outcomes of the proposed study are:

- Identification of economically viable opportunities to develop short line intermodal hubs or logistics parks or other cargo-oriented development
- A strategy to identify, develop and position top projects for confirmed and potential future federal and state funding as appropriate, including:
    - An updated, re-prioritized list of regional freight rail projects focused on improving capacity constraints and targeting industrial access to the rail networks
    - A funding strategy for regional freight/passenger rail bottlenecks
    - A strategy to fund needed grade separations including grade separation needs identified on the Kenton rail line

- A strategy to fund critical modernization projects on the short rail lines

Fact-based guidance for stakeholders to use in negotiating claims over passenger/freight conflicts, balancing passenger and freight goals, and a viable set of solutions and initiatives to meet those goals:

- Regional guidance for public/private investment partnerships to guide investment of regional and national pots of money in identifying and developing freight rail corridors of local, regional and national significance; and
- Specific guidance for local jurisdictions as they develop their transportation system plans (TSPs) in order to avoid or minimize conflicts, and preserve or enhance the functionality of rail facilities and connected industrial land uses

On January 22 2015, Metro staff called a meeting with staff from City of Portland, Clackamas County, Multnomah County, Washington County, Port of Portland, ODOT Region 1, ODOT Rail, and a local rail expert to discuss the potential need and purpose for a Regional Freight/Passenger Rail Study.

The Port of Portland Rail Plan had concentrated on Class 1 railroad lines and was focused on the Port of Portland interests, especially the Port terminals. The Port's plan was not focus much on the short lines and other non-Class 1 railroad lines that run in Clackamas County (west of the Willamette River) and Washington County. The Port's plan identified grade separations as a key strategy to address capacity and safety, including projects along the Kenton Line (Class 1 railroad line) in Portland and Multnomah County.

It was suggested that the study should examine the issue of long trains (up to 7,000 feet long) that take a long time to separate and store the cars when accessing Portland inter-modal terminals due to a lack of storage capacity.

Clackamas County staff suggested that the study address freight rail and passenger rail within Clackamas County and Washington County. Clackamas County staff thought the study should look at improved short line service and providing sufficient freight rail service on the Brooklyn rail line.

Washington County staff stated that the county has shown interest in potential expansion of service and improving speeds with double-tracking some areas on the Portland Western railroad line. Washington County staff identified three areas for the study to consider: 1) Better understanding of existing and future private rail operations in Washington County; 2) Future added service on the WES commuter rail line; and 3) Pedestrian crossing improvements to enhance safety at railroad crossings.

City of Portland staff suggested that the study look at a regional strategy for when and how to partner with private railroads to address funding of rail projects.

ODOT Rail staff suggested that any study of rail capacity needs should consider operational improvements, and not just infrastructure expansion.

The group agreed that the study should move forward after the completion of the Regional Over-Dimensional Truck Route Study, and that the input received at this meeting should be considered by Metro in the scoping and budgeting for this study.

Metro staff determined that the Kenton Rail Line Study should become part of the Regional Freight Rail Study. The Regional Freight Rail Study will determine which at-grade railroad crossings of the UP Kenton main rail line should be grade separated.

Regional Freight Delay and Commodities Movement Study

The purpose of the study would be to evaluate the level of commodity movement on the regional freight network within each of the mobility corridors identified in the Regional Transportation Plan's Mobility Corridor Atlas. The study would use Metro's new freight model to summarize the general types of commodities, the tonnage of the commodities and the value of the commodities that are using these freight facilities within each of the mobility corridors. The study would also evaluate the need for improved access and mobility to and from regional industrial lands and intermodal facilities.

Some of the potential outcomes of the proposed study are:

- Developing a methodology for determining which freight facilities and mobility corridors are carrying the highest tonnage of goods and commodities, and the highest amount of value for those commodities.
- Based on the tonnage and value of the goods and commodities carried in each corridor, a measure could be developed for which corridors should be prioritized for transportation projects based on their importance for freight and economic value.
- Based on the congestion and unreliability found in each of the mobility corridors, transportation projects could be developed and prioritized for corridors that have the most importance for freight and economic value.
- The study would likely utilize a new freight monitoring measure for reliability and the evaluation measures for cost of delay on the freight network and freight access to industrial land and intermodal facilities (being developed as part of the current RTP update).

The study will recommend prioritized freight projects for the next RTP and Regional Freight Plan based on the new freight measures, congestion, unreliability, accessibility and the highest tonnage and value of commodities within each mobility corridor.

CHAPTER 10

MEASURING PROGRESS

In 2012, the Moving Ahead for Progress in the 21st Century (MAP-21) created the most significant federal transportation policy shift since the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA). A fundamental element of the legislation was its focus on performance-based planning and programming. Fixing America's Surface Transportation (FAST Act) passed Congress in December 2015, replacing MAP-21. The FAST Act did not make any major changes to the performance requirements of MAP-21 and did not add any new performance measures.

Performance-based planning

For the first time, MAP-21 established a performance-based planning framework intended to improve transparency and hold state transportation departments, transit agencies and metropolitan planning organizations (MPOs) accountable for the effectiveness of their transportation planning and investment choices. The objective of the new framework was to ensure States and MPOs invest federal resources in projects that collectively will make progress toward the achievement of the national goals identified in MAP-21.

National performance goals related to freight

The legislation established seven national performance goals for the federal-aid highway program and directed the USDOT to develop performance measures for each goal area. The following are the performance goals that relate to system reliability, and freight movement and economic vitality:

System reliability – To improve the efficiency of the surface transportation system.

Freight movement and economic vitality – To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.

MAP-21 directed state transportation departments, transit agencies, and metropolitan planning organizations (MPOs) to incorporate a performance-based approach in their planning, including measures and targets, that are to be used in transportation decision-making. States, transit agencies and MPOs must set targets for measures specified by USDOT and track and report progress toward meeting these targets.

Performance measures have been identified through MAP-21 and subsequent USDOT rulemaking that must be reflected in the 2018 RTP. The table below summarizes the federal performance measures identified for the performance goals related to freight and compares them to the current 2014 RTP Targets/Measures:

Table 6: MAP-21 National Goal Areas, Federal Performance Measures, and Existing RTP Measures

National Goal Areas	Federal Performance Measure(s)	2014 RTP Target(s) / Measure
System reliability	Percent of reliable person-miles traveled [26]on Interstate System and on the non-Interstate National Highway System	None – though reliability is called out as recommended as a system monitoring measure. Also, there's a target labeled "freight reliability" but it measures delay, not reliability.
Freight movement and economic vitality	Percent of Interstate System miles with reliable truck travel times[27]	By 2040, reduce vehicle hours of delay per truck trip by 10% compared to 2010.

10.1 Freight Performance Target

The 2014 RTP Performance Targets had identified one freight performance target. That performance target was called Freight Reliability, and was defined as:

> By 2040, reduce vehicle hours of delay per truck trip by 10 percent compared to 2010.

This is not a true reliability measure. Reliability is a measure of the variability in travel time, not simply the delay in travel time. Researchers have devised feasible, data-driven methods to measure roadway reliability.

Staff recommends discussing how the region could support and apply such techniques to freight and mobility corridors. Staff is currently proposing that the freight performance target would be replaced by the federal performance measure for **Freight movement and economic vitality** using the same methodology:

[26] Reliable defined as the ratio of the 80th percentile travel time of a reporting segment to a "normal" travel time (50th percentile), using data from FHWA's free National Performance Management Research Data Set or equivalent. Data are collected in 15-minute segments during all time periods other than 8 p.m.-6 a.m. local time. The measures are the percent of person-miles traveled on the relevant NHS areas that are reliable

[27] The ratio will be generated by dividing the 95th percentile time by the normal time (50th percentile) for each segment. Then, the Index will be generated by multiplying each segment's largest ratio of the five periods by its length, then dividing the sum of all length-weighted segments by the total length of Interstate. Reporting is divided into five periods: morning peak (6-10 a.m.), midday (10 a.m.-4 p.m.) and afternoon peak (4-8 p.m.) Mondays through Fridays; weekends (6 a.m.-8 p.m.); and overnights for all days (8 p.m.-6 a.m.)

Percent of Interstate System miles with reliable truck travel times.

(To be completed later)

10.2 Freight Monitoring Measures

Freight monitoring measures should tell users how the freight system is performing over time to identify where and when adjustments in the freight network are needed.

Travel time reliability on throughways and intermodal connectors
Generally travel time reliability is the comparison of how long it takes to travel along a roadway route during a certain time of day (an example is 4:00-4:15 pm) on a weekday using many samples, and comparing each sample to how long it would take to travel that route at that time of day under normal conditions (50th percentile of all samples). Higher frequencies of times with a high level of variability from the norm, means high unreliability.

(This is placeholder language and will be completed later)

10.3 Freight System Evaluation Measures

Truck Vehicle Hours of Delay (VHD) on all facilities
This measure uses the Metro travel forecasting model to calculate the hours of truck delay for all roadway facilities within the Metro Planning Area (MPA) during 2015 and various future year scenarios. The calculations have been made for the average weekday during the following times of day: 7AM to 9AM (morning peak), 1PM to 3PM, and 4PM to 6PM (evening peak). The 1PM to 3PM time-slot was chosen as the afternoon period that trucks travel in to avoid peak hours of congestion.

Findings: Between 2015 and 2040, truck delay on all facilities within the MPA increases significantly for all investment scenarios during all three time periods. However, when compared with the 2040 No Build both 2040 RTP investment scenarios show a slower pace of growth in delay in each travel period. In the two-hour mid-day (1-3 PM) the 2040 Financially Constrained truck delay is 68% less than the 2040 No Build and the 2040 Strategic truck delay is 72% less than the 2040 No Build. In the two-hour pm peak (4-6 PM) the 2040 Financially Constrained and the 2040 Strategic truck delay is less than the than 2040 No Build by 27% and 30%, respectively.

(To be completed later)

Truck Vehicle Hours of Delay (VHD) on the Regional Freight Network
This measure uses the Metro travel forecasting model to calculate the hours of truck delay for just the roadways on the Regional Freight Network map within the Metro Planning Area (MPA), during 2015 and various future year scenarios. Once again, the calculations have been made for the average weekday during the following times of day: 7AM to 9AM (morning peak), 1PM to 3PM, and 4PM to 6PM (evening peak).

Findings: Between 2015 and 2040, truck delay on the regional freight network increases significantly for all investment scenarios during all three time periods. However, when compared with the 2040 No Build both 2040 RTP investment scenarios show a slower pace of growth in delay in each travel period. In the two-hour mid-day (1-3 PM) the 2040 Financially Constrained truck delay is 67% less than the 2040 No Build and the 2040 Strategic truck delay is 72% less than the 2040 No Build. In the two-hour pm peak (4-6 PM) the 2040 Financially Constrained and the 2040 Strategic truck delay is less than the than 2040 No Build by 29% and 32%, respectively.

(To be completed later- see 2018 RTP - Chapter 7 Measuring Outcomes - for more detail)

Cost of Truck VHD on all facilities and on the Regional Freight Network
This measure uses the Truck VHD numbers that were calculated for both all roadway facilities and for just the Regional Freight Network, and factors them up by two different values of time for trucks, to obtain the cost of truck delay. The value of time factor for medium trucks* is $28.20 per hour and represents 35% of the truck fleet. The value of time factor for heavy trucks* is $30.72 per hour and represents 65% of the truck fleet.

Findings: In the 2040 No Build, the cost of delay on the regional freight network increases almost four fold during the two-hour pm peak compared to the 2015 Base Year. For the 2040 No Build, the cost of delay on the regional freight network increases almost 15 fold during the two-hour mid-day period. However, implementation of the 2040 RTP Federal Priorities or the 2040 Investment Strategy results in a 68% - 73% decrease in the cost of delay for the mid-day peak period compared to the 2040 No Build strategy. For the two-hour pm peak travel period the 2040 RTP Federal Priorities or 2040 Investment Packages decrease the cost of delay by 29% -32% compared to the 2040 No Build.

(To be completed later- see 2018 RTP - Chapter 7 Measuring Outcomes - for more detail)

Truck travel times between major freight origins and destinations
This measure evaluates the one hour mid-day (12-1 PM), mid-day for trucks (2-3 PM) and PM peak (5-6 PM) truck travel times for 24 routes (one for each mobility corridor) that use the regional freight network, and start and/or end at a major industrial site (rail yard, intermodal facility, major industrial site, etc.). The truck travel times are calculated using the regional travel model for the 2015 Base, the 2017 No Build, the 2027 Constrained, the 2040 No Build, the 2040 Financially Constrained, and the 2040 Strategic. The preliminary findings below do not include a comparison of truck travel times for all 24 routes, and focuses on four major freeway/interstate routes in the region: I-5 (north of the central city), I-5 (south of the central city) , I-84 (east of I-205) and US 26/Sunset Highway.

Findings: The following modeled results for major freeways are for the percent reduction in truck travel time for the 2040 Financially Constrained and 2040 Strategic compared to the 2040 No Build:

- CEID to Vancouver CBD: 12-1 PM = 20-21% less; 2-3 PM = 18-19% less
- CEID to Vancouver CBD: 5-6 PM = 23-24% less

- I-5 @Morrison Br. to Tualatin Industrial: 12-1 PM = 7% less; 2-3 PM = 2-3% less
- I-5 @Morrison Br. to Tualatin Industrial: 5-6 PM = 2% less
- I-84/I-205 to Fed Ex Troutdale: 12-1 PM & 2-3PM = stay the same
- I-84/I-205 to Fed Ex Troutdale: 5-6 PM = stay the same
- I-5 @Morrison Br. to Hillsboro Industrial: 12-1 PM = 3% less; 2-3 PM = stay the same
- I-5 @Morrison Br. to Hillsboro Industrial: 5-6 PM = stay the same

Due to the Columbia River Crossing/I-5 capacity project and the I-5 Rose Quarter project, truck travel times between the Central Industrial Eastside District (CEID) and downtown Vancouver Washington improve by 18 – 24 % over the 2040 No Build scenario. However, for the other 3 major freeway corridors in the region (I-5 south, I-84 east of I-205 and US26 west of Hillsboro) the truck travel times stay virtually the same or have only a slight reduction (3-7%) for some off-peak travel times.

(To be completed later - see 2018 RTP - Chapter 7 Measuring Outcomes - for more detail)

Refinement of the Regional Mobility Policy

The U.S. Department of Transportation issued new regulations (through MAP-21 and the FAST Act) for states and Metropolitan Planning Organizations that will require greater monitoring of mobility on the freeway system and setting targets for system performance. While these new requirements differ somewhat from the current mobility policy for the region, the approach is similar, with a focus on the throughway system.

To meet the new federal mandate and the growing challenges on the freeway system, ODOT and Metro propose to work in partnership after the completion of the 2018 RTP (2019–20) on a refinement to our regional mobility policy. This will allow the refinement work to build on a rich data set and updated policy framework from the RTP, with the goal of better informing system management and investments in the region.

The mobility policy is principally an issue for the freeways, state highways and on the region's principal arterial system, which are an important part of the regional freight network.

(See section 8.2.3.1 Regional Mobility Policy Update in the 2018 RTP for more detailed information)

Freight Evaluation Measures and Refinement of Regional Mobility Policy

Additional freight measures that address freight mobility may be developed that reflect the refinement of the Regional Mobility Policy. One of the expected outcomes of the Regional Mobility Policy refinement is "a mobility corridor-based strategy for managing congestion on regional arterial streets while improving safety, improving transit speed and reliability, completing gaps in pedestrian and bicycle facilities and supporting regional and local land use plans". These outcomes should allow for the development of freight evaluation

measures on the effectiveness managing congestion, achieving better reliability, and improving safety on the regional freight network.

Freight Mobility and Industrial Access Measure

This measure was developed and tested, but not fully implemented or evaluated. The intent was to measure the number of trucks that are coming from or going to freight intermodal facilities or industrial land within each of the Regional Mobility Corridors, and determine the hours of truck delay they are experiencing on the regional freight network. The times of day that were measured include the AM peak (7-9 AM), the mid-day for trucks (1-3 PM) and the PM peak (4-6 PM). The two areas chosen to test were the Tualatin and Sherwood Industrial Area off Tualatin-Sherwood Road (in mobility corridor 11); and the Marine Terminals 5 and 6, and the rail yards off Marine Drive (in mobility corridor 17). This measure was developed and tested as part of the 2018 RTP Systems Evaluation work.

The process consisted of 1) choosing two industrial areas 2) calculating the number of trucks at certain times of day (modeled) that are coming into or leaving these area (zones); and 3) measuring the hours of delay (modeled) that these trucks are experiencing (within the region) at these times of day as they travel to and from these areas.

Findings: The results of the testing were incomplete and inconclusive due to it being limited to two areas with freight intermodal facilities/rail yards or industrial land. Intermodal Facilities and rail yards are not the only places that attract large numbers of freight trucks. According to the truck model, in 2015 the Tualatin and Sherwood Industrial Area generates about 30 percent more truck trips (regardless of time period) than does the North Portland industrial area that includes Marine Terminals 5 and 6, and two rail yards. By 2040, that difference increases to about 33 percent more truck trips regardless of time period.

(To be completed later – see 2018 RTP - Chapter 7 Measuring Outcomes - for more detail on the scenarios that were compared.)

ACRONYMS

BNSF – Burlington Northern Santa Fe

CBOS – Corridors Bottleneck Operations Study

DEQ – Department of Environmental Quality

EB – Eastbound

FAST Act – Fixing America's Surface Transportation Act

GPS – Global Positioning System

HVAC – Heating, Ventilation, Air Conditioning

ICTSI – International Container Terminal Service Inc.

MCTD – Motor Carrier Transportation Division

MPH – Miles per hour

NB – Northbound

ODOT – Oregon Department of Transportation

OFAC – Oregon Freight Advisory Committee

PDX – Portland International Airport

RFWG – Regional Freight Work Group

RRR – Reduction Review Route

SB – Southbound

WB – Westbound

GLOSSARY OF TERMS

Accessibility – The ability or ease to reach desired goods, services, activities and destinations with relative ease, within a reasonable time, at a reasonable cost and with reasonable choices. Many factors affect accessibility (or physical access), including mobility, the quality, cost and affordability of transportation options, land use patterns, connectivity of the transportation system and the degree of integration between modes. The accessibility of a particular location can be evaluated based on distances and travel options, and how well that location serves various modes. Locations that can be accessed by many people using a variety of modes of transportation generally have a high degree of accessibility.

Arterial Street – A class of street. Arterial streets interconnect and support the throughway system. Arterials are intended to provide general mobility for travel within the region. Correctly sized arterials at appropriate intervals allow through trips to remain on the arterial system thereby discouraging use of local streets for cut–through travel. Arterial streets link major commercial, residential, industrial and institutional areas. Major arterials serve longer distance through trips and serve more of a regional traffic function. Minor arterials serve shorter, more localized travel within a community. As a result, major arterials usually carry more traffic than minor arterials. Arterial streets are usually spaced about one mile apart and are designed to accommodate bicycle, pedestrian, truck and transit travel.

Bicycle – A vehicle having two tandem wheels, a minimum of 14 inches in diameter, propelled solely by human power, upon which a person or persons may ride. A three–wheeled adult tricycle is considered a bicycle. In Oregon, a bicycle is legally defined as a vehicle. Bicyclists have the same right to the roadways and must obey the same traffic laws as the operators of other vehicles.

Bicycle facilities – A general term denoting improvements and provisions made to accommodate or encourage bicycling, including parking facilities, all bikeways and shared roadways not specifically designated for bicycle use.

Bike lane – A portion of a roadway that has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

Rail branch lines – Non–Class I rail lines, including short line or branch lines.

Capacity – A transportation facility's ability to accommodate a moving stream of people or vehicles in a given place during a given time period. Increased capacity can come from building more streets or throughways, adding more transit service, timing traffic signals, adding turn lanes at intersections or many other sources.

Central city – Downtown Portland and adjacent areas (like Lloyd District) within the city of Portland.

Collector street – A class of street. Collector streets provide both access and circulation between residential, commercial, industrial and agricultural community areas and the arterial system. As such, collectors tend to carry fewer motor vehicles than arterial streets, with reduced travel speeds. Collector streets are usually spaced at half–mile intervals, midway between arterial streets. Collectors may serve as bike, pedestrian and freight access routes, providing local connections to the arterial street network and transit system.

Commute – Regular travel between home and a fixed location (e.g., work, school).

Commuter rail – Short–haul rail passenger service operated within and between metropolitan areas and neighboring communities. This transit service operates in a separate right–of–way on standard railroad tracks, usually shared with freight use. The service is typically focused on peak commute periods but can be offered other times of the day and on weekends when demand exists and where rail capacity is available. The stations are typically located one or more miles apart, depending on the overall route length. Stations offer infrastructure for passengers, bus and LRT transfer opportunities and parking as supported by adjacent land uses. See also Inter–city rail.

Complete streets – A transportation policy and design approach where streets are designed, operated and maintained to enable safe, convenient and comfortable travel and access for users of all ages and abilities, regardless of their mode of transportation.

Connectivity – The degree to which the local and regional street, pedestrian, bicycle, transit and freight systems in a given area are interconnected.

Congestion – A condition characterized by unstable traffic flows that prevents movement on a transportation facility at optimal legal speeds. Recurrent congestion is caused by constant excess volume compared with capacity. Nonrecurring congestion is caused by incidents such as bad weather, special events and/or traffic accidents.

Corridors (2040 design type) – A type of land use that is typically located along regional transit routes and arterial streets, providing a place for somewhat higher densities than is found in 2040 centers. These land uses should feature a high–quality pedestrian environment and convenient access to transit. Typical new developments would include row houses, duplexes and one to three–story office and retail buildings, and average about 25 persons per acre. While some corridors may be continuous, narrow bands of higher–intensity development along arterial streets, others may be more nodal, that is a series of smaller centers at major intersections or other locations along the arterial that have high quality pedestrian environments, good connection to adjacent neighborhoods and transit service.

Deficiency – Capacity or design constraints that limit, but do not prohibit the ability to travel by a given mode, or meet certain thresholds defined in the Regional Transportation Plan. Examples include locations where throughway capacity is less than six through lanes

and arterial street capacity less than 4 lanes, or that have poor or substandard design features; at–grade rail crossings; height restrictions; bike and pedestrian connections that contain obstacles (e.g., missing curb ramps, distances greater than 330 feet between pedestrian crossings, absence of pedestrian refuges, sidewalks occluded by utility infrastructure, high traffic volumes and complex traffic environments); transit overcrowding or schedule unreliability and high crash locations).

Delay – The additional travel time required by all travelers, as measured by the time to reach destinations at posted speed limits (free–flow speed) versus traveling at a slower congested speed. Delay can be expressed in several different ways, including total delay in vehicle–hours, total delay per vehicle miles traveled (VMT) and share of delay by time period, day of week or speed range.

Employment areas – Areas of mixed employment that include various types of manufacturing, distribution and warehousing uses, and may include commercial and retail development. Retail uses should primarily serve the needs of the people working or living in the immediate employment area. Exceptions to this general policy can be made only for certain areas indicated in a functional plan.

Facility – The fixed physical assets (structures) enabling a transportation mode to operate (including travel, as well as the loading and unloading of passengers). This includes streets, throughways, bridges, sidewalks, bikeways, transit stations, bus stops, ports, air and marine terminals and rail lines.

Federal Highway Administration (FHWA) – The federal agency responsible for administering roadway programs and funds. The FHWA implements transportation legislation approved at the congressional level that appropriates all federal funds to states and local governments.

Freeway – A design for a Throughway in which all access points are grade separated. Directional travel lanes usually separated by a physical barrier, and access and egress points are limited to on–and off–ramp locations or a very limited number of at–grade intersections.

Freight intermodal facility – An intercity facility where freight is transferred between two or more freight modes (e.g., truck to rail, rail to ship, truck to air).

Freight modes – Freight modes are the means by which freight achieves mobility. These modes fall into five basic types: road (by truck), rail, pipeline, marine (by ship or barge) and air.

Freight mobility – The efficient movement of goods from point of origin to destination.

Freight rail – A freight train that is a group of freight cars hauled by one or more locomotives on a railway, transporting cargo all or some of the way between the shipper and the intended destination.

High–occupancy vehicle (HOV) – A vehicle carrying more than two passengers with the exception of motorcycles.

Highway – A design for a Throughway in which access points are a mix of separate and at–grade.

Industrial areas – Areas set aside for industrial activities. Supporting commercial and related uses may be allowed, provided they are intended to serve the primary industrial users. Residential development and retail users whose market area is larger than the industrial area are not considered supporting uses.

Intelligent transportation systems (ITS) – The application of a broad range of advanced communications technologies that are integrated with transportation infrastructure and vehicles to improve the efficiency and safety of transportation systems. ITS can include both vehicle-to-vehicle communication (which allows cars to communicate with one another to avoid crashes and vehicle-to-infrastructure communication (which allows cars to communicate with the roadway) to identify congestion, crashes or unsafe driving conditions, manage traffic flow, or provide alternate routes to travelers.

Intermodal connector – A road that provides connections between major rail yards, marine terminals, airports, and other freight intermodal facilities; and the freeway and highway system (the National Highway System).

Intermodal facilities – A transportation element that allows passenger and/or freight connections between modes of transportation. Examples include airports, rail stations, marine terminals, and rail–yards that facilitate the transfer of containers or trailers. See also passenger intermodal facility and freight intermodal facility definitions.

Local jurisdiction – For the purpose of this plan, this term refers to a city or county within the Metro boundary.

Local streets or roads – Local streets primarily provide direct access to adjacent land. While Local streets are not intended to serve through traffic, the aggregate effect of local street design impacts the effectiveness of the Arterial and Collector system when local travel is restricted by a lack of connecting routes, and local trips are forced onto the Arterial street network. In the urban area, local roadway system designs often discourage "through traffic movement." Regional regulations require local street connections spaced no more than 530 feet in new residential and mixed used areas, and cul–de–sacs are limited to 200 feet in length. These connectivity requirements ensure that a lack of adequate local street connections does not result in the arterial system becoming congested. While the focus for

local streets has been on motor vehicle traffic, they are developed as multi–modal facilities that accommodate bicycles, pedestrians and sometimes transit.

Main line rail – Class I rail lines (e.g., Union Pacific and Burlington Northern/Santa Fe).

Main roadway routes – Designated freights routes that are freeways and highways that connect major activity centers in the region to other areas in Oregon or other states throughout the U.S., Mexico and Canada.

Marine facilities – A facility where freight is transferred between water–based and land–based modes.

Metropolitan Planning Organization (MPO) – A regional policy body, required in urbanized areas with populations more than 50,000 and designated by the governor of the state. MPOs are responsible, in cooperation with the state and other transportation providers for carrying out the metropolitan transportation planning requirements of federal highway and transit legislation. Oregon currently has eight MPOs covering the metropolitan areas of Portland, Salem- Keizer, Corvallis, Eugene-Springfield, Medford-Ashland, Bend, Albany area, and Middle Rogue.

Mobility – The ability to move people and goods to destinations efficiently and reliably.

Mobility corridor – Mobility corridors represent subareas of the region and include all regional transportation facilities within the subarea as well as the land uses served by the regional transportation system. This includes freeways and highways and parallel networks of arterial streets, regional bicycle parkways, high capacity transit, and frequent bus routes. The function of this network of integrated transportation corridors is metropolitan mobility – moving people and goods between different parts of the region and, in some corridors, connecting the region with the rest of the state and beyond. This framework emphasizes the integration of land use and transportation in determining regional system needs, functions, desired outcomes, performance measures, and investment strategies.

Mode – A type of transportation distinguished by means used (e.g., such as walking, bike, bus, single– or high–occupancy vehicle, bus, train, truck, air, marine).

Mode choice – The ability to choose one or more modes of transportation.

Multimodal – The movement of people or goods by more than one mode.

National Highway System (NHS) – Title 23 of the U.S. Code section 103 states that the purpose of the NHS is to provide an interconnected system of principal routes that serve major population centers, international border crossings, ports, airports, public transportation facilities, intermodal transportation facilities, major travel destinations, meet national defense requirements, and serve interstate and inter–regional travel. Facilities included in the NHS are of regional significance.

Network – Connected routes forming a cohesive system.

Objective – An intermediate, short–term desired outcome or result that is measurable and must be realized within the timeframe of the RTP plan period to reach a longer–term goal.

Off–peak hours – The hours outside of the highest motor vehicle traffic period, generally between 9 a.m. and 3 p.m. and between 6 p.m. and 7 a.m.

Oregon Transportation Commission – The Oregon Transportation Commission is a five–member governor–appointed government agency that manages the state highways and other transportation in the state of Oregon, in conjunction with the Oregon Department of Transportation.

Oregon Transportation Plan – The official statewide intermodal transportation plan that is developed through the statewide transportation planning process by ODOT.

Passenger car equivalent – Passenger Car Equivalent (PCE) is a metric used in Transportation Engineering, to assess traffic–flow rate on a highway. A PCE is essentially the impact that a mode of transport has on traffic variables compared to a single car.

Passenger intermodal facilities – Facilities that accommodate or serve as transfer points to interconnect various transportation modes for the movement of people. Examples include Portland International Airport, Union Station, Oregon City Amtrak station and inter–city bus stations.

Passenger rail – Inter–city passenger rail is part of the state transportation system and extends from the Willamette Valley north to British Columbia. Amtrak already provides service south to California, east to the rest of the continental United States and north to Canada. It is a transit system that operates, in whole or part, on a fixed guide–way. These systems should be integrated with other transit services within the metropolitan region with connections at passenger intermodal facilities.

Passenger train – A railroad train for only passengers, rather than goods. Amtrak is the company that controls the railroads that carry passengers in the U.S.

Passenger vehicles – Motor vehicles with at least four wheels, used for the transport of passengers, and comprising no more than eight seats in addition to the driver's seat. Light commercial vehicles are motor vehicles with at least four wheels, used for the carriage of goods.

Peak period or hours – The period of the day during which the maximum amount of travel occurs. It may be specified as the morning (A.M.) or afternoon or evening (P.M.) peak. Peak periods in the Portland metropolitan region are currently generally defined as from 7–9 AM and 4–6 PM.

Pedestrian – A person traveling on foot, in a wheelchair or in another health–related mobility device.

Pedestrian facility – A facility provided for the benefit of pedestrian travel, including walkways, protected street crossings, crosswalks, plazas, signs, signals, pedestrian scale street lighting and benches.

Performance measures – Also called indicators. A measure of how well the transportation system is performing that is used to evaluate the success of the objective with quantitative or qualitative data and provide feedback in the plan's decision–making process. Some measures can be used to predict the future as part of an evaluation process using forecasted data, while other measures can be used to monitor changes based on actual empirical or observed data. In both cases, they can be applied at a system–level, corridor–level and/or project level, and provide the planning process with a basis for evaluating alternatives and making decisions on future transportation investments. They can also be used to monitor performance of the plan in between updates to evaluate the need for refinements to policies, investment strategies or other elements of the plan.

Person–Trip – Trip made by a person from one location to another, whether as a driver, bicyclist, passenger or pedestrian.

Principal arterial – These facilities form the backbone of the motor vehicle network. These routes connect over the longest distance and are spaced less frequently than other Arterials or Collectors. These facilities form the primary connections between the central city, regional centers, industrial areas and intermodal facilities, as well as between neighboring cities and the metro region. Principal arterials generally span several jurisdictions and often are designated to be of statewide importance and serve as major freight routes.

Project development – A phase in the transportation planning process during which a proposed project undergoes a more detailed analysis of the project's social, economic and environmental impacts and various project alternatives. After a project has successfully passed through this phase, it may move forward to right–of–way acquisition and construction phases. Project development activities include: Environmental Assessment (EA)/Environmental Impact Statement (EIS) work, Design Options Analysis (DOA), management plans, and transit Alternatives Analysis (AA).

Ramp meter or metering – A traffic signal used to regulate the flow of vehicles entering the freeway. Ramp meters smooth the merging process resulting in increased freeway speeds and reduced crashes. Ramp meters can be automatically adjusted based on traffic conditions

2040 Regional Centers – Compact, specifically–defined areas where higher density growth and a mix of intensive residential and commercial land uses exists or is planned. Regional centers are to be supported by an efficient, transit–oriented, multi–modal

transportation system. Examples include traditional centers, such as downtown Gresham, and new centers such as Gateway and Clackamas Town Center.

Regional Freight network – Applies the regional freight concept on the ground to identify the transportation networks and freight facilities that serve the region and state's freight mobility needs.

Regional Transportation Plan (RTP) – A long-range transportation plan for the metropolitan planning area covering a planning horizon of at least 20 years. Usually RTPs are updated every five years through the metropolitan transportation planning process. The plan identifies and analyzes transportation needs of the metropolitan region and creates a framework for project priorities.

Regional transportation system – The regional transportation system is identified on the regional transportation system maps in the Regional Transportation Plan. The system is limited to facilities of regional significance generally including regional arterials and throughways, high capacity transit and regional transit systems, regional multi–use trails with a transportation function, bicycle and pedestrian facilities that are located on or connect directly to other elements of the regional transportation system, air and marine terminals, as well as regional pipeline and rail systems.

Regionally Significant Industrial Area (RSIA) – 2040 land use designation; RSIAs are shown on Metro's 2040 map. Industrial activities and freight movement are prioritized in these areas.

Reliability – This term refers to consistency or dependability in travel times, as measured from day to day and/or across different times of day. Variability in travel times means travelers must plan extra time for a trip.

Reload facility – An intermediary facility where freight is reloaded from one land–based mode to another.

Roadway connectors – Roads that connect other freight facilities, industrial areas, and 2040 centers to a main roadway route.

Single–occupancy vehicle (SOV) – Motor vehicles occupied by the driver only.

Stakeholders – Individuals and organizations with an interest in or who are affected by the transportation planning process, including federal, state, regional and local officials and jurisdictions, institutions, community groups, transit operators, freight companies, shippers, non–governmental organizations, advocacy groups, the general public, and people who have traditionally been underrepresented.

State Highways – In Oregon, is a network of roads that are owned and maintained by the Highway Division of the Oregon Department of Transportation (ODOT), including Oregon's portion of the Interstate Highway System.

State Transportation Improvement Program – The funding and scheduling document for major street, highway and transit projects in Oregon for a four–year period. The document is produced by ODOT, consistent with the Oregon Transportation Plan (the statewide transportation plan) and planning processes as well as metropolitan transportation plans, MTIPs, and processes.

Street – A generally gravel or concrete– or asphalt–surfaced facility. The term collectively refers to arterial, collector and local streets that are located in 2040 mixed–use corridors, industrial areas, employment areas and neighborhoods. While the focus for streets has been on motor vehicle traffic, they are designed as multi–modal facilities that accommodate bicycles, pedestrians and transit, with an emphasis on vehicle mobility and special pedestrian infrastructure on transit streets.

Sustainable – A method of using a resource such that the resource is not depleted or permanently damaged.

Sustainability – Using, developing and protecting resources in a manner that enables people to meet current needs and provides that future generations can meet future needs, from the joint perspective of environmental, economic and community objectives. This definition of sustainability is from the 2006 Oregon Transportation Plan and ORS 184.421(4). The 2001 Oregon Sustainability Act and 2007 Oregon Business Plan maintain that these principles of sustainability can stimulate innovation, advance global competitiveness and improve quality of life in communities throughout the state.

System management – A set of strategies for increasing travel flow on existing facilities through improvements such as ramp metering, traffic signal synchronization and access management.

Target – – A numerical goal or stated direction to be achieved for which quantifiable or directional targets may be set, assigning a value to what the RTP is trying to achieve. Targets are expressed in quantitative terms and provide an important measure of progress toward achieving different goals within a timeframe specified for it to be achieved.

Throughways – Limited–access facilities that serve longer–distance motor vehicle and freight trips, providing for interstate, intrastate and cross–regional travel. Throughways are classified as a principal arterial and connect major activity centers within the region to one another and to destinations outside the region.

Traffic – Movement of motorized vehicles, non–motorized vehicles and pedestrians on transportation facilities. Often traffic levels are expressed as the number of units moving over or through a particular location during a specific time period.

Traffic incident management – Planned and coordinated processes followed by state and local agencies to detect, respond to, and remove traffic incidents quickly and safely in order to keep highways flowing efficiently.

Traffic management – Strategies that improve transportation system operations and efficiency, including ramp metering, active traffic management, traffic signal coordination and real-time traveler information regarding traffic conditions, incidents, delays, travel times, alternate routes, weather conditions, construction, or special events.

Traffic signal progression – A process by which a number of traffic signals are synchronized to create the efficient progression of vehicles.

Transportation demand – The quantity of transportation services desired by users of the transportation system.

Transportation demand management (TDM) – The application of a set of strategies that affect when, where and how much people travel in order to make more efficient use of transportation infrastructure and services. Strategies include offering other modes of travel such as walking, bicycling, ride–sharing and vanpool programs, car sharing, education such as individualized marketing, policies, regulations and other combinations of incentives and disincentives that are intended to reduce drive alone vehicle trips on the transportation network.

Transportation Improvement Program (TIP) – The 4–year, specific multimodal program of regional transportation improvements for highways, transit and other travel modes. The TIP consists of projects drawn from the Regional Transportation Plan financially constrained system as well as local plans and programs.

Transportation system – Various transportation modes or facilities (aviation, bicycle and pedestrian, throughway, street, pipeline, transit, rail, water transport) serving as a single unit or system.

Transportation system management (TSM) – A set of strategies for increasing travel flow on existing facilities through improvements such as ramp metering, traffic signal synchronization, incident response and access management.

Transportation system plan (TSP) – The transportation element of the comprehensive plan for one or more transportation facilities that is planned, developed, operated and maintained in a coordinated manner to supply continuity of movement between modes, and between geographic and jurisdictional areas. The TSP supports the development patterns and land uses contained in adopted community plans. The TSP includes a comprehensive analysis and identification of transportation needs associated with adopted land use plans. The TSP complies with Oregon's Transportation Planning Rule, as described in statewide Planning Goal 12.

Travel time – The measure of time that it takes to reach another place in the region from a given point for a given mode of transportation. Stable travel times are a sign of an efficient transportation system that reliably moves people and goods through the region.

Travel time reliability – This term refers to consistency or dependability in travel times, as measured from day to day and/or across different times of day. Variability in travel times means travelers must plan extra time for a trip.

Trip – A one–way movement of a person or vehicle between two points. A person who leaves home on one vehicle, transfers to a second vehicle to arrive at a destination, leaves the destination on a third vehicle and has to transfer to yet another vehicle to complete the journey home has made four unlinked passenger trips.

Truck terminal – A facility that serves as a primary gateway for commodities entering or leaving the metropolitan area by road.

Urban Growth Boundary – The politically defined boundary around an urban area beyond which no urban improvements may occur. In Oregon, UGBs are defined so as to accommodate projected population and employment growth within a 20–year planning horizon. A formal process has been established for periodically reviewing and updating the UGB so that it meets forecasted population and employment growth.

Volume– to–capacity (v/c) ratio – This is a measure of potential roadway capacity. A ratio expressing the relationship between the existing or anticipated volume of traffic on a roadway and the designed capacity of the facility. V/C standards set ratios as a minimum operating standard. Deficiencies can be addressed by lowering traffic volumes through demand management, transit, etc. or by increasing capacity through access management, signal timing, adding lanes, etc., or a combination of methods.

Vehicle Miles Traveled (VMT) – A measurement of the total miles traveled by all vehicles for a specified time period. For purposes of this definition, "vehicles" include automobiles, light trucks, and other similar vehicles used for the movement of people. The definition does not include buses, heavy trucks and trips that involve commercial movement of goods. For regional planning purposes, VMT generally includes trips with an origin and a destination within the MPA boundary and excludes pass through trips (i.e., trips with a beginning and end point outside of the MPA) and external trips (i.e., trips with a beginning or end point outside of the MPA boundary). VMT is often estimated prospectively through the use of metropolitan area transportation models.

APPENDIX A

2018 REGIONAL TRANSPORTATION PLAN FREIGHT PRIORITIES PROJECT LIST

Public Review Draft RTP Freight Projects and Programs

Projects are listed alphabetically by County and nominating agency.

Metro

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Active Transportation	Washington County	Hillsboro	Hillsboro	11145	Airport Rd Bike/Ped Gaps	Brookwood Pkwy	48th Ave	Complete missing bike lanes and sidewalk	$ 1,594,500	2028-2040	No	Build complete street
Active Transportation	Washington County	Wilsonville	Washington County	11798	Elligsen Road Urban Upgrade	Parkway Center Drive	65th	Reconstruct street to 3 lanes with buffered bike lanes and sidewalks (TSP project UU-P3). The project will install sidewalks and bike lanes to remove bikes and pedestrians from vehicle travel lanes. The project has had two serious crashes.	$ 6,000,000	2028-2040	No	Build complete street
Freight	Clackamas County	Milwaukie	Milwaukie	11624	Local Street Improvements in Tacoma Station Area	Location-specific	Location-specific	Construct street improvements on Stubb St, Beta St, Ochoco St, Hanna Harvester Dr, and Mailwell Dr. (TSAP) Street improvements will improve connectivity to equity priority areas.	$ 5,600,000	2028-2040	No	Improve freight access to indust & intermodal fac
Freight	Clackamas County	Wilsonville	Wilsonville	11764	Boones Ferry Road Extension	Commerce Circle	Ridder Road	Construct 3-lane section with bike lanes and sidewalk	$ 2,100,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Gresham	Gresham	10445	181st @ Glisan: Intersection Improvements	181st/Glisan	181st/Glisan	Optimize intersection w/signal upgrades and turn radii improvements.	$ 1,107,505	2018-2027	Yes	Relieve current congestion
Freight	Multnomah County	Gresham	Gresham	10446	181st @ Burnside: Optimize Intersection, Improve Transit Design	181st/Burnside	181st/Burnside	Optimize intersection operation. Transit/Enhanced Transit Corridor supportive project.	$ 1,000,000	2018-2027	Yes	Improve system efficiency
Freight	Multnomah County	Gresham	Gresham	10495	181st @ Halsey: Improve Intersection w/Turn Lanes	Halsey St.	Halsey St.	add 2nd LT lane to N & S legs, add RT lane to EB WB SB.	$ 1,089,615	2018-2027	Yes	Relieve current congestion
Freight	Multnomah County	Gresham	Gresham	10496	181st @ I-84: Study Freight Mobility and Transit Design Improvements	181st/I-84	181st/I-84	Freight mobility improvements subject to refinement study. Transit/Enhanced Transit Corridor supportive project.	$ 1,000,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Multnomah County	Multnomah County	11600	Marine Drive at 223rd	Marine Drive at 223rd	Marine Drive at 223rd	Widen to accommodate freight traffic and provide bike/ped facilities	$ 10,630,000	2028-2040	No	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	Port of Portland	10363	SW Quad Access	NE 33rd Ave.	SW Quad	Provide street access from 33rd Ave. into SW Quad.	$ 6,290,303	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	Portland	10379	Marine Dr. Improvement Phase 2	BNSF grade crossing on Marine Drive	BNSF grade crossing on Marine Drive	Construct rail overcrossing on Marine Dr.	$ 14,503,785	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	Port of Portland	11208	T4 Modernization	Terminal 4		Renovate operation areas at T4 to create intermodal processing areas. Rail spur relocation and expansion, grain elevator demolition, wharf removal	$ 15,845,078	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	BNSF	11357	Terminal 6 Rail Support Yard Improvements	Terminal 6	Terminal 6	Increase Terminal 6 rail capacity.	$ 10,630,000	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	Portland	11659	Rivergate Blvd. Overcrossing	N. Lombard	Time Oil Road	Relieve a congestion point in Rivergate Industrial Area, improve rail access to Terminal 5.	$ 22,263,790	2018-2027	Yes	Relieve current congestion

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Freight	Multnomah County	Port of Portland	Troutdale	11743	Troutdale Airport Master Plan Transportation Improvements	Sundial Road	Swigert Way/Graham Road	Implement transporation improvements developed as part of the Troutdale Airport Master Plan	$ 5,000,000	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	Port of Portland	11649	T2 Redevelopment	Terminal 2	Terminal 2	Construct rail, rail scale, and crane modernization.	$ 4,783,500	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	UPRR	11355	Barnes to Terminal 4 Rail	Terminal 4	Barnes Yard	Improve Rail Access to Terminal 4.	$ 4,543,000	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	UPRR	11651	T2 Track Reconfiguration and Siding	Terminal 2	Terminal 2	Construct rail loops and support siding.	$ 9,460,700	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	UPRR	11652	Bonneville Rail Yard Build Out	Bonneville Rail Yard	Bonneville Rail Yard	Construct two interior yard tracks at Bonneville Yard and complete the double track lead from the wye at the east end of the yard to UP Barnes Yard.	$ 3,826,800	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	UPRR	11653	Ramsey Yard Utilization	Columbia Slough	Bonneville Yard	Connect the existing set out track along the west side of the main lead with the industrial lead near the south end to provide a location to store a unit train.	$ 1,807,100	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	Port of Portland	11207	T6 Modernization	Terminal 6	Terminal 6	Provide improvements to container terminal including crane electronics and stormwater improvements.	$ 8,504,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	Port of Portland	11306	T6 Second Entrance from Marine Drive	N. Bybee Lake Rd.	N. Pacific Gateway	Construct 2nd entrance from Marine Drive and internal rail overcrossing to Terminal 6. i.	$ 12,756,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	BNSF	11353	West Hayden Island Rail Access	BNSF Rail Bridge	West Hayden Island	Advance rail-dependent development.	$ 3,189,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	Port of Portland	11354	West Hayden Island Rail Yard	West Hayden Island	West Hayden Island	Advance rail development on West Hayden Island.	$ 10,098,500	2028-2040	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	Port of Portland	11307	T6 Suttle Road entrance	Terminus of N. Suttle Road	Terminal 6	Access to the east end of Terminal 6 off the terminus of Suttle Road.	$ 3,189,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	Port of Portland	11654	Time Oil Road Reconstruction	Lombard	Rivergate Boulevard	Reconstruct Time Oil Road	$ 9,567,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	BNSF	11955	Railroad Bridge and Track Improvements	Columbia Slough Rail Bridge	Columbia River Rail Bridge	Improve rail track conditions on approaches to Willamette River and Columbia Rive bridges to increase railroad speed and capacity.	$ 10,751,000	2028-2040	No	Improve system efficiency
Freight	Multnomah County	Port of Portland	Port of Portland	11956	Rivergate Columbia Slough Rail Bridge	Terminal 6	Terminal 5	Construct a rail bridge across Columbia Slough to provide rail connection to South Rivergate from Terminal 6.	$ 10,840,000	2028-2040	No	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Port of Portland	UPRR	11953	Six mph Curves Railroad Improvements	Steel Bridge	Just north of Steel Bridge	Realign the curves just north of the Steel Bridge to improve rail speed and capacity.	$ 23,600,000	2028-2040	No	Improve system efficiency

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Freight	Multnomah County	Port of Portland	Portland	11309	Cully Blvd. Grade separation	Columbia	Lombard	Construct roadway overcrossing at NE Cully Blvd. over Kenton line.	$ 37,205,000	2028-2040	No	Improve system efficiency
Freight	Multnomah County	Port of Portland	BNSF	11949	North Portland Junction: Undoing the "X"	UPRR Peninsula Junction	North Portland Junction	Eliminate the at-grade crossing of UPRR and BNSF tracks at North Portland Junction.	$ 33,598,000	2028-2040	No	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Portland	Portland	10337	Marine Dr & 33rd Intersection Improvements	Marine Dr & 33rd Ave, NE	Marine Dr & 33rd Ave, NE	Signalize intersection to improve freight operations.	$ 1,000,000	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Portland	Portland	10375	Cathedral Park Quiet Zone	Cathedral Park UPRR Tracks, N	Cathedral Park UPRR Tracks, N	Address rail switching noise related to the Toyota operations at T-4 by improving multiple public rail crossings in the St. Johns Cathedral Park area.	$ 8,200,000	2018-2027	Yes	Improve system efficiency
Freight	Multnomah County	Portland	Portland	11570	Columbia/Alderwood Intersection Improvements	NE Columbia Blvd & Alderwood Rd	Columbia/Alderwood	Improve intersection and install traffic signal at Columbia & Alderwood.	$ 5,050,654	2018-2027	Yes	Improve system efficiency
Freight	Multnomah County	Portland	Portland	11800	Columbia Blvd Pedestrian Overpass Replacement	N Columbia Blvd west of N Midway Ave	N Columbia Blvd west of N Midway Ave	Replace the pedestrian overpass near George Middle School with either an at-grade crossing or a higher overpass to enable the use of Columbia Blvd as an over-dimensional freight route.	$ 3,000,000	2018-2027	Yes	Reduce fatal and severe injury crashes
Freight	Multnomah County	Portland	Portland	11841	Central Eastside Access and Circulation Improvements	Central Eastside	Central Eastside	Improve access and circulation in the Central Eastside by adding new signals and crossings at Hawthorne & Clay ramp, Salmon & Grand, Salmon & MLK, Washington & Grand, Washington & MLK, Ankeny & Sandy, 16th & Irving, and modifying signals at Stark & Grand, Clay & Grand, and Mill & MLK.	$ 5,205,879	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Portland	Portland	10218	Burgard-Lombard Street Improvements	N Burgard St & Columbia Blvd	Burgard Viaduct	Construct roadway improvements, including pedestrian and bicycle facilities.	$ 2,635,000	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Portland	Portland	10340	Cornfoot Rd Corridor Improvements	NE 47th Ave	NE Alderwood Rd	Improve roadway and intersections to improve freight operations. Construct a multi-use path on the north side of Cornfoot Rd to separate pedestrians and bicyclists from motor vehicle traffic. Install guardrails where needed.	$ 7,000,000	2018-2027	Yes	Improve freight access to indust & intermodal fac

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Freight	Multnomah County	Portland	Portland	11568	St. Johns Truck Strategy Phase II	Columbia	Lombard	Address pedestrian safety, bicycle safety and neighborhood livability impacts associated with cut-through truck traffic on N St Louis Ave and N Fessenden St. Construct pedestrian crossing safety and traffic calming improvements, such as curb extensions and median islands, as outlined in the St Johns Truck Strategy Phase II.	$ 4,000,000	2018-2027	Yes	Reduce fatal and severe injury crashes
Freight	Multnomah County	Portland	Portland	11799	Suttle Rd Freight Street Improvements	N Portland Rd	T6	Improve Suttle Rd to meet Freight District Street standards, separate rail and truck movements, provide pedestrian access to nearby bus line, and enable future T6 entrance Port project.	$ 9,000,000	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Portland	Portland	12004	Columbia Blvd Freight Improvements: Project Development	NE 60th Ave	NE 82nd Ave	Alternatives analysis and project development to identify preferred street and intersection modifications to improve freight reliability and access to industrial properties.	$ 1,000,000	2018-2027	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Portland	Portland	10331	Columbia Blvd / Railroad Bridge Replacement	N Columbia Blvd over BNSF railroad	N Columbia Blvd over BNSF railroad	Replace the existing fracture critical Columbia Blvd bridge (#078) over railroad tracks with a new structure, and perform seismic upgrades on parallel bridge (#078A).	$ 4,000,000	2028-2040	Yes	Keep system in good repair
Freight	Multnomah County	Portland	Portland	11801	Columbia Blvd Railroad Undercrossing Improvement	N Columbia Blvd at railroad bridge near I-5	N Columbia Blvd at railroad bridge near I-5	Lower the Columbia Blvd undercrossing at the UP Railroad Bridge just west of I-5 to enable the use of Columbia Blvd as an over-dimensional freight route.	$ 3,000,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Portland	ODOT	11802	N Portland Rd over Columbia Slough Bridge Replacement	N. Portland Rd at Columbia Slough	N. Portland Rd at Columbia Slough	Replace the weight-restricted N. Portland Road bridge over the Columbia Slough to enable the use of N. Portland Road as an over-dimensional freight route and include a connection for the Columbia Slough Trail.	$ 7,500,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Freight	Multnomah County	Portland	Portland	10376	Columbia Blvd Freight Improvements: Design/Construction	NE 60th Ave.	NE 82nd Ave.	Construct street and intersection modifications to improve freight reliability and access to industrial properties.	$ 14,000,000	2028-2040	Yes	Improve system efficiency
Freight	Multnomah County	Portland	Portland	11871	Going/Greeley Interchange Improvements	N Going/Greeley	N Going/Greeley	Redesign Going/Greeley interchange including climbing lane on Going to improve truck movement between Swan Island, Lower Albina, and I-5.	$ 16,750,000	2028-2040	No	Improve freight access to indust & intermodal fac

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Freight	Washington County	Wilsonville	Washington Co.	10588	Grahams Ferry Road Improvements	Day Road	Washington/ Clackamas County line	Widen Grahams Ferry Road to 3 lanes, add bike/pedestrian connections to regional trail system and fix (project development only) undersized railroad overcrossing.	$ 13,200,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Roads and Bridges	Clackamas County	Clackamas County	Clackamas County	11514	82nd Drive/Strawberry Lane Intersection	82nd Dr/Strawberry Lane intersection	N/A	Improve safety at a key intersection on a high crash corridor by implementing proven safety counter measures, installing a traffic signal and turn lanes on eastbound and northbound approaches, improve ADA accessibility as necessary.	$ 1,520,870	2028-2040	Yes	Reduce fatal and severe injury crashes
Roads and Bridges	Clackamas County	Clackamas County	Clackamas County	10002	Johnson Creek Blvd. Improvements	55th Ave	82nd Ave.	Implement proven safety counter measures and widen to 3 lanes with bikeways and pedestrian facilities from 55th Ave to 82nd Ave to improve safety, improving freight access to industrial area and increasing accessibility for historically marginalized communities.	$ 14,237,510	2028-2040	Yes	Reduce fatal and severe injury crashes
Roads and Bridges	Clackamas County	Clackamas County	Clackamas County	10023	82nd Dr. Improvements	Hwy 212	Strawberry Lane Intersection	Improve safety by implementing proven safety counter measures on known high crash corridor, widening to a consistent 4 lane cross section and include bike/ped improvement and ADA accessibility improvements as necessary. Not including intersection improvements at Strawberry Lane.	$ 18,521,712	2028-2040	No	Reduce fatal and severe injury crashes
Roads and Bridges	Clackamas County	Happy Valley	Clackamas County	10033	172nd Ave & 190th Connector (Phase 1 - Design)	Clatsop	Sunnyside Rd.	Phase 1 design work to widen 172nd to 5 lanes; construct connector between 172nd and 190th Ave using adopted alignment; project includes bike lanes, sidewalks and continuous left turn lane; last connector in n/s freight route alternative to I-205 between I-84 and Hwy-212.	$ 4,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Clackamas County	Happy Valley	Clackamas County	10041	162nd Ave. Extension South Phase 1	Rock Creek Blvd.	Hwy. 212	Extend 162nd Ave from Rock Creek Blvd to Hwy-212; construct new, 3 lane roadway with continuous left turn lane, sidewalks, bike lanes, intersection improvements at Hwy. 212/162nd on all four approaches. Project terminates at industrial employment sector. In addition, will improve safety on on a High Injury Corridor.	$ 5,315,000	2018-2027	Yes	Relieve current congestion

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Roads and Bridges	Clackamas County	Happy Valley	Happy Valley	11135	Rock Creek Blvd. improvements	Hwy. 212/224 (planned Sunrise Corridor Rock Creek Interchange)	177th Ave.	Construct new 5 lane road from Sunrise Corridor Rock Creek interchange to 162nd Ave; Widen existing alignment of Rock Creek Blvd to five lanes from 162nd to 177th Ave. Facility improvements include continuous left turn lane, sidewalks, bike lanes and traffic signals. In addition, will improve safety on on a High Injury Corridor.	$ 23,673,010	2018-2027	Yes	Improve freight access to indust & intermodal fac
Roads and Bridges	Clackamas County	Milwaukie	Milwaukie	10000	Linwood/Harmony Rd./ Lake Rd. Intersection	Railroad Ave / Linwood Ave / Harmony Rd Intersection	Railroad Ave / Linwood Ave / Harmony Rd Intersection	Railroad crossing and intersection improvements based on further study of intersection operations including bikeways and pedestrian facilities to be undertake jointly by the City of Milwaukie and the County	$ 21,300,000	2028-2040	Yes	Relieve current congestion
Roads and Bridges	Clackamas County	Milwaukie	ODOT	11537	Group 4--Pedestrian Improvements at Hwy 224	Harrison St	Freeman Way	Intersection Improvements at Hwy 224 and 37th Ave = Consolidate the two northern legs of 37th Ave and International Way into one leg at Hwy 224. Intersection Improvements at Hwy 224 and Oak St = Add left-turn lanes and protected signal phasing on Oak St approaches. Study of Pedestrian Crossings on Hwy 224 = Examine alternatives for improving pedestrian crossings at five intersections along Hwy 224 (Harrison St, Monroe St, Oak St, 37th Ave, Freeman Way). Intersection Improvements at Hwy 224 and Oak St = Improve	$ 3,100,000	2028-2040	Yes	Relieve current congestion

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Roads and Bridges	Clackamas County	Milwaukie	ODOT	11623	Group 11--Intersection Improvements in North Industrial Area	Ochoco St	Harrison St	Signage and Intersection Improvements at McLoughlin Blvd and Ochoco St = Establish signage for trucks and improve intersection. (TSAP) Intersection Improvements at McLoughlin Blvd and 17th Ave = Prohibit left-turn movement from 17th Ave to northbound McLoughlin Blvd and include in Hwy 224 & Hwy 99E Refinement Plan. Intersection Improvements at Main St and Mailwell Dr = Upgrade intersection turning radii to better accommodate freight movements. Projects will improve freight mobility in an equity priority	$ 2,300,000	2028-2040	No	Relieve current congestion
Roads and Bridges	Clackamas County	Oregon City	ODOT	11891	OR 99E & I-205 NB Interchange Access	I-205 SB Ramp Terminus	I-205 NB Ramp Terminus	Dual left turn lanes on 99E approach to NB I-205 ramp, ramp widening to accomodate approach, dual left turn lanes from off-ramp on to Hwy 99E SB, signal modifications. (Closely related to TSP D75, D76 but not actually these projects)	$ 2,650,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Clackamas County	Oregon City	ODOT	10144	Hwy 99E & I-205 SB Interchange Access	Dunes Drive	I-205 SB Ramp Terminus	Dual left turn lanes on 99E approach to SB I-205 ramp, ramp widening to accommodate approach. (Closely related to TSP D75, D76 but not actually these projects)	$ 2,650,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Clackamas County	Oregon City	Oregon City	11544	Meyers Road Extension (West)	OR 213	High School Avenue	Construct new 3 lane roadway, sidewalks, buffered bike lanes, WB right turn lane and center turn lanes to serve adjacent Clackamas Community College & underdeveloped industrial properties. (TSP D46)	$ 4,500,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Clackamas County	Oregon City	ODOT	10119	OR 213 & Redland, Phase 2	Redland Road	Redland Road Undercrossing	Add third through lane in both northbound & southbound directions. This is Phase 2 of the completed Jughandle Project. (TSP D79)	$ 9,800,000	2028-2040	Yes	Relieve current congestion
Roads and Bridges	Clackamas County	Oregon City	ODOT	10140	OR 213 Widening	Clackamas Community College	Conway Drive	Add one Southbound through lane and one Northbound through lane, bike lanes, and sidewalks. (TSP D77, W31)	$ 5,200,000	2028-2040	Yes	Relieve current congestion
Roads and Bridges	Multnomah County	Gresham	Gresham	10473	223rd @ Stark: Add Turn Lanes	223rd at Stark	223rd at Stark	Add EB and NB RT lanes and 2nd NB and SB LT lanes.	$ 5,500,000	2018-2027	Yes	Relieve current congestion

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Roads and Bridges	Multnomah County	Gresham	Gresham	10511	Hogan @ Stark: Add Turn Lanes	Stark	Stark	Add right turn lanes on all approaches and second northbound and southbound left turns.	$ 3,500,000	2018-2027	Yes	Relieve future congestion
Roads and Bridges	Multnomah County	Gresham	Gresham	10443	Sandy - 181st to 202nd: Multimodal Improvements	181st Ave.	202nd	Widens Sandy Blvd. to 5 lanes and adds new sidewalk, multi-use path, bike lanes from 181st to 202nd Ave.	$ 5,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Multnomah County	Gresham	Gresham	10454	181st - Glisan to Yamhill: Complete Buildout w/Boulevard Design	Glisan	Yamhill	Complete boulevard design improvements.	$ 12,160,785	2018-2027	Yes	Build complete street
Roads and Bridges	Multnomah County	Gresham	Gresham	10512	Hogan - Powell to Burnside: Boulevard Design + Intersection Improvements	Powell	Burnside	Improve to boulevard standards with center median, planter strip, and new sidewalk. Intersection improvements at Burnside and Powell. Multi-use path on west side from Wy'East Way path end to Powell Blvd. Bike lane east side between Powell and Burnside.	$ 9,289,906	2018-2027	Yes	Build complete street
Roads and Bridges	Multnomah County	Gresham	Gresham	10533	190th - 30th to Cheldelin: Complete Buildout	30th	Cheldelin	Improve existing road to major arterial standards, signalize 190th @ Giese, Butler, Richey, Cheldelin.	$ 30,448,832	2018-2027	Yes	Serve new urban area
Roads and Bridges	Multnomah County	Gresham	Gresham	11682	181st - Stark to I-84: Rockwood Safety Corridor (Enhance Safety)	I-84	Stark	Safety corridor: 181st/Rockwood {I-84 - Stark}	$ 2,019,700	2018-2027	Yes	Reduce fatal and severe injury crashes
Roads and Bridges	Multnomah County	Gresham	Gresham	10497	181st @ Stark and Sandy Intersections: Add Turn Lanes	Sandy	Stark	At Sandy: Northbound right turn, 2nd westbound left turn. Overlap eastbound right turn. At Stark, add 2nd left turn lane on east and west legs.	$ 2,003,107	2028-2040	Yes	Improve system efficiency
Roads and Bridges	Multnomah County	Gresham	Gresham	10498	182nd - Powell and Division Intersections: Add Turn Lanes and Transit Supportive Design	181st at Division	181st at Powell	At Division: add second westbound left turn lane (TIF P1). At Powell, add northbound and southbound double left turn lanes (TIF P2 and TSP8).At Powell add SB and NB lanes. Transit/Enhanced Transit Corridor supportive project.	$ 1,788,678	2028-2040	Yes	Relieve current congestion
Roads and Bridges	Multnomah County	Gresham	Gresham	10503	Burnside @ Powell: Eliminate Turn Lanes	Powell	Powell	At Powell: eliminate EB and WB left turn lanes.	$ 1,000,000	2028-2040	Yes	Improve system efficiency
Roads and Bridges	Multnomah County	Gresham	Gresham	11687	Powell @ Eastman: Left Turn Lane Addition	Powell at Eastman	Powell at Eastman	Powell and Eastman {add an additional southbound left turn}	$ 1,000,000	2028-2040	Yes	Relieve current congestion
Roads and Bridges	Multnomah County	Gresham	Gresham	10417	Hogan - Palmquist to Rugg: Complete Buildout (to arterial standards)	Palmquist	Rugg Rd.	Complete project development and construct new principal arterial connection with multi-use path.	$ 36,152,117	2028-2040	Yes	Serve new urban area
Roads and Bridges	Multnomah County	Gresham	Gresham	10431	190th/Highland - 11th to 30th: Complete Buildout	200' south of SW 11th	30th	Reconstruct and widen street to five lanes with sidewalks and bike lanes. Widen and determine the appropriate cross-section for Highland Drive and Pleasant View Drive from Powell Boulevard to 190th Ave.	$ 20,884,252	2028-2040	Yes	Build complete street

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Roads and Bridges	Multnomah County	Gresham	Gresham	10527	Hogan - Powell to Palmquist: Complete Buildout	Powell	Palmquist	Improve to arterial standards.	$ 13,228,630	2028-2040	Yes	Build complete street
Roads and Bridges	Multnomah County	Gresham	Gresham	10416	Hogan - Stark to Burnside: Complete Buildout (Initial Phase)	Stark	Burnside	Interim capacity improvements and access controls.	$ 20,346,310	2028-2040	No	Improve system efficiency
Roads and Bridges	Multnomah County	Gresham	Gresham	10430	Orient - South City limits to Kane Dr: Complete Buildout	South City Limits	Kane Dr	Upgrades to arterial 4 lane standards.	$ 9,567,000	2028-2040	No	Build complete street
Roads and Bridges	Multnomah County	Gresham	Gresham	10434	Burnside - 212th to Hogan: Complete Boulevard Design	Wallula	Hogan	Complete boulevard design improvements on Burnside from Wallula/212 to Hogan. Improve intersection of Burnside at Division by adding eastbound RT and signal, and also improve the intersection of Burnside and Hogan.	$ 34,595,974	2028-2040	No	Build complete street
Roads and Bridges	Multnomah County	Gresham	Gresham	10493	181st - I-84 to Sandy: Widening (New SB Lane, Widen RR Crossing)	Sandy	I-84	Add southbound aux lane & widen RR overcrossing.	$ 1,000,000	2028-2040	No	Relieve current congestion
Roads and Bridges	Multnomah County	Multnomah County	Multnomah County	10399	Reconstruct Sandy Blvd.	201st Ave.	230th	Reconstruct Sandy Blvd to minor arterial standards with bike lanes, sidewalks and drainage improvements, utilizing recommendations from TGM grant. Addition of bike lanes and sidewalks will improve safety of this area and reduce conflict among modes. To address safety and reduce crashes the project will use proven safety countermeasures	$ 7,906,594	2018-2027	Yes	Improve system efficiency
Roads and Bridges	Multnomah County	Multnomah County	Multnomah County	11373	NE 238th Drive Freight and Multimodal Improvements	Halsey St.	Glisan St	Construct southbound travel lanes with passing lane and northbound travel lane. Add bike and pedestrian facilities on both northbound and southbound sides; to address safety and reduce crashes the project will use proven safety countermeasures.	$ 9,567,000	2018-2027	Yes	Improve freight access to indust & intermodal fac

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Roads and Bridges	Multnomah County	Multnomah County	Multnomah County	10386	Glisan St. Multi-modal Improvements	202nd Ave./Gresham-Fairview Trail	207th Ave./Salish Ponds Natural Area	Reconstruct Glisan Street to provide multimodal connection between Gresham-Fairview Trail and Salish Ponds Natural Area. Include bike lanes, sidewalks, two travel lanes in each direction, and on-street parking. 4 lanes. Design green-street treatment for drainage improvements, including Fairview Creek culvert replacement. South side of Glisan St is in Gresham, north is City of Fairview. To address safety and reduce crashes the project will use proven safety countermeasures	$ 12,224,500	2028-2040	Yes	Build complete street
Roads and Bridges	Multnomah County	Multnomah County	Multnomah County	10401	Reconstruct Marine Dr.	Interlachen	I-84	Reconstruct Marine Drive between Intelachen and the frontage roads in Troutdale.	$ 14,882,000	2028-2040	Yes	Improve system efficiency
Roads and Bridges	Multnomah County	Port of Portland	Portland	11951	Columbia Boulevard Rail Overcrossing	Columbia Boulevard at Penn Junction	Columbia Boulevard at Penn Junction	Grade separate Columbia Blvd. at Penn Junction to eliminate three at-grade crossings.	$ 28,935,000	2028-2040	No	Relieve future congestion
Roads and Bridges	Multnomah County	Portland	Portland	10336	Columbia & Cully Intersection Improvements	NE Cully Blvd & Columbia Blvd	NE Cully Blvd & Columbia Blvd	Reconstruct intersection to provide signalization, left turn pockets, enhancing turning radii and improving circulation for trucks serving expanding air cargo facilities south of Portland.	$ 5,000,000	2018-2027	Yes	Improve freight access to indust & intermodal fac
Roads and Bridges	Multnomah County	Portland	Portland	10335	NE 42nd/47th Ave Bridge & Corridor Improvements	NE Killingsworth St	NE Columbia Blvd	Replace the weight-restricted NE 42nd Ave Bridge (#075) over NE Portland Hwy and the adjacent railway, and add pedestrian and bicycle facilities to the bridge and the roadway from Killingsworth to Columbia. This project will remove the weight restriction, improve vertical clearance for over-dimensional freight, and provide pedestrian and bicycle facilities.	$ 12,000,000	2018-2027	Yes	Keep system in good repair
Roads and Bridges	Multnomah County	Portland	Portland	11807	NE 33rd Ave Bridge Replacement	33rd Ave, NE (over railroad tracks and Columbia Blvd)	33rd Ave, NE (over railroad tracks and Columbia Blvd)	Replace the existing seismically vulnerable 33rd Ave bridge (#009) over railroad tracks and provide pedestrian and bicycle facilities on the new structure. Improve and signalize the intersection of 33rd & Columbia, and remove the seismically vulnerable, fracture critical ramp over Columbia (#009A). Project design will consider freight movement needs, consistent with policies, street classification(s) and uses.	$ 9,200,433	2028-2040	Yes	Keep system in good repair

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Roads and Bridges	Multnomah County	Portland	Portland	10242	Interstate-Larrabee Overpass	N Interstate/Larrabee Bridge	N Interstate/Larrabee Bridge	Remove the existing weight-restricted, low-clearance, poor-condition Interstate to Larrabee southbound flyover ramp (Bridge #153) and replace with a new overpass including a multi-use path to connect the future N Portland Greenway Trail to the Broadway Bridge. Assess the costs and benefits of providing vehicle access on the new structure as part of project development.	$ 5,000,000	2028-2040	Yes	Keep system in good repair
Roads and Bridges	Multnomah County	Portland	Portland	10237	Southern Triangle Access Improvements	Powell (12th/Ross Island Bridge)	Hawthorne Bridge (railroad mainline)	Improve vehicle access to the Southern Triangle district from eastbound Powell Blvd, and improve vehicle access from CEID to westbound Powell and southbound I-5.	$ 4,000,000	2028-2040	Yes	Increase access to jobs
Roads and Bridges	Multnomah County	Portland	Portland	11793	SE Yamhill /Taylor Couplet	SE Water	SE Grand	Improve traffic safety and capacity by converting Yamhill and Taylor to couplet operation between Water and Grand Ave, including new traffic signals at Yamhill / MLK, Yamhill / Grand, and Taylor / Water. As part of the project, reconfigure the ramp from Belmont viaduct to MLK.	$ 3,000,000	2028-2040	Yes	Reduce fatal and severe injury crashes
Roads and Bridges	Multnomah County	Portland	ODOT	10235	Ross Island Bridgehead Improvements	SW Naito Parkway	SW Barbur	Reconstruct Naito Pkwy as two-lane road w/bike lanes, sidewalks, left turn pockets, & on-street parking. Includes realignment/regrading at intersecting streets; removal of Barbur tunnel, Ross Is Br ramps, Arthur/Kelly viaduct & Grover ped bridge. This project will be coordinated with ODOT and with the Southwest Corridor Project, and will consider impacts to ODOT facilities including Naito Parkway and the Ross Island Bridge.	$ 69,000,000	2028-2040	Yes	Improve system efficiency
Roads and Bridges	Multnomah County	Portland	UPRR	10334	11th/13th Ave Rail Overcrossing	NE 11th Ave & NE Lombard Pl	NE 11th Ave & NE Lombard Pl	Construct roadway overcrossing at NE 11th/13th over Kenton line.	$ 35,000,000	2028-2040	No	Improve system efficiency

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Roads and Bridges	Multnomah County	Portland	BNSF	11117	Willbridge Industrial Area Rail Overcrossing	NW Balboa	NW St Helens Rd	Provide an alternative crossing of the BNSF Railroad to improve connectivity and safety between US 30 and the industrial properties served by NW Front Avenue in the Willbridge area of the NW Industrial District.	$ 23,113,022	2028-2040	No	Improve system efficiency
Roads and Bridges	Washington County	Cornelius	Cornelius	10802	29th Avenue Traffic Signals and Crossing Gates	TV Hwy (OR 8)	S. Alpine St.	Install traffic signals at intersection of Hwy 8 and 29th Avenue and install crossing gates and signals at S. 29th railroad crossing between Baseline and Alpine Streets.	$ 2,000,000	2018-2027	Yes	Serve new urban area
Roads and Bridges	Washington County	Cornelius	Forest Grove	10795	Holladay Street Extension - West	4th Ave	Yew St.	Construct new collector.	$ 2,657,500	2028-2040	Yes	Improve freight access to indust & intermodal fac
Roads and Bridges	Washington County	Cornelius	Cornelius	10798	Davis Street Extension - West	4th Ave	7th Ave	Construct new collector.	$ 4,130,629	2028-2040	No	Improve system efficiency
Roads and Bridges	Washington County	Forest Grove	ODOT	11661	OR 47/ Martin Road Intersection Improvements	OR 47	Martin Road	Construct improvement (e.g. roundabout) at Highway 47 intersection with Holladay Street extension, Martin Road and 23rd Avenue extension.	$ 5,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Washington County	Forest Grove	ODOT	11950	OR 47 at Purdin Road/Verboort Road Intersection Roundabout Improvement	Highway 47	Purdin Road/Verboort Road	Add a northbound right turn slip lane on the south leg of the roundabout and a southbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection.	$ 4,000,000	2028-2040	Yes	Serve new urban area
Roads and Bridges	Washington County	Forest Grove	ODOT	10774	23rd Avenue Extension	OR HWY 47	24th Avenue	Intersection improvement with connections to Martin Road intersection improvement.	$ 4,000,000	2028-2040	Yes	Increase access to jobs
Roads and Bridges	Washington County	Forest Grove	ODOT	10780	OR 47/ Pacific Avenue Intersection Improvements	OR 47	OR 8	Construct intersection improvement to add a west-bound left turn lane and an eastbound right turn lane.	$ 4,000,000	2028-2040	Yes	Relieve future congestion
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11169	Cornell Rd & 25th Ave Intersection Improvements	N/A	N/A	Widen 25th Ave to provide double southbound left-turn lanes and second northbound through lane	$ 6,378,000	2018-2027	Yes	Reduce minor or non-injury crashes
Roads and Bridges	Washington County	Hillsboro	Washington County	10553	209th Ave Widening and Improvements, Phase 1	TV Hwy	Kinnaman Rd	Widen roadway from two/three lanes to five lanes; improve from rural to urban standard with bike facilities and sidewalks; improve intersections and railroad crossing; new signals at Blanton and Kinnaman; project to serve South Hillsboro UGB area	$ 22,327,000	2018-2027	Yes	Serve new urban area

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Roads and Bridges	Washington County	Hillsboro	Washington County	11170	Cornell Rd & Brookwood Pkwy and Cornell & 48th Ave Intersection Improvements	N/A	N/A	Widen Cornell to provide double left-turn lanes in both eastbound and westbound at Brookwood intersection; and double eastbound left-turn lanes at 48th	$ 4,704,000	2018-2027	Yes	Reduce fatal and severe injury crashes
Roads and Bridges	Washington County	Hillsboro	Washington County	11284	Farmington Rd Widening and Bike/Ped Improvements, Phase 1	185th Ave	198th Ave	Widen roadway from two to five lanes with bike/ped facilities	$ 8,000,000	2018-2027	Yes	Reduce minor or non-injury crashes
Roads and Bridges	Washington County	Hillsboro	Hillsboro	10821	Huffman St Extension, Phase 1	Brookwood Pkwy	Sewell Rd	Construct five-lane road with bike/ped facilites	$ 8,387,070	2018-2027	Yes	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Hillsboro	10822	Starr Blvd Reconstruction and Improvements, Phase 1	Evergreen Rd	Huffman St (future extension)	Construct three-lane road with bike/ped facilities	$ 5,315,000	2018-2027	Yes	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11147	Schaaf Rd Reconstruction	Helvetia Rd	New north-south collector	Reconstruct rural gravel road to three-lane roadway with bike/ped facilities	$ 4,252,000	2018-2027	Yes	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11364	Starr Blvd Reconstruction and Improvements, Phase 2	Huffman St (future extension)	Meek Rd	Construct three-lane road with bike/ped facilities	$ 4,252,000	2018-2027	Yes	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11383	New North-South Collector (North Hillsboro)	Jacobsen Rd	Schaaf Rd	Construct three-lane roadway with bike/ped facilities	$ 2,657,500	2018-2027	Yes	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11890	Huffman St Extension, Phase 2	Sewell Rd	Jackson School Rd	Construct five-lane road with bike/ped facilites	$ 6,500,000	2018-2027	Yes	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Washington Co.	10836	Evergreen Rd Widening and Bike/Ped Improvements	Glencoe Rd	15th Ave	Widen roadway from three to five lanes, complete missing sidewalks, and upgrade to buffered bike lanes	$ 5,782,720	2028-2040	Yes	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Washington County	11285	Farmington Rd Widening and Bike/Ped Improvements, Phase 2	198th Ave	209th Ave	Widen roadway to five lanes with bike/ped facilities; new signal at 209th Ave	$ 7,000,000	2028-2040	Yes	Reduce minor or non-injury crashes
Roads and Bridges	Washington County	Hillsboro	Hillsboro	10831	Century Blvd Extension and Over-Crossing (North Hillsboro)	Bennett St	Wagon Wy	Construct three-lane road including US 26 overpass with bike/ped facilites; connect existing segments to provide new north-south connectivity	$ 13,733,960	2028-2040	Yes	Relieve future congestion
Roads and Bridges	Washington County	Hillsboro	Washington Co.	11140	Brookwood Pkwy Widening	Ihly Wy	Cornell Rd	Widen roadway to five lanes (two through lanes in each direction with left-turn lane at intersections) with bike/ped facilities	$ 9,567,000	2028-2040	Yes	Relieve future congestion
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11387	Meek Rd Improvements, Phase 1	Sewell Rd	Starr Blvd	Widen and improve roadway to three lanes with bike/ped facilities	$ 6,909,500	2028-2040	Yes	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11388	30th Ave Construction	Evergreen Rd	Meek Rd	Construct three-lane industrial collector with bike/ped facilities	$ 10,500,000	2028-2040	Yes	Serve new urban area

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Roads and Bridges	Washington County	Hillsboro	Hillsboro	11905	25th Ave Turn Lanes and Bike/Ped Improvements	Cornell Rd	Griffin Oaks St	Widen roadway from two to three lanes (one through lane in each direction and center turn lane) with bike/ped facilities	$ 4,000,000	2028-2040	Yes	Reduce minor or non-injury crashes
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11906	25th Ave Extension	Evergreen Rd	Huffman St	Construct three-lane roadway with bike/ped facilities; realign intersection at Evergreen to avoid airport clear zone	$ 4,000,000	2028-2040	Yes	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Washington County	11907	Jackson School Rd Improvements	Evergreen Rd	Storey Creek (UGB)	Improve roadway from rural to urban standard and widen to three lanes with bike/ped facilities	$ 11,400,000	2028-2040	Yes	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11910	Meek Rd Improvements, Phase 2	Jackson School Rd	Sewell Rd	Improve Meek Rd to address safety for industrial access to/from Jackson School Rd	$ 3,000,000	2028-2040	Yes	Improve freight access to indust & intermodal fac
Roads and Bridges	Washington County	Hillsboro	ODOT	11392	TV Hwy & River Rd Intersection Improvements	N/A	N/A	Construct eastbound right-turn lane and second northbound left-turn lane; modify traffic signal; improve bike and ped crossing of TV Hwy	$ 2,126,000	2028-2040	No	Reduce minor or non-injury crashes
Roads and Bridges	Washington County	Hillsboro	Hillsboro	10817	Aloclek Dr Gap Completion	Cornelius Pass Rd	Amberwood Dr	Complete missing segment of Aloclek Dr between Cornelius Pass Rd and Amberwood Dr as three-lane road with bike lanes and sidewalks	$ 2,126,000	2028-2040	No	Build complete street
Roads and Bridges	Washington County	Hillsboro	Washington County	10824	Cornell Rd Turn Lanes and Bike/Ped Improvements (Main to Arrington)	Main St	Arrington Rd	Widen roadway from four to five lanes with bike/ped facilites	$ 9,830,624	2028-2040	No	Reduce minor or non-injury crashes
Roads and Bridges	Washington County	Hillsboro	Washington Co.	11149	Helvetia Rd Turn Lanes and Bike/Ped Improvements	Schaaf Rd	West Union Rd	Widen roadway to three lanes (one through lane in each direction and center turn lane) with bike/ped facilities	$ 4,252,000	2028-2040	No	Serve new urban area
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11150	Jacobson Rd Turn Lanes and Bike/Ped Improvements	Helvetia Rd	Century Blvd	Widen roadway from two to three lanes (add center turn lane); complete bike/ped facilities; reconfigure intersection with Helvetia Rd to right-in, right-out only	$ 2,657,500	2028-2040	No	Improve freight access to indust & intermodal fac
Roads and Bridges	Washington County	Hillsboro	Hillsboro	11280	Ronler Dr Extension	Cornelius Pass Rd	215th Ave	Construct three-lane extension with bike/ped facilities	$ 1,000,000	2028-2040	No	Improve system efficiency
Roads and Bridges	Washington County	Hillsboro	Washington Co.	11341	West Union Rd Widening and Improvements	Helvetia Rd	Cornelius Pass Rd	Widen to three lanes from Helvetia to Century, and five lanes from Century to Cornelius Pass, including bike/ped facilities along entire length	$ 12,000,000	2028-2040	No	Serve new urban area

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Roads and Bridges	Washington County	Sherwood	To be determined, Wash	10674	Oregon-Tonquin Intersection Improvements	SW Oregon Street	SW Tonquin Rd	Reconstruct and realign three leg intersection with a roundabout (partial two-lane roundabout) approx 400 feet northeast of existing roundabout at SW Oregon St & Murdock Rd. ROW, PE, design & construction. Potential for signal in-lieu of dual-roundabout system if better for development and once SW 124th Ave project is completed. If roundabout, project will include rapid flashing beacons at new roundabout and retrofit of adjacent roundabout to meet MUTCD suggestions for pedestrian crossings at roundabouts. This is currently a Washington County facility but would likely become Sherwood's upon completion of project to TSP standards	$ 2,400,000	2018-2027	Yes	Relieve future congestion
Roads and Bridges	Washington County	Sherwood	Sherwood	10699	Oregon Street Improvements	SW Murdock Rd	SW Langer Farms Pkwy	Widen existing substandard 2-lane road (no sidewalks, no median) to a 3-lane collector meeting current TSP standards (8' sidewalks, 5' landscape strip, 12' travel, 14' median, 12' travel, 5' landscape, 8' sidewalks, plus 2 on-street bike lanes or 4' added to each 8' sidewalk). On-street bike lanes vs. 2 multi-use paths TBD with future development.	$ 5,700,000	2018-2027	Yes	Build complete street
Roads and Bridges	Washington County	Sherwood	Sherwood	11404	Baler Way Extension	SW Langer Farms Parkway	SW Tualatin-Sherwood Road	Extend SW Baler Way (3-lane collector) between SW Tualatin-Sherwood Road and SW Langer Farms Parkway, possibly SW Pacific Highway depending upon results of widening of SW Tualatin-Sherwood Road project by Washington County.	$ 3,800,000	2018-2027	Yes	Link land use with transportation investments
Roads and Bridges	Washington County	Sherwood	To be determined, ODO	12047	Brookman Road Intersection Realignment	SW Pacific Highway	SW Brookman Road	Realigns and relocates the SW Brookman Road intersection with SW Pacific Highway (OR 99W) to accommodate the expansion of SW Brookman Road for future development	$ 15,500,000	2028-2040	Yes	Relieve future congestion
Roads and Bridges	Washington County	Sherwood	Sherwood	12046	Tonquin Area East-West Collector	SW 124th Avenue	SW Tonquin Road	Construct 3-lane collector status road between SW 124th Avenue and SW Tonquin Road through the Tonquin employment area to serve recent UGB annexation area.	$ 10,500,000	2028-2040	Yes	Relieve future congestion
Roads and Bridges	Washington County	Sherwood	Sherwood	10700	Arrow Street Improvements	SW Langer Farms Parkway	SW Gerda Lane	Construct 3-lane collector street to TSP standards between SW Langer Farms Parkway and SW Gerda Lane.	$ 8,200,000	2028-2040	No	Link land use with transportation investments

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Roads and Bridges	Washington County	Tigard	Tigard	10755	72nd Ave. Improvements - 99W to Hunziker	99W	Hunziker	Build complete street (with bike lanes sidewalks) as determined by conceptual design phase; Likely to be 3-lane section from Hwy 99W to Clinton St; 5-lane section from Clinton St to Hunziker St.	$ 14,400,000	2018-2027	Yes	Build complete street
Roads and Bridges	Washington County	Tigard	Tigard	10768	Upper Boones Ferry Road (I-5 to Durham Road) Complete Street and Intersection Improvements	Interstate 5	South of Durham Rd	Widen Upper Boones Ferry Rd to five lanes with bike lanes and sidewalks from Interstate 5 through Durham Road, including additional turn lanes at intersections with Sequoia Pkwy, 72nd Ave, and Durham Rd.	$ 11,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Washington County	Tigard	ODOT	10770	OR 99W Intersection Improvements (PE)	64th Ave.	Durham Rd.	Project development phase: Provide increased capacity and safety improvements at priority intersections by adding turn and/or auxiliary lanes, improved sidewalks and bike lanes, pedestrian crossings, and access management from I-5 to Durham Road. See 2035 Tigard TSP Project #66 for specific improvements.	$ 5,000,000	2018-2027	Yes	Improve system efficiency
Roads and Bridges	Washington County	Tigard	Tigard	11995	Wall St (Hunziker to Tech Center)	Hunziker Road	Tech Center Drive	Construct new street with sidewalks and bike lanes from Hunziker Road (along Wall Street) to Tech Center Drive to improve freight access and connectivity to Tigard Triangle	$ 3,000,000	2018-2027	Yes	Increase access to jobs
Roads and Bridges	Washington County	Tigard	ODOT	10751	OR 217 Overcrossing - Beveland to Hunziker	Hunziker Road	Beveland	Realign Hunziker Road to meet Hampton Street at 72nd Ave, remove existing 72nd/Hunziker Road intersection, provide bicycle, pedestrian and transit facilities. Project to be refined based on SW Corridor High Capacity Transit recommendations.	$ 30,000,000	2028-2040	Yes	Relieve current congestion
Roads and Bridges	Washington County	Tigard	ODOT	11666	OR 99W Intersection Improvements (CON)	64th Ave.	Durham Rd.	Construction phase: Provide increased capacity and safety improvements at priority intersections by adding turn and/or auxiliary lanes, improved sidewalks and bike lanes, pedestrian crossings, and access management from I-5 to Durham Road. See 2035 Tigard TSP Project #66 for specific improvements.	$ 30,000,000	2028-2040	Yes	Improve system efficiency

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Roads and Bridges	Washington County	Tualatin	Tualatin	10715	Herman	124th	Tualatin	To improve safety and add active transportation options: Upgrade this road section to urban stadards with sidewalks, bicycle lanes and curbs/gutters.	$ 6,000,000	2018-2027	Yes	Reduce minor or non-injury crashes
Roads and Bridges	Washington County	Tualatin	Tualatin	10716	Myslony	112th	124th Ave	Reconstruct/widen from 112th to 124th to fill system, includes bridge. Improve the intersection of 124th and Myslony.	$ 10,000,000	2018-2027	Yes	Increase access to jobs
Roads and Bridges	Washington County	Tualatin	Tualatin	11417	Blake Street Extension	115th	124th Ave	Extend Blake Street to create an east-west connection between 115th and 124th. Install signal at Blake and 124th. New road section will provide an alternative route for industrial traffic on the high injury corridor: Tualatin/Sherwood Road.	$ 17,000,000	2018-2027	Yes	Increase access to jobs
Roads and Bridges	Washington County	Tualatin	Tualatin	10718	Herman	Cipole	124th Ave	Reconstruction: Widen to 3-lanes from Cipole to 124th.	$ 2,736,162	2028-2040	Yes	Increase access to jobs
Roads and Bridges	Washington County	Tualatin	Tualatin	10738	Teton	Tualatin	Avery	To improve safety and add active transportation improvements in an employment corridor: Widen Teton to three lanes and add bike lanes. Add right-turn lanes from NB Teton to WB T/S Road. Signalize the intersection of Teton/Tualatin Rd. Add SB turn-pocket at Teton/Avery and signalize intersection.	$ 7,000,000	2028-2040	Yes	Relieve current congestion
Roads and Bridges	Washington County	Tualatin	Tualatin	11423	Avery	Teton	Tualatin-Sherwood	Upgrade to urban standards.	$ 3,826,800	2028-2040	Yes	Build complete street
Roads and Bridges	Washington County	Tualatin	Washington County	10717	Cipole Street Reconstruction	OR 99W	Tualatin-Sherwood	Reconstruct/widen to 3 lanes from 99W to Tualatin-Sherwood Road and include shared-use path for the Ice Age Tonquin Trail, includes signal at Cipole and Herman. The project or a portion of the project is outside the UGB.	$ 21,291,890	2028-2040	No	Increase access to jobs
Roads and Bridges	Washington County	Tualatin	ODOT	11420	Nyberg	I-5 on-ramp	I-5 on-ramp	Add an additional on-ramp lane for vehicles traveling westbound on SW Nyberg Street to I-5 northbound (northeast quadrant of the Nyberg Interchange). Reduce the pedestrian island and improve illumination to enhance safety.	$ 2,500,000	2028-2040	No	Relieve current congestion

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Roads and Bridges	Washington County	Washington County	ODOT	10560	Farmington Rd. Improvements	170th	Kinnaman Rd.	Widen roadway from 2/3 lanes to 4 lanes with turn lanes at major intersections, bike lanes, sidewalks, access management, realignment of Rosa/179th intersection.	$ 34,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	10561	Jenkins Rd. Improvements	158th Ave.	Murray	Widen roadway from three to five lanes with bike lanes and sidewalks.	$ 7,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	10568	Tualatin-Sherwood Rd. Improvements	Langer Farms Pkwy.	Teton Ave.	Widen from three to five lanes with bike lanes and sidewalks.	$ 35,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	10575	West Union Rd.	Cornelius Pass Rd.	185th Ave.	Widen from two to five lanes with bike lanes and sidewalks.	$ 22,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	10587	Cornelius Pass Rd. Improvements	Frances St.	T.V. Hwy.	Widen to five lanes with bike lanes and sidewalks	$ 16,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	10590	Tonquin Rd. Improvements	Grahams Ferry Rd.	124th	Realign and widen to three lanes with bike lanes and sidewalks and street lighting.	$ 11,400,000	2018-2027	Yes	Build complete street
Roads and Bridges	Washington County	Washington County	Washington Co.	11470	Basalt Creek Parkway	Grahams Ferry Rd.	Boones Ferry Rd	Extend new 5 lane Arterial with bike lanes, sidewalks and street lighting.	$ 31,700,000	2018-2027	Yes	Serve new urban area
Roads and Bridges	Washington County	Washington County	Washington Co.	11486	Roy Rogers Rd.	Scholls Ferry Rd.	UGB	Widen to five lanes with bike lanes and sidewalks	$ 21,300,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington County	11903	Roy Rogers Rd.	Chicken Creek Bridge	Borchers Rd	Widen roadway to 5 lanes, includes sidewalks and bike lanes	$ 11,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington County	11914	Roy Rogers Rd	UGB	Chicken Creek Bridge	Widen roadway to 4-5 lanes, includes sidewalks and bike lanes	$ 25,000,000	2018-2027	Yes	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington County	11915	Scholls Ferry Rd	Tile Flat Rd.	Roy Rogers Rd.	Widen roadway to 5 lanes, includes sidewalks and bike lanes	$ 8,300,000	2018-2027	Yes	Relieve future congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	11452	Scholls Ferry Rd. Improvements	West of Tile Flat Rd.		Realign curves to improve safety and reduce crashes.	$ 4,600,000	2028-2040	Yes	Reduce minor or non-injury crashes
Roads and Bridges	Washington County	Washington County	Washington Co.	11487	Boones Ferry Improvements	Basalt Creek East-West Arterial	Day Rd.	Widen from 3 lanes to 5 lanes with bike lanes, sidewalks and street lighting	$ 1,200,000	2028-2040	Yes	Relieve future congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	10559	Cornell Improvements	Hwy. 26	Murray Blvd.	Widen Cornell from three to five lanes with bike lanes and sidewalks.	$ 25,000,000	2028-2040	Yes	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	10578	Merlo/158th Improvements	170th Ave.	Walker Rd.	Widen roadway to five lanes with bike lanes and sidewalks	$ 5,000,000	2028-2040	Yes	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	10591	Glencoe Rd. Improvements	Evergreen Rd.	Jackson Ave.	Widen to three lanes with bike lanes and sidewalks.	$ 27,700,000	2028-2040	Yes	Build complete street
Roads and Bridges	Washington County	Washington County	Washington Co.	10557	Murray/TV Hwy. Intersection	Farmington Rd.	TV Hwy.	Intersection improvement at TV Hwy. and Farmington with Murray Blvd.	$ 26,600,000	2028-2040	No	Relieve current congestion

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Roads and Bridges	Washington County	Washington County	Washington County	11737	Cornell @ 185th Intersection Improvements	185th Ave.	Cornell Rd	Prioritize near-term improvements such as signal timing, transit prioritization, traffic operations, monitoring, and specific turn lane configurations. Intersection improvements (and/or other reasonable replacement improvements) are to be implemented and prioritized as funding allows. If, after such improvements have been considered and motor vehicle traffic congestion becomes unacceptable, then these intersections could be considered as candidates for grade separation and/or other improvements to meet travel needs.	$ 22,300,000	2028-2040	No	Relieve future congestion
Roads and Bridges	Washington County	Washington County	Washington County	10596	Scholls Ferry Rd. Improvements	Hwy. 217	121st Ave.	Widen to seven lanes with bike lanes and sidewalks.	$ 21,000,000	2028-2040	No	Relieve current congestion
Roads and Bridges	Washington County	Washington County	Washington County	10598	Southern Arterial	Hwy. 99W	I-5	Purchase ROW. Construct 2/3 lane arterial with bike lanes and sidewalks.	$ 140,000,000	2028-2040	No	Relieve future congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	11436	East-West Arterial Overcrossing	Boones Ferry Rd	East of I-5	Extend new 4-lane overcrossing over I-5 from Boones Ferry Rd to 65th and Stafford Rd.	$ 40,400,000	2028-2040	No	Relieve future congestion
Roads and Bridges	Washington County	Washington County	Washington Co.	11469	124th Ave Improvements	Tualatin-Sherwood Rd.	Grahams Ferry Rd	Widen 124th from 2 lanes to 5 lanes with bike lanes and sidewalks	$ 14,900,000	2028-2040	No	Relieve future congestion
Roads and Bridges	Washington County	Washington County	Washington County	11490	Day Rd Overcrossing	Boones Ferry Rd	Elligsen Rd	Extend new 4-lane overcrossing over I-5 from Boones Ferry Rd to Elligsen Rd.	$ 46,900,000	2028-2040	No	Relieve future congestion
Roads and Bridges	Washington County	Washington County	Washington County	11923	Grahams Ferry Road (Helenius to Tonquin)	Helenius St	Tonquin Rd	Widen roadway to 3 lanes, includes sidewalks and bike lanes	$ 4,000,000	2028-2040	No	Build complete street
Roads and Bridges	Washington County	Washington County	Washington County	11924	Grahams Ferry Road (Tonquin to Day)	Tonquin Rd.	Day Rd.	Widen roadway to 5 lanes, includes sidewalks and bike lanes	$ 6,000,000	2028-2040	No	Relieve future congestion
Roads and Bridges	Washington County	Wilsonville	Wilsonville	10853	Garden Acres Road Extension	Day Road	Ridder Road	Construct three lane road extension with sidewalks and cycle track and reconstruct/reorient Day Road/Grahams Ferry Road/Garden Acres Road intersection.	$ 14,260,000	2018-2027	Yes	Improve freight access to indust & intermodal fac

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Roads and Bridges	Washington County	Wilsonville	Wilsonville	11243	Day Road Improvements	Grahams Ferry Rd.	Boones Ferry Rd.	Widen street from 3 to 5 lanes with buffered bike lanes, sidewalks and street lighting. Improve structural integrity for increased freight traffic and provide congestion relief. Sidewalk infill and creation of Tonquin Trail multi-use path spur will reduce pedestrian and vehicle conflicts. Bike buffers will reduce bicycle and freight conflicts.	$ 10,560,000	2028-2040	Yes	Relieve future congestion
Roads and Bridges	Washington County	Wilsonville	ODOT	11489	Boones Ferry / I-5 off ramp improvements	SB I-5 off ramp	Boones Ferry Rd	construct second right-turn lane	$ 1,063,000	2028-2040	Yes	Relieve current congestion
Roads and Bridges	Washington County	Wilsonville	Wilsonville	11809	Java Road Connection and Signal	Grahams Ferry Road	Garden Acres Road	Construct new Java Road with buffered bike lanes and sidewalks, disconnect Clutter Street from Grahams Ferry Road, and install traffic signal at Grahams Ferry Road.	$ 1,500,000	2028-2040	No	Increase access to jobs
Throughways	Clackamas County	ODOT	ODOT	10890	OR 212/224 Sunrise Hwy Phase 2: SE 122nd to SE 172nd (PE, ROW)	I-205	172nd Ave.	Conduct preliminary engineering (PE) and acquire right-of-way (ROW) on phase 2 of the OR 212/224 Sunrise Corridor from I-205 to SE 172nd Ave consistent with the Final Environmental Impact Statement (FEIS)/Record of Decision (ROD).	$ 70,000,000	2018-2027	Yes	Relieve current congestion
Throughways	Clackamas County	ODOT	ODOT	11350	OR 224 Milwaukie Expressway improvements	I-205	Rusk Rd	Construct a third westbound lane on Milwaukie Expressway (Hwy-224) from I-205 to Rusk Rd	$ 12,000,000	2018-2027	Yes	Improve system efficiency
Throughways	Clackamas County	ODOT	ODOT	11585	I-205 Abernethy Bridge (PE and ROW)	OR99E Interchange	Oswego Hwy (OR 43) Interchange	Widen bridge to address recurring bottlenecks on the bridge.	$ 8,000,000	2018-2027	Yes	Relieve current congestion
Throughways	Clackamas County	ODOT	ODOT	11904	I-205 Southbound and Northbound widening (CON)	Oswego Hwy Interchange	Stafford Rd Interchange	Widen Interstate 205 by one lane in both directions to address recurring bottlenecks. Construction (CON) phase.	$ 200,000,000	2018-2027	Yes	Relieve current congestion
Throughways	Clackamas County	ODOT	ODOT	11969	I-205 Abernethy Bridge (CON)	OR99E Interchange	Oswego Hwy (OR 43) Interchange	Widen both directions of the I-205 Abernethy Bridge and approaches to address recurring bottlenecks on the bridge. Install Active Traffic Management (ATM) on northbound and southbound I-205. Preliminary Engineering (PE) and Right-of-Way (ROW) phase.	$ 200,000,000	2018-2027	Yes	Relieve current congestion
Throughways	Clackamas County	ODOT	ODOT	11981	I-205 Northbound Auxiliary Lane, Sunrise Expressway Entrance to Sunnybrook	Sunrise Expressway Entrance	Sunnyside/ Sunnybrook Exit	Provide I-205 NB auxiliary lane between Sunrise Expressway entrance ramp and the Sunnyside Road/Sunnybrook Blvd interchange exit ramp.	$ 7,000,000	2018-2027	Yes	Improve system efficiency

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Throughways	Clackamas County	ODOT	ODOT	11301	OR 212/224 Sunrise Hwy Phase 2: SE 122nd to SE 172nd (CON)	I-205	172nd Ave.	Construct (CON) Phase 2 of the OR 212/224 Sunrise corridor, consisting of a 4-lane roadway from SE 122nd Ave to SE 172nd Ave, consistent with the FEIS/ROD.	$ 100,000,000	2028-2040	Yes	Relieve current congestion
Throughways	Clackamas County	ODOT	ODOT	11990	I-5 Southbound: Wilsonville Rd to Wilsonville-Hubbard Hwy	Wilsonville Rd	Wilsonville-Hubbard Hwy	Add an auxiliary lane on I-5 from Wilsonville Road to the Wilsonville-Hubbard Highway, including improvements to the Boone Bridge. PE, ROW and Construction Phases.	$ 80,000,000	2028-2040	Yes	Improve system efficiency
Throughways	Clackamas County	ODOT	ODOT	11992	I-205 Operational Improvements	Columbia River	I-5	Construct improvements to address bottlenecks and improve safety on I-205. Specific improvements as identified in operational analysis, mobility corridor analysis and refinement planning.	$ 20,000,000	2028-2040	No	Improve system efficiency
Throughways	Clackamas County, Multnomah County	ODOT	ODOT	11305	I-205 Active Traffic Management	Columbia River	I-5	Construct improvements to address recurring bottlenecks on I-205. Specific improvements as identified in operational analysis, Mobility Corridor analysis, refinement planning and Active Traffic Management Atlas.	$ 15,000,000	2018-2027	Yes	Improve system efficiency
Throughways	Clackamas County, Multnomah County, Washington County	ODOT	ODOT	11991	I-5 Freight Operational Improvements	Columbia River	South MPO Boundary	Construct improvements to address bottlenecks and improve safety on I-5. Specific improvements as identified in operational analysis, mobility corridor analysis and refinement planning.	$ 200,000,000	2028-2040	No	Improve system efficiency
Throughways	Multnomah County	ODOT	ODOT	11304	I-5 South Operational Improvements	Marquam Bridge	Region Boundary	Construct improvements to address recurring bottlenecks on I-5 south of the central city. Specific improvements as identified in operational analysis, Mobility Corridor analysis and refinement planning.	$ 15,000,000	2018-2027	Yes	Improve system efficiency
Throughways	Multnomah County	ODOT	ODOT	11370	I-205 Northbound Auxiliary Lane Powell to I-84	Powell Entrance Ramp	I-84	Design and construct an auxiliary lane on northbound I-205 from Powell Blvd to the I-84 interchange.	$ 15,000,000	2018-2027	Yes	Improve system efficiency
Throughways	Multnomah County	ODOT	ODOT	11583	I-5 Northbound: Lower Boones Ferry to Carman Auxiliary Lane Extension	Lower Boones Ferry Rd. Interchange	Carman Dr. Interchange	Extend existing auxiliary lane between the Lower Boones Ferry Road interchange and the Carman Drive interchange.	$ 22,500,000	2028-2040	No	Improve system efficiency

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Throughways	Multnomah County	ODOT	ODOT	11974	I-405 Operational Improvements	Fremont Bridge	I-5	Construct operational improvements to address bottlenecks and improve safety on I-405. Specific improvements as identified in operational analysis, mobility corridor analysis, and refinement planning	$ 50,000,000	2028-2040	No	Improve system efficiency
Throughways	Multnomah County	ODOT	ODOT	11993	I-84 Operational Improvements	I-5	Troutdale	Construct improvements to address bottlenecks and improve safety on I-84. Specific improvements as identified in operational analysis, mobility corridor analysis and refinement planning	$ 20,000,000	2028-2040	No	Improve system efficiency
Throughways	Multnomah County, Washington County	ODOT	ODOT	11971	US 26 (Sunset Highway) Operational Improvements	I-405	West MPO Boundary	Construct Improvements to address bottlenecks and improve safety on US 26 (Sunset Highway) Specific improvements as identified in operational analysis, mobility corridor analysis, and refinement planning	$ 50,000,000	2028-2040	No	Improve system efficiency
Throughways	Washington County	Hillsboro	ODOT	11393	US 26 Widening - Brookwood to Cornelius Pass	Brookwood Pkwy/Helvetia Rd	Cornelius Pass Rd	Widen US 26 from four to six lanes	$ 26,575,000	2028-2040	Yes	Relieve future congestion
Throughways	Washington County	Hillsboro	ODOT	11279	US 26 & 185th Ave Interchange Refinement Study and Implementation	N/A	N/A	Conduct interchange refinement study and implementation	$ 26,575,000	2028-2040	No	Relieve future congestion
Throughways	Washington County	ODOT	ODOT	11986	OR 217 Northbound Auxiliary Lane 99W to Scholls Ferry (CON)	99W	Scholls Ferry	Extend OR 217 Northbound (NB) auxiliary lane from OR 99W to Scholls Ferry. Construction (CON) phase	$ 50,000,000	2018-2027	Yes	Improve system efficiency
Throughways	Washington County	ODOT	ODOT	11987	OR 217 Southbound Auxiliary Lane Beaverton Hillsdale Hwy to 99W (CON)	Beaverton-Hillsdale Hwy	OR99W	Extend Southbound (SB) auxiliary lane from Beaverton-Hillsdale Hwy to OR 99W. Build collector/distributor road from Allen Blvd to Denny Rd. Construction Phase	$ 45,000,000	2018-2027	Yes	Improve system efficiency
Throughways	Washington County	ODOT	ODOT	12019	OR 217 Northbound Auxiliary Lane 99W to Scholls Ferry (PE, ROW)	OR99W	Scholls Ferry Interchange	Extend OR 217 Northbound (NB) auxiliary lane from OR 99W to Scholls Ferry. ROW and PE phase	$ 7,500,000	2018-2027	Yes	Improve system efficiency
Throughways	Washington County	ODOT	ODOT	11402	I-5 Northbound: Auxiliary Lane Extension Nyberg to Lower Boones Ferry	Nyberg Rd. Interchange	Lower Boones Ferry Rd. Interchange	Extend existing auxiliary lane.	$ 13,500,000	2028-2040	Yes	Improve system efficiency
Throughways	Washington County	ODOT	ODOT	11988	OR 217 Southbound Braided Ramps Beaverton-Hillsdale Hwy to Allen Blvd	Beaverton-Hillsdale Hwy	Allen Blvd	Design and construct braided ramps on southbound OR 217 at Canyon Rd and Beaverton Hillsdale Hwy.	$ 50,000,000	2028-2040	Yes	Improve system efficiency
Throughways	Washington County	ODOT	ODOT	11302	I-5/OR 217 Interchange Phase 2	I-5/OR 217 Interchange	N/A	I-5/OR 217 Interchange Phase 2 - southbound OR 217 to southbound I-5 entrance ramp; southbound I-5 exit to Kruse Way loop ramp.	$ 53,000,000	2028-2040	No	Relieve current congestion

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Throughways	Washington County	ODOT	ODOT	11582	OR 217 Capacity Improvements	US 26 (Sunset Hwy)	I-5	Construct as a 6-lane freeway, adding 3rd through lane in each direction, and complete interchange reconstruction with ramp and overcrossing improvements	$ 398,500,000	2028-2040	No	Relieve current congestion
Throughways	Washington County	ODOT	ODOT	11976	OR 217 Northbound Auxiliary Lane Extension Scholls Ferry to Allen/Denney	Scholls Ferry Road	Allen/Denney Interchange	Extend OR 217 auxiliary lane from Scholls Ferry to Allen/Denney interchange by filling in the existing auxiliary lane and modifying related ramp connections	$ 50,000,000	2028-2040	No	Improve system efficiency
Throughways	Washington County	ODOT	ODOT	11978	OR 217 Interchange, Safety, and Operational Improvements	US 26 (Sunset Highway)	I-5	Design and construct improvements to OR 217 between US 26 and Allen/Denney interchange to improve safety, reliability and mobility	$ 75,000,000	2028-2040	No	Improve system efficiency
Throughways	Washington County	Washington County	ODOT	10599	OR 217/72nd Ave. Interchange Improvements	OR 217/72nd Avenue	OR 217/72nd Avenue	Complete interchange reconstruction with additional ramps and bridge structure replacement	$ 21,300,000	2028-2040	No	Relieve future congestion
Transportation System Management (Technology)	Multnomah County	Gresham	Gresham	11261	181st/182nd - Glisan to Powell: ACM with Transit Priority Treatment	Glisan	Powell	Includes the ACM project with transit signal priority added to traffic signals along a facility.	$ 4,252,000	2018-2027	Yes	Relieve current congestion
Transportation System Management (Technology)	Multnomah County	Gresham	Gresham	11262	181st - Glisan to I-84: ACM with Adaptive Signal Timing and Transit Priority Treatment	I-84	Glisan	Provide real time and forecasted traveler information on arterial roadways including current roadway conditions, congestion information, travel times, incident information, construction work zones, current weather conditions and other events that may affect traffic conditions.Transit/Enhanced Transit Corridor supportive project.	$ 3,933,100	2018-2027	Yes	Improve system efficiency
Transportation System Management (Technology)	Multnomah County	Gresham	Gresham	11264	US 26 - Portland to Gresham: Roadside Travel Time Information	Portland	Gresham	Provide real time traveler information on westbound US 26 for different routes (arterial and freeway) between Portland and Gresham. The project or a portion of the project is outside the designated urban growth boundary.	$ 1,169,300	2018-2027	Yes	Improve system efficiency

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Transportation System Management (Technology)	Multnomah County	Multnomah County	Multnomah County	11299	257th/Kane Dr.: Arterial Corridor Management (ACM) w/ Adaptive Signal Timing	I-84	Orient Dr.	Install upgraded traffic signal controllers, establish communications to the central traffic signal system, provide arterial detection (including bicycle detection where appropriate) and routinely update signal timings. Provide realtime and forecasted traveler information on arterial roadways including current roadway conditions, congestion information, travel times, incident information, construction work zones, current weather conditions and other events that may affect traffic conditions.	$ 2,976,400	2028-2040	Yes	Improve system efficiency
Transportation System Management (Technology)	Multnomah County	Multnomah County	Multnomah County	11300	238th/242nd Ave/Hogan Dr.: ACM with Adaptive Signal Timing	Sandy	Palmquist	Improve arterial corridor operations by expanding traveler information and upgrading traffic signal equipment and timings. Includes the ACM project with signal systems that automatically adapt to current arterial roadway conditions.	$ 4,889,800	2028-2040	Yes	Improve system efficiency
Transportation System Management (Technology)	Multnomah County	Multnomah County	Multnomah County	11297	NE 207th Ave.: Arterial Corridor Management (ACM)	Sandy	Glisan	Install upgraded traffic signal controllers, establish communications to the central traffic signal system, provide arterial detection (including bicycle detection where appropriate) and routinely update signal timings. Provide realtime and forecasted traveler information on arterial roadways including current roadway conditions, congestion information, travel times, incident information, construction work zones, current weather conditions and other events that may affect traffic conditions.	$ 1,647,650	2028-2040	No	Improve system efficiency

RTP Investment Category	County	Nominating Agency	Primary Facility Owner	2018 RTP ID	Project Name	Start location	End location	Description	Estimated Cost (2016 dollars)	Time Period	Included in Financially Constrained project list	Primary Purpose
Transportation System Management (Technology)	Multnomah County	Portland	Portland	10213	Airport Way ITS	I-205	NE 158th Ave	Install ITS infrastructure (communication network, enhanced bus detection, truck priority detection, Bluetooth detection, CCTV cameras, and vehicle /pedestrian detectors). These ITS devices allow us to provide more efficient and safe operation of our traffic signal system consistent with our policies of moving people and goods more effectively.	$ 1,500,000	2018-2027	Yes	Improve system efficiency
Transportation System Management (Technology)	Multnomah County	Portland	Portland	10342	Columbia Blvd Corridor ITS Improvements	N Burgard St	NE Killingsworth St	Corridor ITS Improvements to improve freight operations. Communications infrastructure including closed circuit TV cameras, truck priority detection, variable message signs for remote monitoring and control of traffic flow for six signals.	$ 5,000,000	2018-2027	Yes	Improve system efficiency
Transportation System Management (Technology)	Multnomah County	Portland	Portland	10266	I-405 Corridor ITS Improvements	SW Clay	NW Glisan	ITS improvements at six signals between Clay and Glisan including communications infrastructure; closed circuit TV cameras, variable message signs for remote monitoring and control of traffic flow.	$ 1,000,000	2028-2040	Yes	Improve system efficiency
Transportation System Management (Technology)	Multnomah County	Portland	Portland	10346	Marine Drive ITS	N Portland Rd.	NE 185th Ave.	Install ITS infrastructure (communication network, enhanced bus detection, truck priority detection, Bluetooth detection, CCTV cameras, and vehicle /pedestrian detectors). These ITS devices allow us to provide more efficient and safe operation of our traffic signal system consistent with our policies of moving people and goods more effectively.	$ 1,500,000	2028-2040	Yes	Improve system efficiency
Transportation System Management (Technology)	Multnomah County	Portland	Portland	11796	Going St Connected/Automated Vehicle Connection	Swan Island Industrial Area	I-5	Design and construct a Connected/Automated Vehicle connection between Swan Island and I-5.	$ 5,000,000	2028-2040	Yes	Improve system efficiency

APPENDIX B

REGIONAL FREIGHT AND GOODS MOVEMENT TASK FORCE MEMBERS

Engaging stakeholders to develop a regional freight plan

The center point for the engagement of stakeholders was the Metro Council appointed Regional Freight and Goods Movement Task Force. The 33-member task force included representatives from the multimodal freight industry, community and government agencies. The group was charged with guiding the formation of policy and strategy recommendations for the region's multimodal freight transportation system. Metro Councilor Rod Park served as chairperson for the task force. The list of members included:

Steve Akre
OIA Global Logistics

Grant Armbruster
Columbia Sportswear

Steve Bates
Redmond Heavy Haul

Scott Bricker
Bicycle Transportation Alliance

Katy Brooks
Port of Vancouver

Gary Cardwell
NW Container Service

Terry Cleaver
Columbia Grain

Lynda David
Southwest Washington RTC

Tom Dechenne
Norris, Beggs & Simpson

John Drew
Far West Fibers

Ann Gardner
Schnitzer Steel Industries

Pete George
PW George Consulting

Cam Gilmour
Clackamas County

Van Hooper
Sysco Foods

Tom Hughes
City of Hillsboro

Monica Isbell
Starboard Alliance

Susie Lahsene
Port of Portland

Brian McMullen
WSDOT

Jeanne Morgan
Xerox

James Nave
Union Pacific RR

Rod Park
Metro

Michael Powell
Powell's Books

Warren Rosenfeld
Calbag Metals

Robert Russell

Paul Smith
City of Portland

John Speight
Portland & Western RR

Paul Thalhofer
City of Troutdale

Jason Tell
ODOT

Elizabeth Wainwright
Merchants Exchange

Tracy Ann Whalen
ESCO Corporation

Rick Williams
Lloyd District TMA

The RFGM Task Force met 11 times between July 2006 and October 2007. Additionally, the task force worked in ad hoc subcommittees to tackle specific issues, such as a regional vision for freight, freight---related RTP goals and objectives, and project prioritization criteria, and brought back recommendations to the full task force. Task Force members also participated in a combined Metropolitan Policy Advisory Committee and Joint Policy Advisory Committee on Transportation meeting held in October 2007.

The long---standing Metro committee on regional freight coordination, the Regional Freight Advisory Committee, served as the technical advisory committee on this plan, providing data, input on analysis, and review of memorandums and reports. The committee is loosely comprised of transportation agencies in the region with an interest in freight issues. Active participants include:

- Oregon Department of Transportation
- Washington County
- Washington Department of Transportation
- Multnomah County
- Metro
- City of Gresham
- Southwest Washington Regional Transportation Council
- City of Milwaukie Port of Portland
- City of Portland
- Port of Vancouver
- City of Tualatin
- FHWA
- City of Wilsonville
- Clackamas County

APPENDIX C

METRO FREIGHT MODEL

FREIGHT MODEL SUMMARY

This purpose of the Freight Demand Modeling and Data Improvement Project was to replace the current trip-based truck model developed by Oregon Metro (Metro) that utilizes fixed commodity flows with a truck tour model designed to reflect decisions made by shippers, receivers, truck operators, terminal managers, and others. The model simulates movement of individual shipments throughout the supply chain, including both direct shipments and those that travel through transshipment facilities. Shipments are allocated to trucks of various classes, and the movements of all freight vehicles are simulated over the course of a typical weekday.

Key participants in the project included Metro, the Oregon Department of Transportation (ODOT), the Port of Portland, and local agencies throughout the region.

The objectives of the project were to:

- Develop tools to enable a more comprehensive analysis of infrastructure needs and policy choices pertaining to the movement of goods;
- Develop more detailed network assignments by truck type to support regional environmental analysis, as well as local traffic operations and engineering analysis;
- Develop freight forecasts that are responsive to changes in economic forecasts, changing growth rates among industrial sectors, and changing rates of economic exchange and commodity flows between sectors; and
- Replace the trip-based truck model with more realistic tour-based model.

2.1 Current Metro Models

Metro has deployed commodity-flow based truck models for almost 20 years. These models have utilized data based on the Freight Analysis Framework (FAF) and prepared under contract for Metro and the Ports of Portland and Vancouver. The current model is based on FAF3, which utilized data gathered in the 2007 Commodity Flow Survey (CFS), together with data from several other sources.

Commodities are grouped into 16 categories, and assigned to major "gateways" by long-haul mode and direction. Long-haul truck-borne commodities enter and exit at major highway cordons. The commodities are segmented by carrier type (private, common carrier, truckload, and LTL). A portion of the commodities in each group is routed through warehouse, distribution, and consolidation facilities based on a 2006 survey. They are distributed to individual Transportation Analysis Zones (TAZ's) based on employment types associated with each group and then assigned to medium and heavy vehicles based on load factors. External-internal and internal-external truck flows are derived by designating

a portion of the truck volumes at each external station as through trips, in accordance with the 2006 survey.

Daily heavy and medium truck trips are factored into time periods using data from a region-wide truck count database. The trips are factored to passenger-car-equivalents and assigned to the network using multi-class assignment techniques. The current truck model does not include local delivery vehicles or non-freight commercial vehicles, and there is no feedback of network travel costs into the model.

Metro's current trip-based passenger model, code-named "Kate", was estimated in 2016 and calibrated and validated in the spring of 2017. The main model inputs are households by size, income, and life cycle; and employment by sector. A series of demographic models is used to estimate household attributes not included in the inputs, such as the number of workers, number of school-age children, and number of household vehicles. Fixed trip generation rates are assigned to households based on specific attributes (e.g., persons, workers, and age of head of household) for eight trip purposes. Destination choice for home-based work trips is further segmented into three income classes. The mode choice model assigns seven travel modes - drive alone, drive-with-passenger, auto passenger, walk-to-transit, drive-to-transit, walk, and bike. The drive alone and drive-with-passenger modes are assigned to the network as SOV and HOV vehicles, respectively. Public transit sub modes (bus, LRT, streetcar, commuter rail) are determined in the transit assignment path choice, but are not segmented in the demand model. There is full feedback and equilibration of the demand model (destination choice, mode choice, and assignment path choice) with auto network costs.

There is a separate airport model that estimates person-trips to Portland International Airport for all purposes and modes, a separate bicycle route choice model that interacts with mode choice, and a special events model that is used for certain types of transit studies.

2.2 Model User Needs

Early in the study, a series of stakeholder interviews were held with potential users of the freight model output to identify key freight-related issues and challenges, important impacts to measure for decision-making, expected use of a freight model or outputs, and the level of interest in freight model development from their perspective. The stakeholder groups were:

- Oregon Metro
- ODOT
- Port of Portland
- Local agencies
- Portland Freight Committee

The key freight-related issues and challenges identified by the groups include the following:

- Multimodal analysis (rail, air, water, pipeline) in addition to truck;
- Local truck movements for pick-up and delivery (last mile connections and congestion);
- Impacts of distribution centers (new and existing) and industrial land development;
- Economic impacts of freight; and
- Operational impacts of local truck movements (reliability, road diets and impacts to bike/pedestrian movements).

The model addresses all of these issues, except pipeline transport, either directly or indirectly. Pipeline movements could be added to the mode choice models in future enhancements. Other issues, such as economic and operational impacts, will require additional tools which Metro may choose to develop.

The stakeholder groups also identified a set of impacts that will be important to measure:

- Shifts in imports and exports (representing global shifts in freight to the U.S.);
- Shifts in national commodity flow movements due to Portland improvement projects;
- Greenhouse gas (GHG) emissions;
- Roadway operational improvements;
- Rail capacity and speed improvements;
- Shifts in transloading at the Ports of Portland and Vancouver;
- Distribution of oil arriving by pipeline; and
- Economic benefits of freight movements.

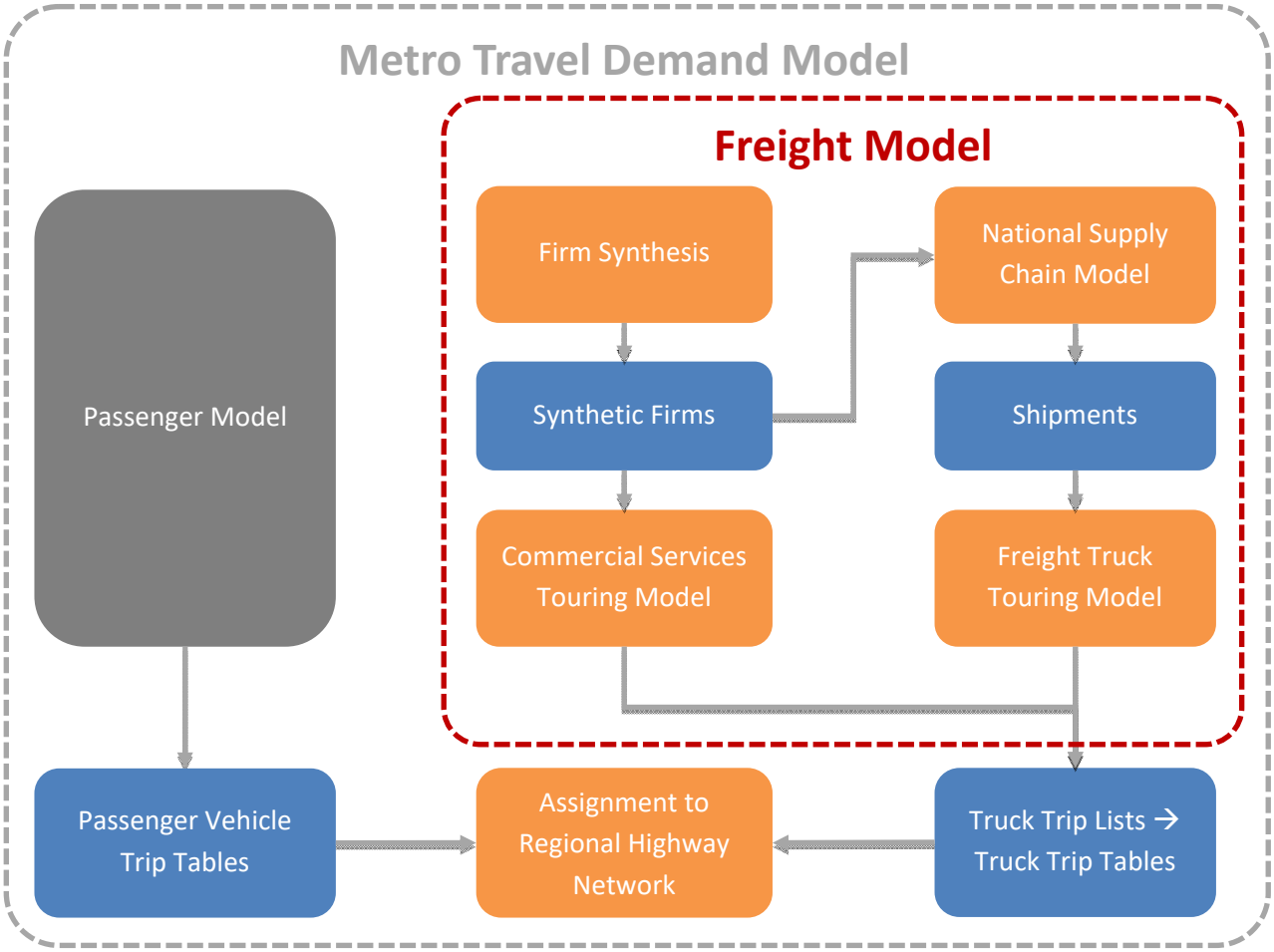
The model represents imports and exports, but does not explicitly model global freight movements, so the impacts of global changes could be represented by adjusting these inputs as a scenario analysis. Operational analysis would benefit from integrating truck movements produced by the model with an operational model, such as VISSIM, capable of evaluating localized operational improvements. Although pipelines are not included directly in the model, the distribution of oil to consumers arriving by pipeline to the port is represented by truck movements.

The stakeholder interviews were also used to identify how the model or its outputs might be used by the various groups. The responses focused on the ability to evaluate possible investments or policies to improve freight mobility and the need to communicate the freight movement story to decision-makers and the public.

2.3 Model Overview

Figure 1 shows the integrated model system containing Metro's passenger travel demand models (gray boxes) that are used to estimate personal travel by auto and other modes. The freight and commercial vehicle travel demand models being developed in this SHRP 2 C20 project are shown in orange, with the output datasets shown in blue.

Figure 1. Integrated Freight Model System



There are there primary modeling systems that comprise the Metro freight model:

- The **national supply chain model** simulates the transport of freight between supplier and buyer businesses in the United States, in this case focusing on movements that involve Portland. Its output, a list of commodity shipments by mode, is used in two ways. First, in the Metro model, a model component connected to the national supply chain model converts the annual shipment flows to daily vehicle trip tables that can be assigned to the regional highway network in Metro's model, along with trips tables from the passenger model. Secondly, as indicated by the blue arrow, the list of commodity shipments by mode is extracted from the supply chain model and used an input to the freight truck touring model.
- The **freight truck-touring model** simulates truck movements within the Portland region that deliver and pick up freight shipments at business establishments. The model is a tour-based model, and builds a set of truck tours including transfer points at which the shipment is handled before delivery/after pickup for shipments with a more complex supply chain (i.e., a warehouse, distribution center, or consolidation center) and the suppliers and buyer of shipments where those are within the model region. The shipment list from the national supply chain model is used as the demand input for the freight truck touring model and describes the magnitude and location of delivery and pick up activity in the region that must be connected by truck movements. The model will generate trip lists by vehicle type and time of day so that the outputs from this model can be combined with the outputs from the commercial services touring model and appropriate trip tables from Metro's passenger model for highway assignment.
- The **commercial services touring model** simulates the remainder of the travel of light, medium, and heavy trucks that is for commercial purposes, i.e., providing services and goods delivery to households and services to businesses. As with the freight truck touring model, the commercial services touring model is a tour-based model, but this time demand is derived from the characteristics of the business establishments and households in the region and as such is not affected by the national supply chain model. That is, while the freight truck touring model simulates truck tours based on commodity flows, the commercial services touring model generates and simulates truck and light-duty vehicle movements based on demand for services and goods from the region's industries.

For each of these model systems, we describe the analytical engine, the input and output databases, and the integration of the models into Metro's regional travel demand modeling system (trip-based model, Kate version).

The outputs from the both the freight truck touring model and the commercial services touring model are lists of truck trips and tours and are aggregated to represent trip tables. In this case, a trip list from each model with trip start and end location and trip timing

information is aggregated into zone to zone trips by time period that can be assigned to the regional highway networks in the Metro travel model along with trips tables from the passenger model.

2.4 Model Development Process

2.4.1 Implementation Plan

To guide the model development process, an implementation plan was developed detailing the initial demonstration model transfer, software requirements, integration with the current Metro travel models, external linkages, and desired enhancements/customizations of the model. The questions considered in the plan included:

- Extent to which the freight model would be integrated with Metro's passenger travel demand modeling system;
- Maintenance of the model and its data elements, including possible coordination with external partners such as the Ports and ODOT;
- Integration of the truck touring model with a national supply chain model approach;
- Sensitivity to long-haul movements across the U.S. for shipments that travel to, from or through Portland;
- Resources available in the project to implement the supply chain model components;
- Resources needed to acquire and maintain necessary data inputs, both initially and in the future; and
- Software and hardware requirements, tailored to meet Metro's freight model performance objectives and staff capabilities.

2.4.2 Data Plan

A data plan was developed to identify data needs and how they would be met in fulfillment of project objectives, as developed through Metro staff discussion and the stakeholder interviews. The data plan was intended to identify currently available data and a flexible set of options to accommodate Metro's approach to model integration and data collection funding. The freight model required three types of data to support model development and application:

- Behavioral data for model estimation;
- Observed travel data outcomes for model calibration and validation; and
- Model input data describing transport networks and zone systems, warehousing and major distribution facilities, employment/establishments, households, supply chain relationships and national commodity flows.

The behavioral and observed travel data was required for the development of the working updated model. The model input data was needed for implementation of the working enhanced demonstration model.

2.4.3 Data Collection

The final data plan was implemented to collect and prepare the required data for model estimation, calibration, and validation. The behavioral data collection for model estimation comprised the following tasks:

- Design of truck travel diary survey questionnaire;
- Development of survey tools, including an online survey application (rSurvey) and a mobile survey application (rMove);
- Development of a survey sampling plan, including holding focus group meetings to obtain information to guide the plan development and introduce prospective survey participants to the project;
- Survey recruitment;
- Survey data collection, including the development and hosting of a project website, conducting a pilot survey, and conducting the full survey; and
- Processing and summarization of the survey data.

The observed travel data for model calibration and validation consisted of truck counts and commodity flow survey data. The truck count data was used for the development of the truck touring model, while the commodity flow data was used both as input data for the supply chain model and setting calibration targets for the supply chain model. The following steps were involved in the truck count data collection:

- Compilation of raw count data;
- Initial data checking;
- Count adjustment;
- Aggregation of counts to model time periods and vehicle classifications;
- Import of data to GIS;
- Import of data to model network; and
- Final data checking

The commodity flow data was derived from the Freight Analysis Framework by Metro. As specified in the data plan, the model input data consisted of the commodity flow data, industry input-output tables, zone systems, networks, employment data, and TAZ household data by Metro. These are discussed in Section 3.3.

2.4.4 Model Development Approach

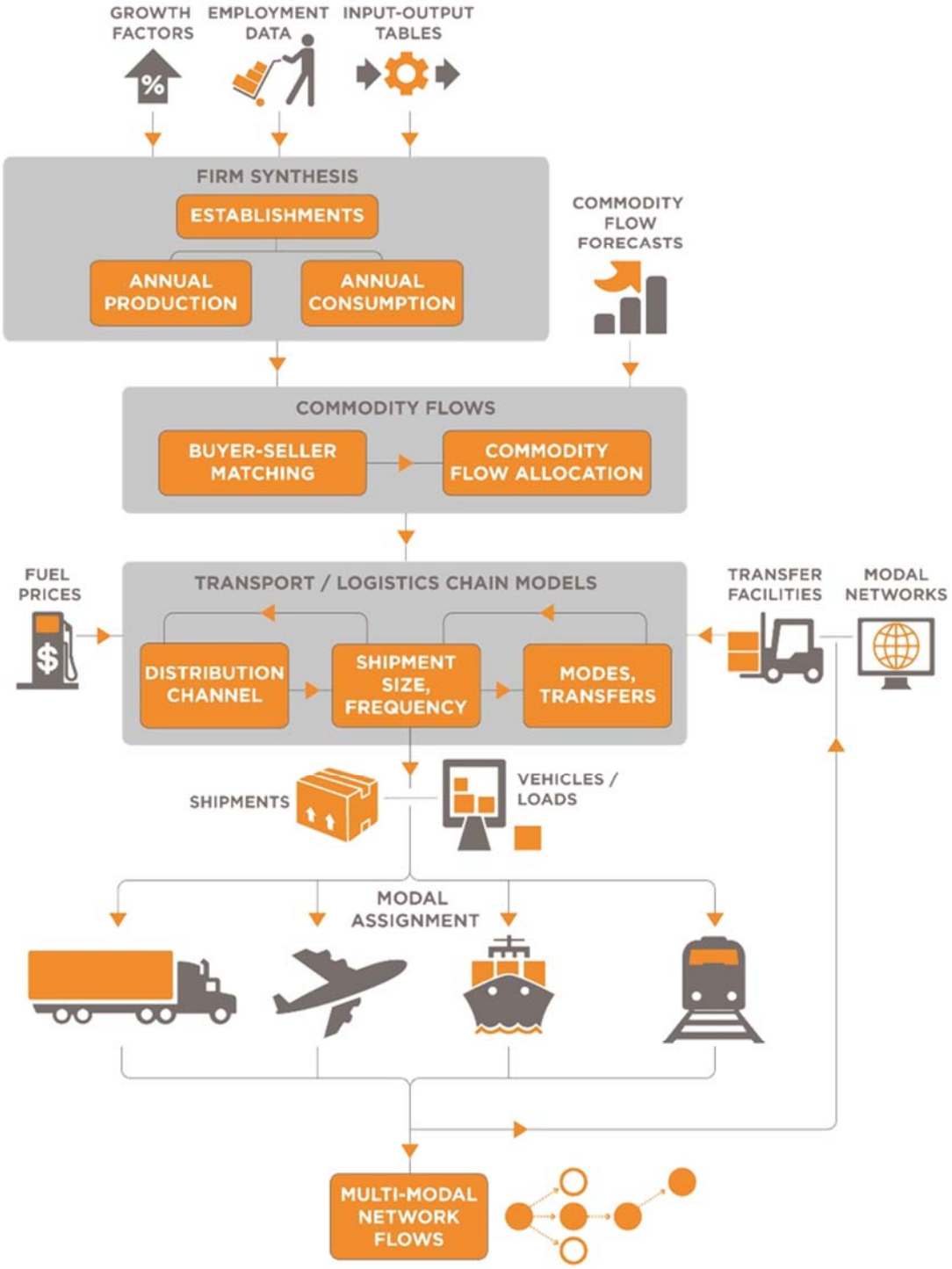
The Portland freight model is based on a combined supply chain and tour-based framework developed with Federal Highway Administration research funding by RSG and implemented in Chicago, Florida, Piedmont and Baltimore with rFreightTM software. This framework is comprised of several steps that simulate the transport of freight between each supplier and buyer business in the United States, with additional imports and exports from international businesses.

Supply Chain Models

Figure 2 shows these supply chain processes, with major input and output data identified. The steps are introduced in this section and further detail is provided in Section 4 on model development. The modeling system includes the selection of business locations, trading relationships between businesses, and the resulting commodity flows, distribution channel, shipment size and mode and path choices for each shipment made annually:

1. **Firm Synthesis.** Synthesizes all firms in the United States and a sample of international firms
2. **Supplier Firm Selection.** Selects supplier firms for each buyer firm by type
3. **Goods Demand.** Predicts the annual demand in tonnage for shipments of each commodity type between each firm in the United States
4. **Firm Allocation.** Allocates firms in each county to traffic analysis zones within the Portland region
5. **Distribution Channels.** Predicts the level of complexity of the supply chain (e.g., whether it is shipped directly or whether it passes through one or more warehouses, intermodal centers, distribution centers, or consolidation centers)
6. **Shipment Size and Frequency.** Estimates discrete shipments delivered from the supplier to the buyer
7. **Modes and Transfers.** Predicts four primary modes (road, rail, air, and waterway) and transfer locations for shipments with complex supply chains

Figure 2. National Supply Chain Model Structure



The model incorporates a multimodal transportation network that provides supply side information to the model including costs for different paths by different modes (or combinations of modes). While the model is focused on Oregon and Portland, it also encompasses freight flows between Oregon and the rest of the world. The rail, air and waterway freight movements are not assigned in the current work. The highway assignments are described below as part of the truck touring model process.

The supply chain models were transferred from the Baltimore/Maryland model and calibrated using the locally collected data sources. The primary purpose of the supply chain models in the Portland freight model is to produce individual shipments of goods into, out of, and through the Portland region. These models were calibrated to achieve reasonable external flows by mode. The model components of the supply chain were not calibrated individually, since the focus of the project is on the tour-based models in the Portland region.

The supply chain models rely on commodity flow forecasts, so adjustments to growth forecasts need to be translated into adjustments to commodity flow forecasts for scenario analysis or evaluation of different growth forecasts. A separate model component for procurement markets (that RSG has developed) could be deployed as an enhancement to allow a more structured scenario analysis of growth forecasts, but this is not part of the current work. This modeling framework does provide for the future inclusion of this procurement market game model and is currently an element of exploratory research at the FHWA.

Truck Touring Models

The supply chain model is integrated with a regional truck touring model, which is a sequence of models that takes shipments from their last transfer point to their final delivery point. The integrated modeling system connects the national supply chain models with the regional truck touring models. The final transfer point is the last point at which the shipment is handled before delivery (i.e., a warehouse, distribution center, or consolidation center for shipments with a more complex supply chain or the supplier for a direct shipment). It performs the same function in reverse for shipments at the pick-up end, where shipments are taken from the supplier to distances as far as the first transfer point. For shipments that include transfers, the tour-based truck model accounts for the arrangement of delivery and pick-up activity of shipments into truck tours.

A commercial services touring model is also developed to provide a comprehensive representation of all trucks. This model has the same structure and features of the regional truck touring model, but demand is generated from businesses and households in the region rather than from goods movement. These commercial services include utilities, business and personal services.

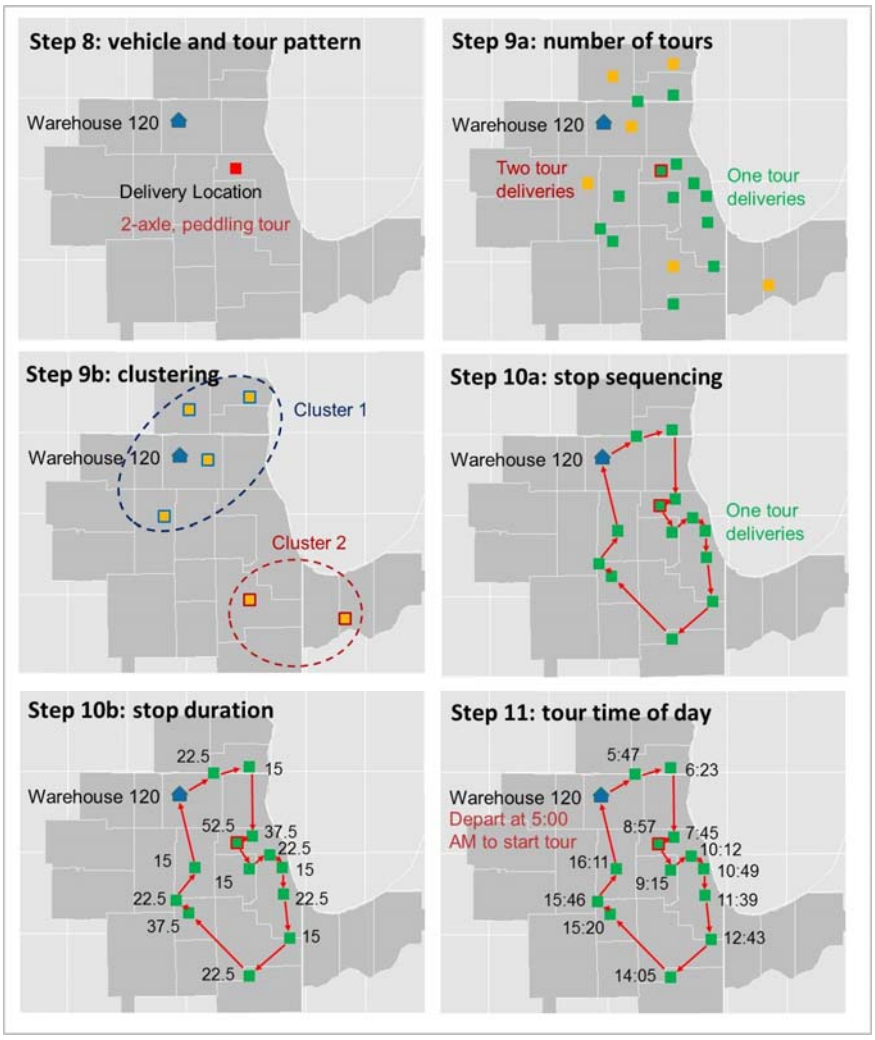
The regional freight truck and commercial vehicle touring models were transferred from the work done in Baltimore. These were calibrated and validated using locally collected data.

The model produces trip lists for all the freight delivery trucks and commercial vehicles in the region that can be assigned to a transportation network. The truck touring model components predict the elements of the pick-up and delivery system within the Portland region through several modeling components, as shown in Figure 3:

1. **Vehicle and tour pattern choice**. Predicts the joint choice of whether a shipment is delivered on a direct- or a multi-stop tour and the size of the vehicle that makes the delivery.
2. **Number of tours and stops**. Predicts the number of multi-stop tours required to complete all deliveries and estimates the number of shipments that the same truck delivers.
3. **Stop sequence and duration**. Sequences the stops in a reasonably efficient sequence but not necessarily the shortest path. Predicts the amount of time taken at each stop based on the size and commodity of the shipment.
4. **Delivery time of day**. Predicts the departure time of the truck at the beginning of the tour and for each subsequent trip on the tour.

The Portland freight model is integrated with the passenger travel model for highway assignment and can become part of the Portland travel demand modeling system.

Figure 3. Truck Touring Model Steps



ACKNOWLEDGEMENTS

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