Metro
600 NE Grand Ave.
Portland, OR 97232-2736

Metro Policy Advisory Committee (MPAC) agenda

Wednesday, April 25, 2018 | **5:00 PM** | **Metro Regional Center, Council chamber**

1. Call To Order, Introductions, Chair Communications (5:00 PM)

2. Public Communication on Agenda Items (5:05 PM)

3. Council Update (5:10 PM)

4. MPAC Member Communication (5:15 PM)

5. Consent Agenda (5:20 PM)

5.1 Clackamas County MTAC Nomination — COM 18-0125

Attachments: Clackamas County MTAC Nomination

5.2 Consideration of April 11, 2018 Minutes — 18-5009

Attachments: April 11, 2018 Minutes

6. Information/Discussion Items

6.1 2018 Urban Growth Management Decision: Trends in How Businesses Use Space and Select Locations (5:20 PM) — COM 18-0123

Presenter(s): Alisa Pyszka, Leland Consulting
Patricia Raicht, Jones Lang LaSalle
Ann Burnum, Autodesk
Kirk Olsen, Trammel Crow Company
Karrie Bartel Christensen, Providence St. Joseph

Attachments: MPAC Worksheet

6.3 2018 RTP: Draft Regional Transportation Safety Strategy (6:10 PM) — COM 18-0122

Presenter(s): Lake McTighe, Metro

Attachments: MPAC Worksheet
Memo: 2018 RTP: Draft Regional Transportation Safety Strategy
Draft Regional Transportation Safety Strategy
2018 State of Safety Report

6.2 2018 RTP: Draft Regional Freight Strategy (6:40 PM) COM 18-0121

Presenter(s): Tim Collins, Metro

Attachments: MPAC Worksheet
Memo
Draft Regional Freight Strategy
Regional Freight Concept
Regional Freight Network Map with Inserts

7. Adjourn (7:00 PM)

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February 2017

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2018 MPAC Work Program

as of 4/18/2018

Items in italics are tentative

Wednesday, April 25, 2018 • Employment Trends: Changes in How and Where People Work – Information/Discussion (panel TBD; 50 min) • Draft Freight Strategy – Information/Discussion (Tim Collins, Metro; 20 min) • Draft Safety Strategy – Information/Discussion (Lake McTighe, Metro; 30 min)	**Wednesday, May 9, 2018** • Food Scraps Policy Update – Information/Discussion (Jennifer Erickson, Metro; 20 min) • Regional Transit Strategy – Information/Discussion (Jamie Snook, Metro; 45 min) • Draft RTX Policies and Strategies – Information/Discussion (Eliot Rose, Metro; 40 min) May 8 – 10: JPACT Trip to Washington, D.C.
Wednesday, May 23, 2018 • Regional Housing Measure: Draft Measure and Programs – Information/Discussion (TBD; 60 min) • Draft RTP (Focus on Policies and Implementation)– Information/Discussion (Ellis; 45 min)	**Wednesday, June 13, 2018** • City Proposals for UGB Expansions – Information/Discussion (Representatives from 2-3 Cities; 90 min)
Wednesday, June 27, 2018 • City Proposals for UGB Expansions – Information/Discussion (Representatives from 2-3 Cities; 90 min) • Report on RTP Performance (Round Two) – Information/Discussion (Ellis; 20 min)	**Wednesday, July 11, 2018** • Overview of Draft 2018 Urban Growth Report – Information/Discussion (Ted Reid, Metro; 45 min) • *Hold for Tonnage Allocations (Molly Vogt, Metro; 45 min)*
Wednesday, July 25, 2018 • Merits of City Proposals for UGB Expansions – Information/Discussion (TBD; 60 min)	**Wednesday, August 8, 2018**

Wednesday, August 22, 2018	**Wednesday, September 12, 2018** • Metro Chief Operating Officer Recommendation on 2018 Urban Growth Management Decision – Information/Discussion (Martha Bennett, Metro; 60 min) • MPAC Recommendation to Metro Council on Urban Growth Management Decision – Recommendation to the Metro Council (Ted Reid, Metro; 30 min)
Wednesday, September 26, 2018 • Introduce and Discuss MTAC Recommendation on 2018 RTP and Strategies for Freight, Transit, and Safety (Ellis; 90 min) September 27-29: League of Oregon Cities Annual Conference, Eugene, OR	**Wednesday, October 10, 2018** • MPAC Recommendation to Metro Council on Adoption of 2018 RTP and Strategies for Freight, Transit, and Safety (Ellis; 60 min)
Wednesday, October 24, 2018	**Wednesday, November 14, 2018** November 13-15: Association of Oregon Counties Annual Conference, Eugene, OR
Wednesday, November 28, 2018	**Wednesday, December 12, 2018** • MPAC Year in Review (TBD; 10 min)
Wednesday, December 26, 2018 – cancelled	

Memo

Metro
600 NE Grand Ave.
Portland, OR 97232-2736

Date: April 6, 2018
To: MPAC
From: Tom Kloster, MTAC Chair
Subject: MTAC Nomination for MPAC Consideration

We have received a nomination for Clackamas County.

Clackamas County has nominated Jennifer Hughes to be their primary member on MTAC. Martha Fritzie remains as the alternate member.

Please consider this nomination for MTAC membership. Per MPAC's bylaws, MPAC may approve or reject any nomination submitted.

If you have any questions or comments, please do not hesitate to contact me.

Thank you.

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METRO POLICY ADVISORY COMMITTEE (MPAC)
Meeting Minutes
April 11, 2018
Metro Regional Center, Council Chamber

MEMBERS PRESENT	AFFILIATION
Emerald Bogue	Port of Portland
Steve Callaway	City of Hillsboro,
Sam Chase	Metro Council
Denny Doyle (*Chair*)	City of Beaverton, Second Largest City in Washington County
Chloe Eudaly	City of Portland
Amanda Fritz	City of Portland
Mark Gamba	City of Milwaukie, Other Cities in Clackamas County
Linda Glover	City of Vancouver
Jeff Gudman	City of Lake Oswego, Largest City in Clackamas County
Kathryn Harrington	Metro Council
Jerry Hinton	City of Gresham, Second Largest City in Multnomah County
Gordon Hovies	Tualatin Fire and Rescue, Special Districts in Washington County
Nathan Phelan	Peninsula Drainage District #1, Special Districts in Multnomah County
Craig Prosser	TriMet
Martha Schrader	Clackamas County
Mark Watson	Hillsboro School District Board of Directors, Governing Body of a School District

ALTERNATES PRESENT	AFFILIATION
Gretchen Buehner	City of King City, Other Cities in Washington County
Carrie McLaren	Oregon Department of Land Conservation and Development
Brenda Perry	City of West Linn, Other Cities Clackamas County

MEMBERS EXCUSED	AFFLIATION
Ed Gronke	Citizen of Clackamas County
Don Trotter	Clackamas County Fire District #1, Special Districts in Clackamas County

OTHERS PRESENT: Adam Barber, Laura Weigel, Kari Schlosshauer, Anna Slatinksy, Jennifer Hughes, Emily Klepper, Jennifer Donnelly, Chris Deffebach, Richard Swift

STAFF: Nellie Papsdorf, Ernest Hayes, Miranda Mishan, Megan Gibb, Alison Kean, Andy Shaw, Jes Larson, Craig Beebe, Ramona Perrault, Jamie Snook

1. CALL TO ORDER, SELF INTRODUCTIONS, CHAIR COMMUNICATIONS

Chair Doyle called the meeting to order at 5:01PM.

2. PUBLIC COMMUNICATIONS

Kari Lyons, Welcome Home Coalition: Ms. Lyons discussed the importance of placing houseless people in affordable homes. She emphasized that the regional housing bond could bring in up to $1 billion, and asked staff to work towards bringing in this amount. Ms. Lyons asked MPAC members to support the bond.

Diane Linn, Proud Ground: Ms. Linn emphasized the need for housing stability and the importance of focusing on housing families. She noted that they were in support of comprehensive plans in the regional bond and were supporting the Welcome Home Coalition and communities of color.

Kari Schlosshauer and Mary Kyle McCurdy, Getting There Together Coalition: Ms. Schlosshauer and Ms .Kyle McCurdy expressed support for the Welcome Home Coalition. They advised that MPAC continue to work n mitigating displacement, and ensure that communities of color were prioritized. Ms. Schlosshauer and Ms. Kyle McCurdy conveyed the need to integrate the housing bond measure with the transportation investment bond.

Jenny Lee, Coalition of Communities of Color: Ms. Lee advocated for homeownership, and noted that homeownership should become avalue and a goal in the housing bond. She explained that it was a powerful opportunity for low income families to raise their children, create intergenerational wealth and address ongoing discrimination within homeownership.

3. COUNCIL UPDATE

Councilor Kathryn Harrington recounted the work being done by the Regional Investment Stakeholder Taskforce. She discussed the recent event to commemorate the assassination of Reverend Dr. Martin Luther King, Jr. and highlighted the collaboration of faith, union and government leaders to celebrate Dr. King Jr.'s life.

Councilor Harrington highlighted construction and improvements at Oxbow Regional Park. She explained that there would be the addition of a 2600 sq. ft. welcome center for the parks team as well as materials to create a welcoming experience for visitors. Councilor Harrington conveyed that there would be an additional seventeen campsites added and an accessible playground. She added that this was happening as a result of voter approved investments.

4. MPAC MEMBER COMMUNICATION

Commissioner Amanda Fritz provided a summary of the affordable housing work and the growth of affordable housing units in the City of Portland.

Commissioner Martha Schrader discussed the letter from Clackamas County to MPAC regarding the housing bond that was distributed to MPAC members at the meeting. She shared some of the development of affordable housing in Clackamas County and highlighted some of the county's specific needs. Commissioner Schrader emphasized the need to frame need in terms of poverty.

5. <u>CONSENT AGENDA</u>

5.1 Consideration of March 14, 2018 Minutes

Commissioner Fritz asked that she be marked as present in the minutes.

<u>MOTION:</u> Councilor Gudman moved and Mayor Steve Callaway seconded to adopt the consent agenda with the changes to the minutes.

<u>ACTION:</u> With all in favor, the motion passed.

6. <u>INFORMATION/DISCUSSION ITEMS</u>

6.1 Regional Housing Measure Update

Chair Doyle reminded MPAC members that finding an affordable home was one of the most pressing challenges facing the region, particularly those with very limited incomes. He explained that Metro was working with public and private partners to develop a recommended ballot measure proposal to create and protect affordable homes throughout the region.

Chair Doyle shared that Metro staff last presented the work plan for this effort to MPAC on February 14th, and at they were returning for an update and a discussion of what was to come. He introduced Mr. Andy Shaw, and Ms. Jes Larson, Metro staff.

Key elements of the presentation included:

Mr. Shaw provided a broad overview of the housing bond framework. Ms. Larson shared an update on the housing measure engagement timeline, and explained that they were working towards the draft framework and the steps they were taking to work on the draft framework with various jurisdictions and stakeholders.

Ms. Larson shared what they expected to be covered in the measure framework, including the scope, eligible program activities, outcomes, accountability, next steps and racial equity. She explained some of the discussions that were being had by the advisory tables, and the broader goals of each group.

Ms. Larson highlighted the community values that were guiding the stakeholder tables and the feedback they had heard from community members throughout the process so far. She noted the emphasis on furthering racial equity in the measure.

Ms. Larson recalled that the work of advancing racial equity would show up in the targeted communities, and that preventing displacement was necessary. She recounted the preliminary scenarios of the housing bond and the potential outcomes. Ms. Larson explained the research on partner capacity, racial equity and public opinion and some of the strategies they were using including contracting with community groups and polling. She noted that voter interest in the bond was significant.

Ms. Larson highlighted the next steps, specifically the community engagement that was coming up. She highlighted that the draft framework would come to MPAC on May 9.

Member discussion included:

- Commissioner Eudaly discussed eligible program activities, and asked if there was conversation about home ownership opportunities for low-income communities. She remarked that 66% of people polled supported a fifty cent tax increase.
- Ms. Larson shared that general obligation bonds were required to be used on things owned and operated by the public and under the current constitution home ownership was not eligible for funding with the bond. She noted that with the addition of the constitutional amendment, home ownership could be funded.
- Commissioner Eudaly asked how that would line up with the amendment process. Mr. Shaw shared that the bond and the constitutional amendment would be on the ballot together. He added that there could be opportunities for home ownership if the constitution was amended.
- Commissioner Schrader asked if Mr. Shaw could repeat the list of community partners. Mr. Shaw listed the groups, and explained that they were selected because they proposed doing outreach in all areas of the region.
- Councilor Jerry Hinton asked if they were thinking about the bond as $50 million. Ms. Larson clarified that they were thinking about $500 million. Councilor Hinton asked about the number of units that could be generated from the bond. Ms. Larson explained that the modeling was still underway and the constitutional amendment would have a significant impact on the number of units built. Mr. Shaw recalled that they were hesitant to make estimates because the technical table was still modeling the potential number of units.
- Councilor Hinton asked if the polling was done just for homeowners or the public at large. Mr. Shaw confirmed that it included both renters and

homeowners. Councilor Hinton shared that he would like to focus on slum and blight in terms of acquisition.

- Councilor Gretchen Buehner raised concerns about the elderly population, and emphasized the need to pass the constitutional amendment. Mr. Shaw reminded MPAC that Metro staff was not able advocate for the constitutional amendment, but that elected officials were able.
- Commissioner Fritz highlighted the importance of looking at acquisition over construction, because they could provide safeguards for at-risk tenants. She shared the City of Portland's plan for low income housing, and expressed hope that MPAC and Metro staff were thinking about not only the physical structures of homes but how people are successful in housing.
- Commissioner Eudaly shared that the region was seeing a slow down in unit costs which was an indicator that a shallow recession was impeding. She asked if Metro was consulting economists. Mr. Shaw explained that they had not yet done the shorter term forecasting necessary to understand the impacts of a recession.
- Mayor Callaway conveyed that the public had to know the details of the bond, and the returns of the tax needed to be made clear. He emphasized the need to think about flexibility and how needs could be met in all communities. Mayor Callaway highlighted the importance of wealth building in communities of color, and the need to invest in these communities and neighborhoods.
- Mayor Mark Gamba noted that the changes made by a half a billion dollar housing bond would not be visible to most people, and that doubling that amount should be explored in the next set of polls. He discussed the importance of serving homeless families by focusing on units with more bedrooms.

6.2 Trends behind the Regional Population Forecast: Migration and Demographic Change

Chair Doyle explained that one of MPAC's primary responsibilities was to provide policy advice to the Metro Council as they planned for regional population and employment growth. He noted that in September they would be asked to provide the Metro Council with advice on the 2018 Urban Growth Management decision.

Chair Doyle expressed that the following presentation would recount he factors that were influencing population and employment growth in the region and nationwide. He introduced the panelists, Ms. Sheila Martin, from the PSU Institute of Portland Metropolitan Studies, Mr. Tom Potiowsky, PSU Northwest Economic Research Center, Mr. Bill Reid, PNW Economics, and the panel moderator, Mr. Craig Beebe, Metro.

Chair Doyle asked Ms. Megan Gibb to provide some context regarding the growth management decision process. Ms. Gibb shared that Metro relied on employment and population forecasts to make Urban Growth Management decisions. She added that the full report on demographic trends would be published in the Urban Growth Report.

Key elements of the presentation included:

Mr. Beebe explained that one of the findings of the forecast was that the Metro region had rebounded from the great recession. He asked what lessons were learned from the recession and which were most relevant at the regional level.

Mr. Potiowsky explained that one of the lessons learned was that in economic crises the government had to step in. He proposed that the government could step in to get people back into the labor force.

Ms. Martin shared that household formation slowed down in the recession, and building was at a standstill, but as the recession ended demand for housing increased as people were able to form households and the region could not accommodate this demand. She remarked that they could have done land banking to house people and provide incentives for builders to build houses and mitigate lack of investment in order to even out the house-building cycle.

Mr. Reid explained that the recovery of the recession was not started with a lot of land for single family homes that were ready for building, and there was not a lot of capacity when the economy moved and migration to the region increased.

Mr. Beebe asked what the largest sources of uncertainty on the economy were.

Mr. Reid conveyed that the biggest uncertainty was to do with the fact that they were at an unprecedented level of buildable land, and the biggest risk moving forward was the unavailability of cities and counties for meeting resident's needs.

Mr. Potiowsky spoke to the changing federal trade policies that were putting tariff's on trade, and expressed concern about a trade war, and that products from Oregon to China would be impacted. He acknowledged that demand could increase and supply would not be able to keep up, leading to higher inflation which would increase land prices.

Ms. Martin conveyed that they did not know how major industries might change the business models to deal with constraints. She added that the region had an aging population but did not have the resources to serve the aging population model moving forward. Ms. Martin added that health care might change its service model to deal with the needs of the population without building many more hospitals.

Mr. Beebe asked if there were concerns about the widening income gap, and if the panelists had any ideas about mitigating the negative impacts of the increasing gap.

Mr. Potiowsky cautioned against regional policy for income redistribution, and suggested that such a situation might cause social unrest.

Ms. Martin explained that as more communities of color came to the region there was a need to be more inclusive and that employers needed to move away from the idea that employees needed to “fit the culture” of the company. She conveyed that this would prevent inclusivity. Ms. Martin noted that opportunities were opened up by a tight labor market, and employers had to be willing to invest in training to ensure that people were productive and had a good job experience.

Mr. Beebe asked if the region was experiencing typical changes.

Mr. Reid acknowledged that a lot of what was happening in the region was happening in other areas.

Mr. Beebe asked panelists to recount some of the reasons that people were moving to the region and asked if the demographics were changing.

Mr. Potiowsky explained that when an area reached full employment, the economy slowed down. He added that it was difficult to say if the region was changing because it was at full employment or if it was becoming a more expensive place to live.

Mr. Reid added that in the last six months there had been research that showed that millennial home buying had only started in the last year. He explained that housing ownership options for millennial’s would be critical moving forward.

Ms. Martin expressed the importance of continuing to explore providing a variety of different ways for people to get into housing. She highlighted the importance of making denser living easier, and noted that densifying would protect farms ad forests. Ms. Martin cautioned that this could cause the region to become an enclave for the rich.

Mr. Beebe asked if the region was preparing for changes in housing preferences.

Mr. Reid shared that data on home buying preferences was consistent with rental preferences. He recounted that people wanted to be able to live in an urban environment, and that it was necessary to deliver affordable homes with desired qualities.

Ms. Martin remarked that people were returning to central cities because they had become safer, and that this had encouraged people to stay in cities. She emphasized the need to invest in central cities so that they were desirable places to live.

Mr. Potiowsky conveyed that millenials were a demographic cohort that was putting off traditional expenditures and not buying homes. He shared that desirable neighborhoods may be too expensive and the pressure would come to the suburbs which would have impacts on the UGB and transit issues.

Member discussion included:

- Mayor Gamba asked if there had been work done to show wages compared to housing costs on the basis of generations. Ms. Martin shared that low-income renters were often the most cost burdened. Mayor Gamba suggested that they were not thinking about the magnitude of the differences in wages over generations. Ms. Martin noted that this work could be done.
- Mayor Gamba asked about how automation would affect the work force. Mr. Reid suggested that the notion that automated technology would soon be a part of everyday life was exaggerated and speculative.
- Mr. Potiowsky remarked that technology opened up new jobs but the problem was workers transitioning into these new jobs that incorporated new technologies.
- Ms. Martin emphasized the importance of life-long learning as a key to resiliency. She conveyed that policies that resisted changes could work against the population.
- Councilor Buehner asked how the population growth ratio was changing. Mr. Potiowsky explained that Washington, Clackamas and Clark County were going to grow soon. Ms. Martin added that migrants to the region came from a wide variety of areas.
- Councilor Buehner asked if there would be an influx of migrants from Appalachia like in the early twentieth century. Ms. Martin explained that the jobs that were growing in the region would not likely attract the kinds of workers that might migrate from Appalachia.
- Mr. Mark Watson asked Mr. Potiowsky about his views given on the housing bond given his cautions against redistributive policies. Mr. Potiowsky explained that he favored the housing bond because there was a need to provide housing. He expressed support for the public sector providing goods when there was demand.
- Councilor Gudman noted that on the topic of generations, the biggest difference for millennial's was education debt. He asked what the ideal densification number was for the seven county areas. Councilor Harrington expressed that studies showed that high density was possible, and design was of high importance. Mr. Potiowsky agreed and explained that design could make an area livable or not.

7. <u>ADJOURN</u>

MPAC Chair Doyle adjourned the meeting at 7:02 PM.

Respectfully Submitted,

Miranda Mishan
Recording Secretary

ATTACHMENTS TO THE PUBLIC RECORD FOR THE MEETING OF APRIL 11, 2018

ITEM	DOCUMENT TYPE	DOC DATE	DOCUMENT DESCRIPTION	DOCUMENT NO.
4.0	Handout	4/10/18	Letter from Clackamas County Board on the Housing Bond	041118m-01
6.1	Handout	3/13/18	Regional Housing Measure Framework: Advisory tables	041118m-02
6.1	Presentation	4/11/18	Regional Housing Measure: Update PowerPoint	041118m-03

MPAC Worksheet

Agenda Item Title: 2018 Urban Growth Management Decision: trends in how businesses use space and select locations

Presenter: Moderator: Alisa Pyszka, Principal, Leland Consulting
Panelists: TBD – likely to include private sector representatives from the development, professional services, warehousing and distribution, and healthcare sectors

Contact for this worksheet/presentation: Ted Reid, Metro Planning and Development

Purpose/Objective
Help prepare MPAC for its September recommendation to the Metro Council on its 2018 urban growth management decision.

Action Requested/Outcome
No action at this time. The desired outcome of this discussion is that MPAC becomes more familiar with the trends influencing how businesses use space and select locations.

What has changed since MPAC last considered this issue/item?
MPAC last discussed employment trends during the 2015 urban growth management decision.

Over time, there have been significant changes in how businesses use space and choose locations. Those changes are attributable to a number of factors, including:

- Changes in the types of jobs that are prevalent
- The automation of manufacturing
- Shifts towards a knowledge-based economy and the need for collaborative work environments
- The emergence of e-commerce and the desire for quick deliveries
- Demand for urban amenities (to attract and retain an educated workforce)
- Increased real estate prices in in-demand locations
- The availability of development-ready sites
- The need to be located close to customers (or patients, in the case of healthcare)
- The emergence of the "gig economy"
- Transportation considerations

This moderated panel discussion will provide MPAC with an opportunity to learn more about these trends and their implications for land use and transportation planning and economic development. Panelists will be representative of the fastest growing employment sectors. There will also be time allotted for MPAC members to ask questions of the panel.

What packet material do you plan to include?
None

MPAC Worksheet

Agenda Item Title (include ordinance or resolution number and title if applicable): 2018 RTP: Draft Regional Transportation Safety Strategy

Presenter: Lake McTighe, Senior Transportation Planner

Contact for this worksheet/presentation: Lake McTighe, 503-797-1660, lake.mctighe@oregonmetro.gov

Purpose/Objective
Purpose: Update on how the Draft Regional Transportation Safety Strategy ("Draft Safety Strategy") implements MPAC, JPACT and Metro Council policy direction.

Objective: MPAC understands how policy direction has been addressed and provides further input, if needed, to finalize the Draft Safety Strategy for the public comment period starting June 29, 2018.

Action Requested/Outcome
No action is required at this time.

1. Has policy direction been adequately addressed?
2. Does MPAC have additional input on the Draft Safety Strategy?

What has changed since MPAC last considered this issue/item?
MPAC last provided direction on the Draft Safety Strategy at the April 12, 2017 meeting. At that meeting, MPAC affirmed that the Draft Safety Strategy should:

1. **Use the Vision Zero framework and target with a goal of zero traffic related deaths and fatalities by 2035.** *The Draft Safety Strategy commits to eliminating fatalities and serious injuries as a top priority and establishes a 2035 target of zero deaths and severe injury crashes; establishes annual targets to get to the 2035 target and fulfill federal performance measure requirements; and provides a Safe System Vision Zero framework for new safety policies, strategies and actions.*

2. **Identify safety projects in the 2018 RTP as a way to measure how safety is being addressed.** *A definition of safety projects in included in the Draft Safety Strategy, and projects that reduce crashes and reduce fatal and severe injury crashes have been identified in the draft project list of the 2018 Regional Transportation Plan. The Draft Safety Strategy recommends continuing to track Share of Safety projects to better understand investment in safety and in race and income marginalized communities, but will not be identified as a system evaluation measure (since it does not measure effectiveness of safety outcomes).* (Refer to Chapter 5, Section 5.4 of the Draft Safety Strategy for a summary of projects that address safety in the 2018 RTP.)

3. **Test use of an Exposure to Crash Risk measure.** *This measure was tested, but the results were not meaningful, and it will not be carried forward as a system evaluation measure in the 2018 RTP. Due to an increase in people and vehicle miles traveled it is assumed that the absolute number of crashes could increase without fully implementing state, regional and local safety plans and adopted transportation and land use plans. It is also assumed that due to lower vehicle miles traveled per person, crash risk could go down (though that is currently not the trend), however it is unknown if crash risk for vulnerable users, including people walking and bicycling, people of color and people with low incomes, will decrease. The Draft Safety Strategy includes a recommended future implementation task to work with regional partners, Oregon Department of Transportation and the Federal Highway Administration to developing a Crash Prediction Model for future RTP updates to better understand how investments can reduce (or increase) crashes.*

4. **Use the Regional High Injury Corridors as a tool to help inform prioritizing investments in the 2018 RTP.** *The Draft Safety Strategy prioritizes Regional High Injury Corridors and Intersections, especially in race and income marginalized communities, for regional investments to increase safety.* (Refer to Chapter 2 in the Draft Safety Strategy.)

Policy direction from the Metro Council
Since MPAC last provided direction on the Draft Safety Strategy, the Metro Council provided policy direction on March 20, 2018 that has been incorporated into the Draft Safety Strategy:

1. Use a racial and income equity lens in safety maps and analysis.

2. Explicitly prioritize investments on Regional High Injury Corridors and Intersections, especially in race and income marginalized communities.

Federal safety performance measure requirements
State Departments of Transportation and Metropolitan Planning Organizations must now report on the federally required safety performance measures identified in the federal transportation reauthorization bills MAP-21 and the FAST Act. To meet federal performance measure requirements, Metro has established annual safety performance targets that move towards zero serious crashes by 2035 in the Draft Safety Strategy; the annual targets were identified using a methodology that is consistent with the Oregon Department of Transportation's 2016 Transportation Safety Action Plan. (Refer to Chapter 6 of the Draft Safety Strategy.)

Draft Safety Strategy overview
Below is an overview of the main elements of the Draft Safety Strategy.

- Policy framework, including Vision Zero Safe System approach, equity and public health (Chapter 1)
- New safety policies, updated goals and objectives and targets (Chapter 2)
- Data analysis on contributing factors and crash types (Chapter 3 and the 2018 Metro State of Safety Report)
- Top three safety findings from analysis of data (Executive Summary and Chapter 3)
- Data-driven strategies and actions (Chapter 4)
- Implementation activities (Chapter 5)
- Annual targets to measure progress and meet federal requirements (Chapter 6)

What packet material do you plan to include?
1. Draft Regional Transportation Safety Strategy (March 20, 2018)
2. 2018 Metro State of Safety Report
3. Staff memo

Memo

Metro
600 NE Grand Ave.
Portland, OR 97232-2736

Date: April 9, 2018
To: Metro Policy Advisory Committee and interested parties
From: Lake McTighe, Senior Transportation Planner
Subject: 2018 RTP: Draft Regional Transportation Safety Strategy

Purpose
The purpose of this agenda item is to update and receive feedback from the Metro Policy Advisory Committee (MPAC) on the Draft Regional Transportation Safety Strategy ("Draft Safety Strategy") before it is refined and released for public comment on June 29, 2018. MPAC will be asked to make a recommendation to the Metro Council on adoption, by Resolution, of the final Regional Transportation Safety Strategy on October 18, 2018.

Questions for MPAC

1. Has past policy direction been adequately addressed?
2. Does MPAC have further input or questions on the Draft Safety Strategy?

Background
Transportation safety is one of the policy areas for the update of the 2018 Regional Transportation Plan (RTP). Transportation safety, with a focus on serious crashes, is consistently a top concern and priority in public engagement and outreach, including at the 2018 RTP Regional Leadership Forums.

As part of the 2018 RTP, the 2012 Regional Transportation Safety Plan is being updated with the Draft Safety Strategy. The Draft Safety Strategy is a topical plan of the RTP. The Draft Safety Strategy sets regional policies related to transportation safety in the Regional Transportation Plan, analyzes crash data to identify the most common crash types and contributing factors in crashes, and identifies strategies and actions to reduce serious crashes.

The Draft Safety Strategy was developed with policy direction from the Metro Council, the Joint Policy Advisory Committee on Transportation and MPAC. Technical review and guidance is provided by the Transportation Safety Technical Work Group, the Metro Technical Advisory Committee (MTAC), and the Transportation Policy Alternatives Committee. (Refer to Chapter 1, Section 1.4 of the Draft Safety Strategy for a description of the planning process and public engagement.)

MPAC policy direction
MPAC last provided direction on the Draft Safety Strategy at the April 12, 2017 meeting. At that meeting, MPAC affirmed that the Draft Safety Strategy should:

1. **Use the Vision Zero framework and target with a goal of zero traffic related deaths and fatalities by 2035.** The Draft Safety Strategy commits to eliminating fatalities and life

changing injuries as a top priority and establishes a 2035 target of zero deaths and severe injury crashes; establishes annual targets to get to the 2035 target and fulfill federal performance measure requirements; and provides a Safe System Vision Zero framework for new safety policies, strategies and actions.

2. **Identify safety projects in the 2018 RTP as a way to measure how safety is being addressed.** A definition of a safety project is included in the Draft Safety Strategy, and projects that reduce crashes and reduce fatal and severe injury crashes have been identified in the draft Project List of the 2018 Regional Transportation Plan (the list is currently being refined).

   The Draft Safety Strategy recommends continuing to track safety projects to better understand investments in safety and in race and income marginalized communities. However, the Share of Safety Projects but will not be identified as a system evaluation measure (since it does not measure effectiveness of safety outcomes). (Refer to Chapter 5, Section 5.4 of the Draft Safety Strategy for a summary of projects that address safety in the 2018 RTP.)

3. **Test use of an Exposure to Crash Risk measure.** This measure was tested, but the results were not meaningful and it will not be carried forward as a system evaluation measure in the 2018 RTP. Due to an increase in people and vehicle miles traveled it is assumed that the absolute number of crashes could increase without fully implementing state, regional and local safety plans and adopted transportation and land use plans. It is also assumed that due to lower vehicle miles traveled per person, serious crashes per capita and per vehicle miles traveled could go down (though that is currently not the trend), however it is unknown if crash risk for vulnerable users, including people walking and bicycling, people of color and people with low incomes, will decrease.

   The Draft Safety Strategy includes a recommended future implementation task to work with regional partners, Oregon Department of Transportation and the Federal Highway Administration to developing a Crash Prediction Model for future RTP updates to better understand how investments can reduce (or increase) crashes.

4. **Use the Regional High Injury Corridors as a tool to help inform prioritizing investments in the 2018 RTP.** The Draft Safety Strategy prioritizes Regional High Injury Corridors and Intersections, especially in race and income marginalized communities, for regional investments to increase safety. (Refer to Chapter 2 in the Draft Safety Strategy.)

Policy direction from the Metro Council
Since MPAC last provided direction on the Draft Safety Strategy, the Metro Council provided policy direction on March 20, 2018 that has been incorporated into the Draft Safety Strategy:

1. **Use a racial and income equity lens in safety maps and analysis.** The Draft Safety Strategy uses a racial and income equity lens in maps and analysis. One of the top findings of the Draft Safety Strategy is the disproportionate impact of serious crashes on people of color, people with low incomes and people over age 65. Strategies and actions in the Draft Safety Strategy address this finding.

2. **Explicitly prioritize investments on Regional High Injury Corridors and Intersections, especially in race and income marginalized communities.** This policy direction has been incorporated into the Draft Safety Strategy, specifically in new Safety Policy 2 and Policy 3 [refer to Chapter 2 of the Draft Safety Strategy].

Federal safety performance measure requirements
State Departments of Transportation and Metropolitan Planning Organizations must now report on the federally required safety performance measures identified in the federal transportation reauthorization bills MAP-21 and the FAST Act. To meet federal performance measure requirements, Metro has established annual safety performance targets that move towards zero serious crashes by 2035 in the Draft Safety Strategy; the annual targets were identified using a methodology that is consistent with the Oregon Department of Transportation's 2016 Transportation Safety Action Plan. (Refer to Chapter 6 of the Draft Safety Strategy.)

Draft Safety Strategy overview
Below is an overview of the main elements of the Draft Safety Strategy.

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- Data-driven strategies and actions (Chapter 4)
- Implementation activities (Chapter 5)
- Annual targets to measure progress and meet federal requirements (Chapter 6)

Next Steps

- April 10, 2018 – Present Draft Safety Strategy to Metro Council
- April 19, 2018 – Present Draft Safety Strategy to JPACT
  April 24, 2018 – Present Draft Safety Strategy to MPAC
- April 25-June 28, 2018 – Refine Draft Safety Strategy
- June 29, 2018 – Release Refined Draft Safety Strategy for 45-day public comment period
- August 14 – October 1, 2018 – Finalize Safety Strategy in response to public comment
- October 10, 2018 – Recommendation to Metro Council from MPAC on adoption of the Final Safety Strategy
- October 18, 2018 – Recommendation to Metro Council from JPACT on adoption of the Final Safety Strategy
- November 11, 206 – Direction from Metro Council to staff on finalizing Safety Strategy for Council consideration
- December 6, 2018 – Metro Council considers adoption of Regional Transportation Safety Strategy, by Resolution

Materials attached

1. Draft Regional Transportation Safety Strategy (March 20, 2018)
2. 2018 Metro State of Safety Report

DISCUSSION DRAFT

2018 Regional Transportation Plan

Regional Transportation Safety Strategy

A strategy to achieve Vision Zero in the greater Portland region

March 20, 2018

oregonmetro.gov/safety

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Metro is the federally mandated metropolitan planning organization designated by the governor to develop an overall transportation plan and to allocate federal funds for the region.

The Joint Policy Advisory Committee on Transportation (JPACT) is a 17-member committee that provides a forum for elected officials and representatives of agencies involved in transportation to evaluate transportation needs in the region and to make recommendations to the Metro Council. The established decision-making process assures a well-balanced regional transportation system and involves local elected officials directly in decisions that help the Metro Council develop regional transportation policies, including allocating transportation funds.

Regional Transportation Plan website: **oregonmetro.gov/rtp**
Regional Transportation Safety Strategy web site: **oregonmetro.gov/safety**

The preparation of this strategy was financed in part by the U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration. The opinions, findings and conclusions expressed in this strategy are not necessarily those of the U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration.

TABLE OF CONTENTS

Increasing pedestrian safety is a central focus of the Regional Transportation Safety Strategy
Source: Metro, Hwy 99W

FOREWORD

The 2018 Regional Transportation Safety Strategy ("Regional Safety Strategy") updates the region's first Regional Transportation Safety Plan, which was completed in 2012. The Regional Safety Strategy is a topical plan of the Regional Transportation Plan and updates regional safety goals, objectives, policies, targets and performance measures.

With the federal Transportation Equity Act for the 21sr Century (TEA-21) in 1998, safety and security appeared as planning factors for metropolitan planning organizations to address in transportation planning. The Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU), adopted in 2005, placed a greater emphasis on addressing safety and established the Highway Safety Improvement Program (HSIP) as a core Federal-aid program. Signed into law 2012, the Moving Ahead for Progress in the 21sr century Act (MAP-21) required States and metropolitan planning organizations to adopt safety performance measures and targets. This requirement was maintained in the most recent federal surface transportation legislation the Fixing America's Surface Transportation Act (FAST Act), signed into law in 2015.

The Regional Safety Strategy was developed by a regional transportation safety technical work group as part of the update of the 2018 Regional Transportation Plan. The Joint Policy Advisory Committee on Transportation (JPACT), the Metro Policy Advisory Committee (MPAC), the Transportation Policy Alternatives Committee (TPAC) and the Metro Technical Advisory Committee (MTAC) provided policy and technical guidance. Development of the Regional Safety Strategy was informed by state, county and city transportation safety action plans.

The purpose of the Regional Safety Strategy is to provide a specifically urban-focused overarching data-driven framework for increasing traffic safety in the greater Portland region. The plan focuses on strategies and actions drawn from best-practices and proven to reduce traffic related deaths and serious injuries.

The Regional Safety Strategy does not mandate adoption or implementation of the safety strategies and actions described in the plan; transportation elements required to be included in local transportation system plans are listed in the Regional Transportation Functional Plan.

23 U.S. Code 409 states that crash and safety data, including reports, surveys, schedules, and lists, compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing federal-aid highway funds, shall not be subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

Designing for safety supports equity, human and environmental health, air quality, and economic prosperity
Photo: Metro

EXECUTIVE SUMMARY

Traffic related deaths and severe injuries are a critical and preventable public health and social equity issue in the greater Portland region. Between 2011 and 2015, there were more than 116,000 traffic crashes resulting in 311 deaths and 2,102 people severely injured.[1]

Traffic crashes are the leading cause of unintentional injury death for young people ages 5 to 24 in Multnomah, Washington and Clackamas County, and the second leading cause of unintentional injury death for people ages 25 to 84.[2]

On average, 62 people die each year on the region's roadways and 420 people experience a life changing injury. Nearly two people are either killed or severely injured every day in our region in a traffic crash; every 10 days a person riding a bike is killed or severely injured; every 5 days a person walking is killed or severely injured.

Sixty percent of these fatal and severe injury crashes occur on just 6 percent of the region's major streets. These roadways are identified in this document as Regional High Injury Corridors and Intersections. They are also where we tend to travel the most, where we run to catch the bus, cross the street to get to schools and shops, ride our bikes or drive.

Top three findings

The Regional Transportation Safety Strategy identifies three top findings to that must be addressed to make daily travel safer for all people, whether driving, walking, bicycling or taking transit.

Traffic deaths are increasing and are disproportionately impacting people of color, people with low incomes and people over age 65

- Serious crashes (fatal and severe injury crashes combined) have fluctuated since 2007, but more recently have been increasing. Initial data from 2016, 2017 and 2018 indicate that the trend is continuing. This is a trend that is also happening at the state and national levels.
- The regional annual fatality rate by population and vehicle miles traveled (for 2011-2015) has increased compared to the 2012 Metro State of Safety Report.[3]
- Your risk of dying in a motor-vehicle involved crash is higher if you are a person of color, are over 65 or have a lower income.[4]

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[1] 2018 Metro State of Safety Report ~ unless otherwise noted, all crash data findings are from the 2018Metro State of Safety Report

[2] Oregon Death Certificates: Center for Health Statistics, Center for Public Health Practice, Public Health Division, Oregon Health Authority. Accessed March 13, 2018. For 2012-2016. Unintentional injuries were the 4th leading cause of death (just about tied for third with cerebrovascular disease/stroke); within the category of unintentional injury deaths, transport injuries are the third leading cause behind falls and poisoning (poisoning includes drug overdoses).

[3] Fatality rates for traffic related crashes are the proportion of all crashes, person deaths or severe injuries for every 1 million people or every 100 million vehicle miles traveled.

- A majority of Regional High Injury Corridors are in communities with higher densities of people of color, people with low incomes and English language learners.[5]
- A majority of pedestrian deaths are in are in communities with higher densities of people of color, people with low incomes and English language learners.
- Older drivers are twice as likely to die in a traffic crash. For male drivers age 70 to 79 and female drivers age 75 to 85 and older the share of serious crashes is double that of drivers in other age groups.
- In Oregon, American Indians/Alaska Natives have the highest average rate of vehicle related deaths (5.9 per 100,000) 1.8 times the rate among whites (3.3 per 100,000), and American Indians/Alaska Natives and Black or African American had the highest hospitalization rate -52.2 and 46.2 per 100,000, compared to 45.5 for whites and 20.8 Asian Pacific Islander for traffic related injuries.[6] This data is not currently available at the regional level.

Traffic deaths are disproportionately impacting people walking

- Auto-only crashes comprise ninety-one percent of all crashes, and thirty-eight percent of all fatal crashes. Pedestrian crashes make up two percent of all crashes, and thirty-six percent of all fatal crashes.
- Pedestrian traffic deaths are steadily increasing, are the most common type of fatal crash, and have the highest severity of any crash type.
- Pedestrian fatalities have steadily increased to 2015 at the local, regional, state and national levels.
- In the region, a pedestrian crash is more than 26 times as likely to be fatal than a crash not involving a pedestrian, and more than 110 times as likely to be fatal as a rear end crash, the most common crash type.
- Roadway design is critical to pedestrian safety. Seventy-seven percent of serious pedestrian crashes occur on arterial roadways in the region. This pattern is seen at the state level as well.

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[4] *Motor Vehicle Traffic-Related Pedestrian Deaths — United States, 2001–2010*, Centers for Disease Control and Prevention (2013); *Dangerous by Design*, National Complete Streets Coalition (2016); *Income Disparities in Street features that Encourage Walking*, Bridging the Gap (2012); *Pedestrians Dying at Disproportionate Rates in America's Poorer Neighborhoods*, Governing, August 2014; *America's Poorer Neighborhoods Plagued by Pedestrian Deaths*, Governing Research Report (August 2014)

[5] The map at the end of this section shows the overlap of Regional High Injury Corridors and census tracts with both higher than regional average concentration and double the regional density of people of color, people with low income, and/or English language learners.

[6] Oregon Public Health Authority, 2008-2014 crashes

A majority of traffic deaths are occurring on a subset of arterial roadways

- Arterial roadways are the location of the majority of the serious crashes in the region. Sixty-six percent of all serious crashes occur on a roadway designated as an arterial.
- In the region, seventy-three percent of non-freeway serious crashes occur on a roadway designated as an arterial; seventy-seven percent of serious pedestrian crashes occur on a roadway designated as an arterial; sixty-five percent of serious bicycle crashes occur on a roadway designated as an arterial.
- A majority of Regional High Injury Corridors are arterial roadways.
- A majority of the High Injury Corridors and Intersections – and a majority of pedestrian deaths and severe injuries – are in areas with race and income marginalized communities.

The Regional Safety Strategy uses a Safe System approach and identifies effective and proven strategies and actions to address these and other data-driven findings.

Traffic deaths and life changing injuries impact the lives of our families, friends, neighbors and community members. They also have a major economic cost – estimated at $1 billion for our region.

Research sponsored by AAA found that in large urban areas, such as the greater Portland region, costs resulting from crashes are over three times more than congestion. –"Crashes vs. Congestion: What's the Cost to Society?" Cambridge Systematics, 2011

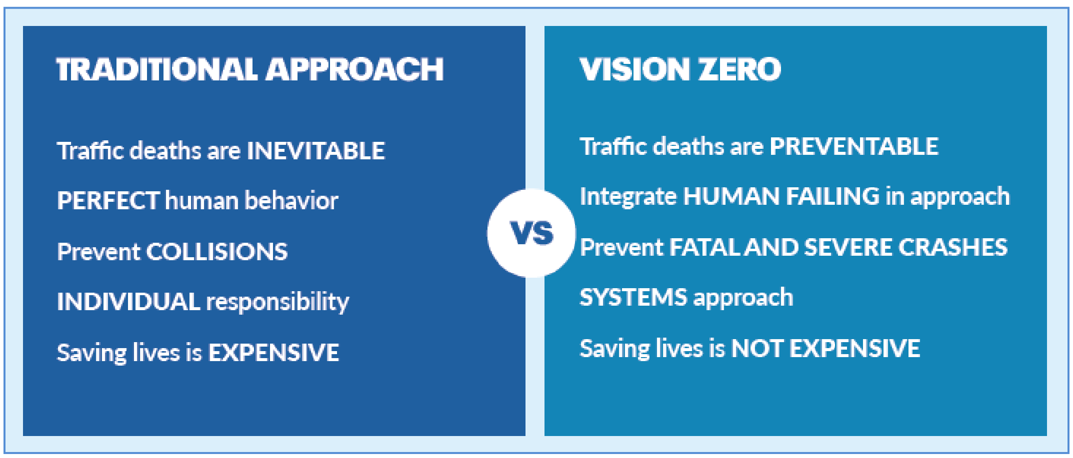
Achieving Vision Zero with a Safe System approach

While the greater Portland region has one of the lowest crash rates in the country, our elected and community leaders acknowledge that the high number of tragedies on our roadways is largely predictable and preventable and that no loss of life from a traffic crash is acceptable. They are stepping up to declare that "enough is enough" and to devise plans and policies for a safe future on our roadways. Just as we expect the right to safe water to drink and clean air to breathe, so too should we expect the right to move about safely.

The region is employing a Vision Zero Safe System approach with an adopted goal to eliminate deaths and severe injuries for all users of the transportation system by 2035.

The Safe System approach has been developed and refined over many decades of application. Since it was first introduced, in Europe, it has been taken up at the country, state, and city levels around the world. The system is often branded under a public policy identity, such as Vision Zero or Toward Zero Deaths, which aims to connect with the public and establish a direct link to the desired outcome. [7]

The Safe System approach involves a holistic view of the transportation system and the interactions among travel speeds, vehicles and road users. It is an inclusive approach that prioritizes safety for all user groups of the transportation system - drivers, motorcyclists, passengers, pedestrians, bicyclists, and commercial and heavy vehicle drivers. Consistent with the region's long-term safety vision, it recognizes that people will always make mistakes and may have road crashes—but the system should be designed so that those crashes should not result in death or serious injury. Design emphasizes separation – between people walking and bicycling and motor-vehicles, access management and median separation of traffic – and survivable speeds.



Vision Zero is a Safe System approach
Source: Vision Zero Network

The Safe System approach focuses on **key guiding principles** that shape how transportation safety is addressed.

1. **No death or serious injury is acceptable** – lack of safety should not be a trade-off for faster mobility. Rather, the transportation system should be both safe and efficient.

2. **Traffic deaths and severe injuries are preventable** - the focus is on fatal and severe injury crashes, not all crashes. This is one of the most important shifts in how traffic safety is perceived and addressed, shifting the focus to how and where people are dying. It helps prioritize and focus efforts to lead to more immediate outcomes.

3. **People make mistakes that can lead to road crashes** – design roadways so that crashes do not result in a serious injury. Safety should focus on systems-level changes above influencing individual behavior.

[7] Sustainable and Safe: A Vision and Guidance for Zero Road Deaths (2017) World Resources Institute and Global Road Safety Facility

4. **Humans are vulnerable to injury** – especially people walking, bicycling, riding motorcycles and working in the right-of- way, and we must operate our transportation system to avoid serious injury.

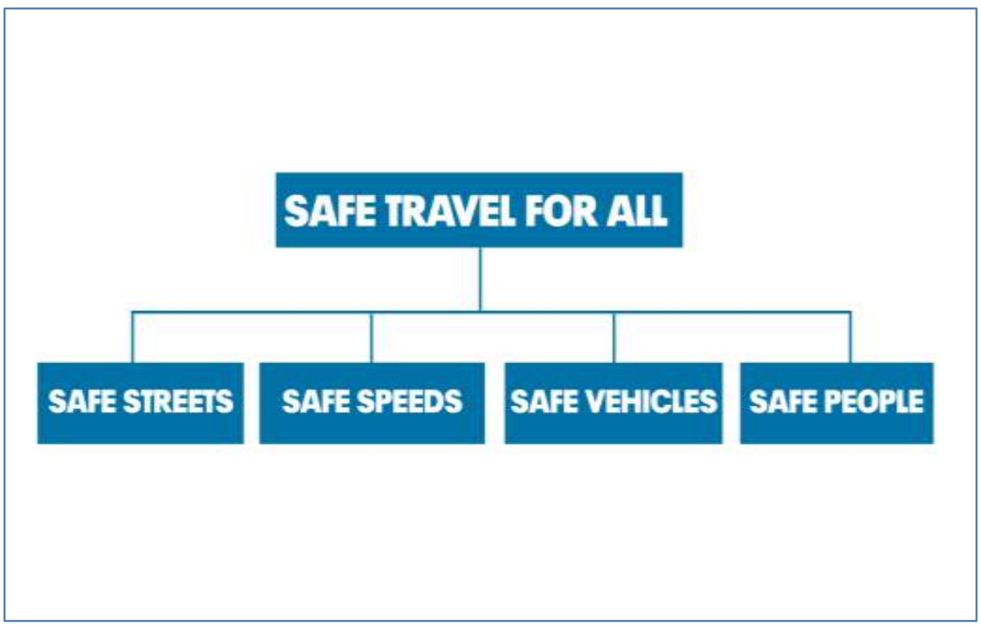
5. **Responsibility is shared** – the people that design, build, manage, and use roadways and vehicles and provide post-crash care have a shared responsibility to prevent severe injuries and deaths.

6. **Proactive versus reactive actions** – rather than waiting for events to occur and reacting, a proactive approach should be taken to make the transportation system safe, systemically addressing risk. All parts of the system must be strengthened so that if one part fails road users are still protected.

7. **Data driven decision making-** use data, research and evaluation to understand crashes and risks and to guide decision making.

The Safe System approach provides a framework for strategies and actions that starts with safe travel for all, including reducing disparities for people of color and people with low incomes and for people walking and bicycling. It focuses on proven and effective strategies that create safe streets, safe speeds, safe vehicle and safe people.

Governments are increasingly using the Safe System approach because it is proving to be effective in the countries where it has been in place for decades. Many countries, states, and cities that have adopted a Safe System approach have reduced road fatalities at a faster rate than others that followed the traditional approach.[8]



Vision Zero Safe System Approach
Source: Vision Zero Network

[8] Sustainable and Safe: A Vision and Guidance for Zero Road Deaths (2017) World Resources Institute and Global Road Safety Facility

Six data-driven strategies

The Regional Transportation Safety Strategy identifies six strategies and fifty-three actions to address findings from analysis of 2011-2015 crash data. Strategies and actions with proven effectiveness were prioritized. Actions for each strategy can be found in Chapter 4.

1 Protect vulnerable users and reduce disparities[9]

Vulnerable users have higher fatality rates. Increasing safety for vulnerable users increases safety for all transportation users and reduces disparities.

2 Design roadways for safety

Arterial roadways have the highest serious crash rate per road mile and per vehicle mile traveled. Prioritizing and standardizing safety in street design for all modes can prevent dangerous behaviors and save lives.

3 Reduce speeds and speeding

Speed is a fundamental contributing factor in crash severity. Reducing speeds and speeding saves lives.

4 Address aggressive and distracted driving

Dangerous behaviors include those that arise from aggressive or distracted driving and can lead in an instant to injury or death. Policies and roadway design can reduce the likelihood of and minimize the impact of bad decisions.

5 Address impairment

Crashes involving alcohol and drugs have a much higher likelihood of being fatal than other crashes. Providing options to people using the roadways while drunk or intoxicated saves lives.

6 Ongoing engagement and coordination

Many partners are needed to implement Vision Zero. Ongoing engagement and coordination among all partners is essential.

Reaching towards Vision Zero will be a challenge, but not impossible

Vision Zero is an ambitious goal but one the region must strive for. With coordinated effort, proven strategies and focused investments the region can move towards Vision Zero. Safety projects in the 2018 Regional Transportation Plan and on the region's High Injury Corridors and Intersections will make it safer to walk, catch the bus, drive, and ride a bicycle or motorcycle. They will address streets with high risk characteristics and prevent crashes from happening. Programs will educate and inform people on safer behaviors and connect people with travel options that reduce driving, thereby reducing exposure to traffic crashes.

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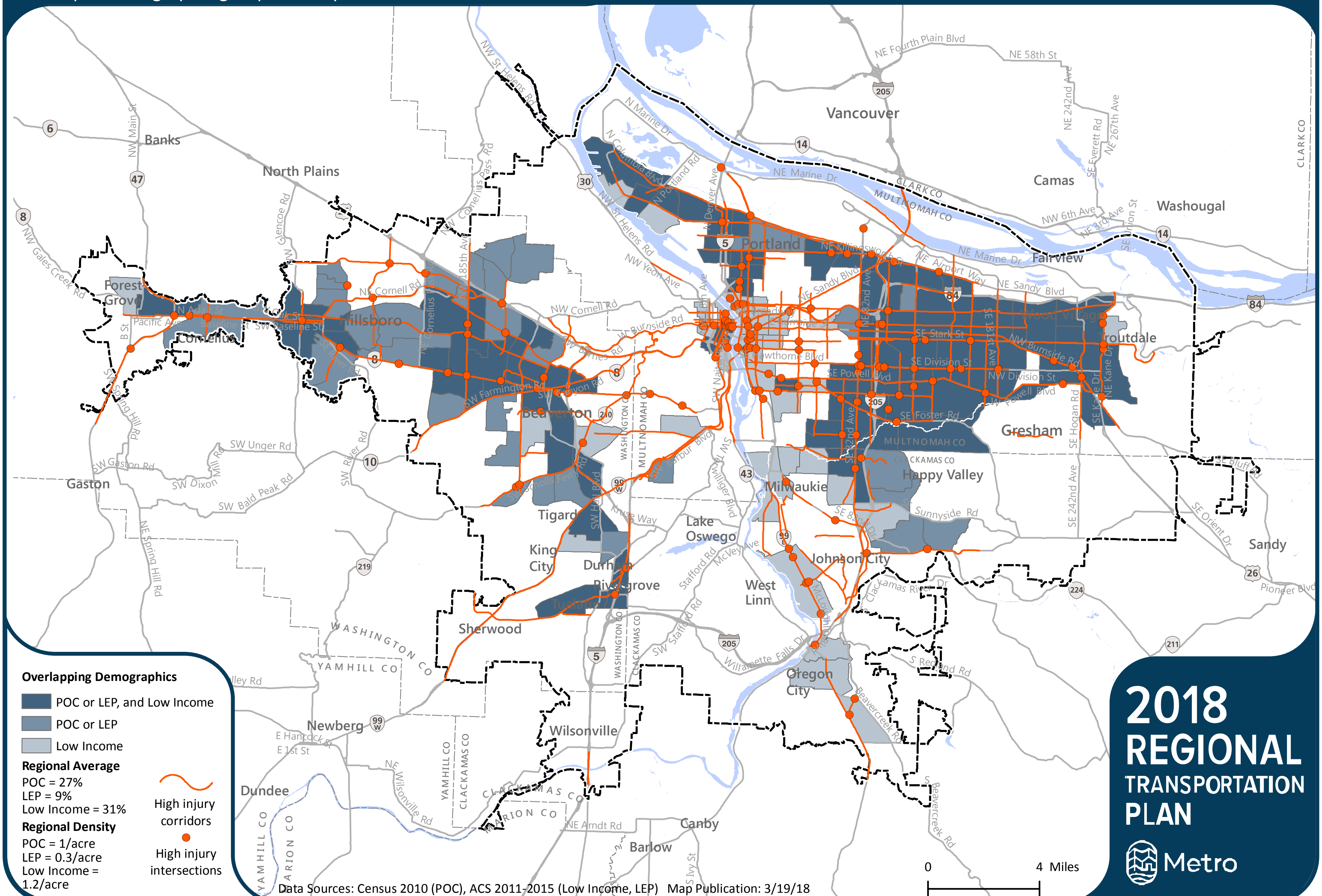
[9] Vulnerable users are people that are more vulnerable to being killed or seriously injured in crashes. Vulnerable users are pedestrians, bicyclists, motorcycle operators, children, older adults, road construction workers, people with disabilities, people of color and people with low income

High Injury Corridors Overlapping Communities of Color, English Language Learners, and Lower-Income Communities

This map shows the overlap of regional high injury corridors and road intersections with census tracts with higher than regional average concentrations and double the density of one or more of the following: people of color, people with low income, and English language learners. Census tracts where multiple demographic groups overlap are identified.



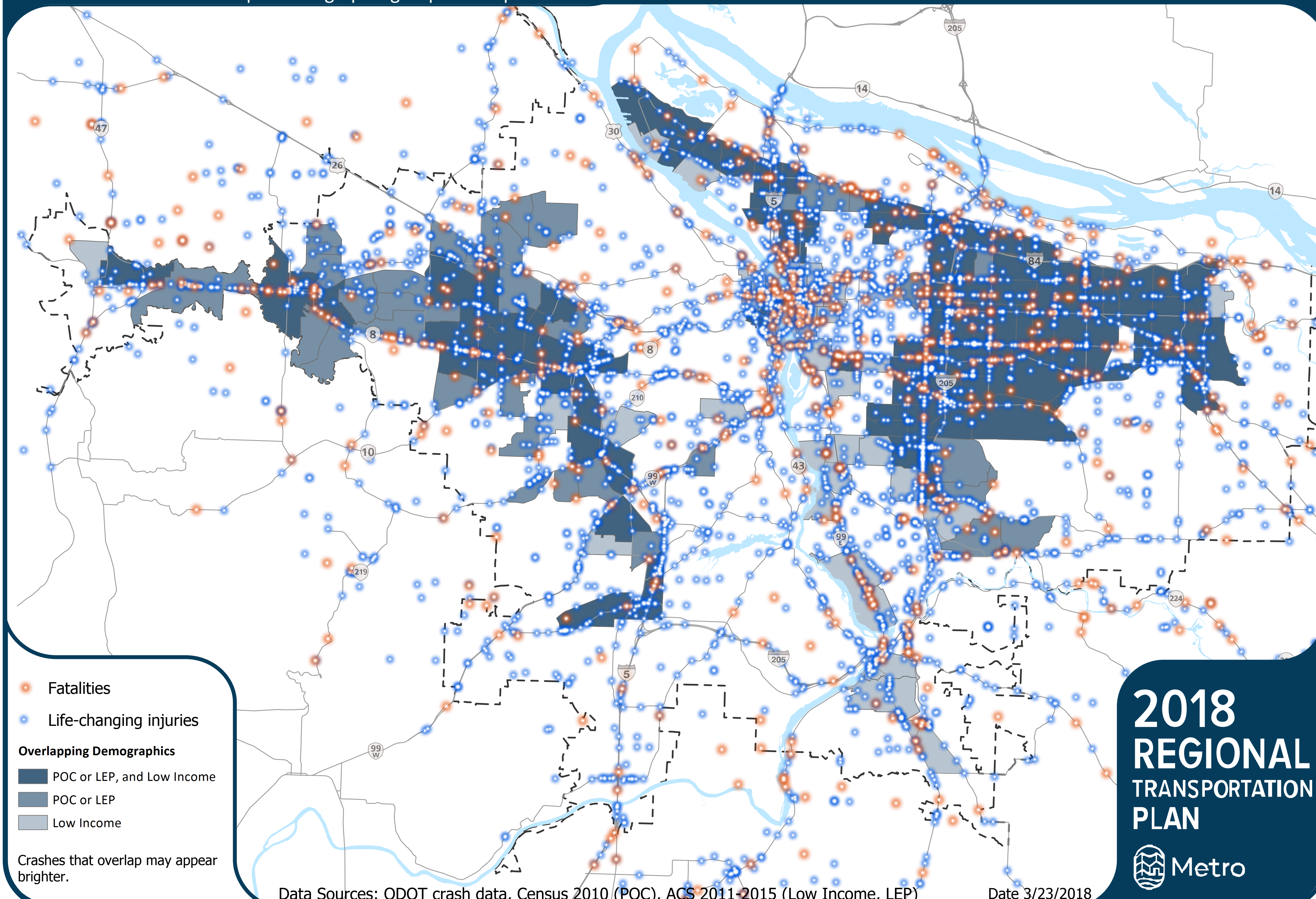
Data Sources: Census 2010 (POC), ACS 2011-2015 (Low Income, LEP) Map Publication: 3/19/18

2018 REGIONAL TRANSPORTATION PLAN

Metro

Fatal and Serious Crashes Overlapping Communities of Color, English Language Learners, and Lower-Income Communities

This map shows the overlap of fatal and life changing crashes involving people driving, biking and walking with census tracts with higher than regional average concentrations and double the density of one or more of the following: people of color, people with low income, and English language learners. Census tracts where multiple demographic groups overlap are identified.



Data Sources: ODOT crash data, Census 2010 (POC), ACS 2011-2015 (Low Income, LEP)

Date 3/23/2018

2018 REGIONAL TRANSPORTATION PLAN

Metro

WE REMEMBER

Your stories inspire us to take serious action.

The Regional Transportation Safety Strategy is dedicated to the victims of traffic violence in the Portland region—the daughters, sons, mothers, fathers, wives, husbands, siblings, and friends who have been killed or severely injured on our streets.

Oregon and SW Washington Families for Safe Streets is comprised of victims of traffic violence and families whose loved ones have been killed or severely injured by aggressive or reckless driving and dangerous roadway conditions in Oregon and SW Washington. The group is modeled after the original Families for Safe Streets group banded together in New York City in 2014. With stories and advocacy, Oregon and SW Washington Families for Safe Streets seek cultural and physical changes on streets and the rapid implementation of Vision Zero. Oregon and SW Washington Families for Safe Streets envision communities where pedestrians, bicyclists and vehicles safely co-exist, and children and adults can travel freely without risk of harm – where no loss of life in traffic is acceptable.

Community member story

Community member story

Community member story

Community member story

On December 28, 2005, my neighbor Peilian Wu was killed crossing NW Walker Road (at NW 180th Ave) to get to the bus stop that we both used. I felt great grief for her and her family, and astonished grief as a fellow pedestrian. Fei Fei and Dong Dung lost their grandmother who they lived live within a three generation household. Her fellow employees lost an infectious cheerful co-worker, I lost a dynamic good neighbor, and we lost a valued community member. It took me three years before I mustered the courage to cross the road to use that bus stop again or to walk to the local park and stores.

One death or fatal injury by vehicle crashes is one death too many. We can and must do better to make our communities safer for people of all ages to walk, whether to get to shops, schools or parks, for physical or mental health boosts, or just to enjoy some time and company out in our community. ~Kathryn Harrington, Metro Councilor

Public awareness campaigns can be an effective way to engage the public, such as ODOT's Oregonian Crossing campaign, spreading the message that every intersection is a crosswalk
Photo: Metro

CHAPTER 1 INTRODUCTION

The Regional Transportation Safety Strategy ("Regional Safety Strategy") sets regional transportation safety policy for the Regional Transportation Plan and provides a framework for working towards zero traffic related deaths and severe injury crashes in the region by 2035.

The Regional Safety Strategy provides the transportation safety action plan for the greater Portland region, defined as the area within the Metropolitan Planning Area (MPA). The MPA is slightly larger than the region's Urban Growth Boundary. The Regional Safety Strategy is a topical plan of the Regional Transportation Plan.

This Introduction provides context for the Regional Safety Strategy, including the role of Metro in transportation safety planning for the region, the policy framework that was used to guide the development of the Regional Safety Strategy, relationship to other plans, the planning process and public engagement, and the organization of the document.

Transportation safety is protection from death or bodily injury from a motor-vehicle crash through design, regulation, management, technology and operation of the transportation system.

Personal and public security is protection from intentional criminal or antisocial acts while engaged in trip making through design, regulation, management, technology and operation of the transportation system.

1.1 Metro's role in transportation safety planning

As the region's metropolitan planning organization (MPO), Metro has a variety of roles and requirements in transportation safety planning.

1. Safety policy and planning.
    - Setting and reporting on federally required safety performance targets.
    - Developing the Regional Transportation Safety Strategy and the Regional Transportation Plan (RTP), including safety goals, objectives, targets and performance measures, policies, strategies and actions, and investment strategies.
    - Reporting on performance outcomes measured against level of investment.
    - Allocating federal transportation funding through a project selection process informed by regional safety policies.

- Developing and reporting on the Metropolitan Transportation Improvement Plan (MTIP), including project consistency with regional plans and policies.
- Reviewing local comprehensive and transportation plans for consistency with the Regional Transportation Plan.
- Supporting and introducing safety legislation.
- Convening jurisdictions and agencies to achieve better coordination.

2. Data collection, maintenance, analysis and interpretation.
   - Gathering and maintaining data such as roadway network, traffic volumes, and vehicle miles traveled.
   - Improving crash and risk data and analysis tools.
   - Coordinating with the Oregon Department of Transportation and other partners on crash data.
   - Analyzing, interpreting and sharing regional data.
3. Encouraging best practices in transportation safety and roadway design with funding and programmatic support.
   - Developing regional street design guidelines.
   - Developing criteria for regional funding sources.
   - Supporting use of tools such as the Highway Safety Manual.
4. Collaborating on efforts to highlight safety in materials, messaging and campaigns.

1.2 Policy framework for the Regional Safety Strategy

This section describes the policy framework that guided the development of the Regional Safety Strategy. A review of current federal, state, regional and local policies related to transportation safety reveal a continuing and growing emphasis on transportation safety for all modes.[10] Five themes emerged from the policy review. The policy framework coupled with analysis of regional crash data guide the policies, strategies and actions in the Regional Safety Strategy.

1. Setting ambitious transportation safety goals for zero deaths and serious injuries.
2. Growing use of the Safe System approach, evident is policies such as Vision Zero, Towards Zero Deaths and Drive to Zero, to achieve better safety results.
3. Using data driven decision making, using data, performance measurement, and evaluation to develop data driven safety plans, strategies and actions and monitor progress towards goals.
4. Applying social equity (especially for race and income) and public health perspectives into safety plans and policy.

[10] Metro Transportation Safety Policy Framework Report, July 2016

5. Recognition of vulnerable users and the need to take additional actions to protect them.

Each of the five policy themes is explained in more detail below.

❶Setting ambitious goals

Setting a goal of zero or near zero deaths and severe injuries, with interim targets for reaching the goal, reflects the perspective that these deaths are not accepted as unpreventable deaths.[11] Setting ambitious transportation safety goals is increasingly used as a policy tool because ambitious goals are resulting in better outcomes, when those ambitious targets are supported by rigorous interventions and prioritization.[12] A recent report by the World Resources Institute found that many countries, states and cities that have adopted a Safe System approach have reduced road fatalities at a faster rate than others that followed a more traditional approach.[13] These places have also set ambitious targets, but the key is that they are supported by specified interventions and a coordinated leadership implementing the actions. In the U.S. from the federal level down, setting ambitious goals is redefining how safety is addressed:

- In October 2016, the U.S. Department of Transportation and the National Safety Council launched the 'Road to Zero' Coalition to end roadway fatalities in the next thirty years. The Secretary of Transportation noted that "setting the bar for safety to the highest possible standard requires commitment from everyone to think differently about safety – from drivers to industry, safety organizations and government at all levels."[14]
- In 2016, Oregon adopted its Transportation Safety Action Plan with a target of zero serious crashes by 2035.
- In the early 2000s, Washington and Minnesota were the first states to adopt the Toward Zero Deaths goal into their safety plans. Both states have had fewer fatalities and severe injury crashes, than did non-Toward Zero Deaths states and the rate of decline was faster.[15]
- Clackamas County has been a leader in setting aggressive safety targets. The county was the first local government in the state to develop a safety action plan. It uses the Toward Zero Deaths framework.

[11] Sustainable and Safe: A Vision and Guidance for Zero Road Deaths (2017) World Resources Institute and Global Road Safety Facility
[12] Towards Zero: Ambitious Road Safety Targets and Safe Systems Approach (2008) Transport Research Centre
[13] Sustainable and Safe: A Vision and Guidance for Zero Road Deaths (2017) World Resources Institute and Global Road Safety Facility
[14] Road to Zero Coalition, National Safety Council http://www.nsc.org/learn/NSC-Initiatives/Pages/The-Road-to-Zero.aspx and https://www.nhtsa.gov/press-releases/us-dot-national-safety-council-launch-road-zero-coalition-end-roadway-fatalities
[15] Munnich, Lee W., Jr., F. Douma, X. Qin, J.D. Thorpe, and K. Wang. 2012. Evaluating the Effectiveness of State Toward Zero Deaths Programs. Technical Report. Minneapolis: Center for Excellence in Rural Safety, University of Minnesota.

- Over 40 cities in the U.S. have adopted Vision Zero plans and have identified themselves as Vision Zero cities, including the City of Portland. The City of Portland has adopted a Vision Zero target for 2025 and developed an ambitious Vision Zero Plan with an equity lens. In 2016, the City of Hillsboro adopted a safety action plan with a target of zero by 2035. Beaverton completed a Transportation Safety Action Plan in 2017 with a goal of zero fatalities and severe injuries by 2035. Washington County has completed a plan with a vision of moving towards zero deaths.

❷ Use a Safe System approach

The Safe System approach has been developed and refined over many decades of application. Since it was first introduced, in Europe, it has been taken up at the country, state, and city levels around the world. The U.S. Department of Transportation is taking initial steps towards applying the Safe System approach at the national level.[16]

The system is often branded under a public policy identity, such as Vision Zero or Toward Zero Deaths, which aims to connect with the public and establish a direct link to the desired outcome. The best-known brand may be Sweden's Vision Zero. The name of this policy refers to the foundational principle that no loss of life should be acceptable on the roads. It also establishes an ambitious target to reach zero traffic fatalities. [17]

The Safe System approach involves a holistic view of the transportation system and the interactions among travel speeds, vehicles and road users. It is an inclusive approach that prioritizes safety for all user groups of the transportation system - drivers, motorcyclists, passengers, pedestrians, bicyclists, and commercial and heavy vehicle drivers. Consistent with the region's long-term safety vision, it recognizes that people will always make mistakes and may have road crashes—but the system should be forgiving and those crashes should not result in death or serious injury.

Whether the approach is called Vision Zero, Toward Zero Deaths, or Road to Zero, the Safe System approach focuses on **key guiding principles** that shape how transportation safety is addressed.

1. **No death or serious injury is acceptable** – lack of safety should not be a trade-off for faster mobility. Rather, the transportation system should be both safe and efficient.

[16] *New Safety UTC Envisions Safe Systems Approach for U.S. Roadways.* (October 2017) University Transportation Centers Program and U.S. DOT Office of the Assistant Secretary for Research and Technology.
https://www.transportation.gov/sites/dot.gov/files/docs/utc/286546/utcnewsletter115october.pdf
This national safety UTC is focused on implementing a collaborative, multidisciplinary, safe systems approach to reducing transportation-related injuries and fatalities, and to helping traffic safety become recognized as a public health priority in the United States.

[17] Sustainable and Safe: A Vision and Guidance for Zero Road Deaths (2017) World Resources Institute and Global Road Safety Facility

2. **Traffic deaths and severe injuries are preventable** - the focus is on fatal and severe injury crashes, not all crashes. This is one of the most important shifts in how traffic safety is perceived and addressed, shifting the focus to how and where people are dying. It helps prioritize and focus efforts to lead to more immediate outcomes.

3. **People make mistakes that can lead to road crashes** – design roadways so that crashes do not result in a serious injury. Safety should focus on systems-level changes above influencing individual behavior.

4. **Humans are vulnerable to injury** – especially people walking, bicycling, riding motorcycles and working in the right-of- way, and we must operate our transportation system to avoid serious injury.

5. **Responsibility is shared** – the people that design, build, manage, and use roadways and vehicles and provide post-crash care have a shared responsibility to prevent severe injuries and deaths.

6. **Proactive versus reactive actions** – rather than waiting for events to occur and reacting, a proactive approach should be taken to make the transportation system safe, systemically addressing risk. All parts of the system must be strengthened so that if one part fails road users are still protected.

7. **Data driven decision making**- use data, research and evaluation to understand crashes and risks and to guide decision making.

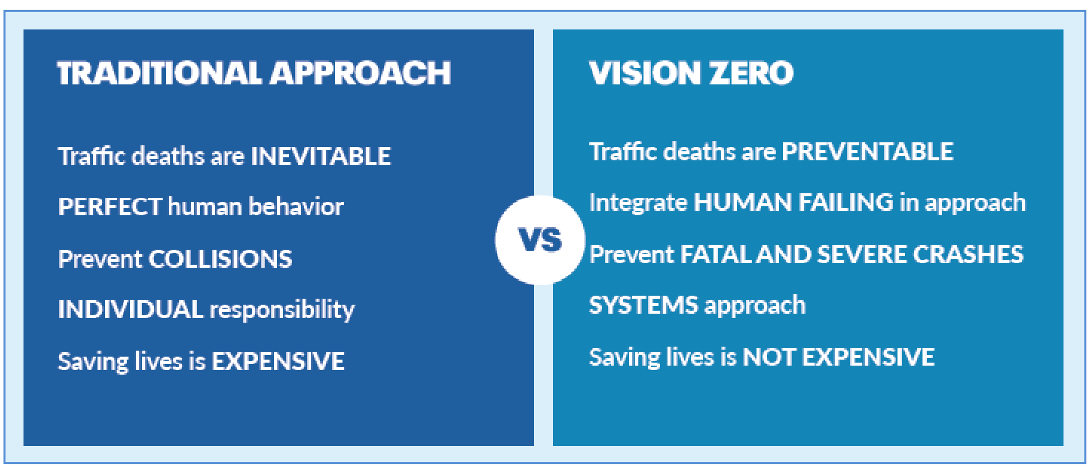


Figure 1: Vision Zero is a Safe System approach
Source: Vision Zero Network

The Safe System approach provides a framework for strategies and actions that starts with safe travel for all, including reducing disparities for people of color and people with low incomes and for people walking and bicycling. Figure X illustrates the Safe System approach framework.[18]

Safe travel for all embraces the guiding principle that serious traffic crashes are preventable and that no death or severe injury is acceptable.

Safe streets encompasses roadway design that reduces the severity of crashes, education on how to navigate new roadway designs, information such as signage, and technology such as automated speed enforcement. Safety features are integrated into the road design from the outset, including segregating road users, segregating motor-vehicle traffic with medians and barriers, setting appropriate speeds to slow traffic, and designing roads that are "self-explaining" that is, they are designed so that the road user is aware of what is expected of them and behaves appropriately. There is also an emphasis on a proactive approach to road safety, with improvements made to improve both the actual and perceived risks of road safety.

Safe speeds encompasses reducing speeding, evaluating how posted speeds are set and establishing appropriate speed limits, enforcing existing speed limits, especially with automated speed enforcement, and educating road users. Speed is a primary factor in the severity of many crashes and reducing speeding and speeds is seen as a critical way to prevent serious crashes. [19] Speed limits in safe systems are based on aiding crash avoidance and a human body's limit for physical trauma.

Safe vehicles encompasses vehicle technology and licensing and registration, including increasing the frequency of license testing. Vehicles are designed, built and regulated to minimize the occurrence and consequences of crashes, with the emphasis on collision survivability. There are two main strands to safer vehicles – technology and road-worthiness. Vehicle technology, such as autonomous vehicles, holds great promise for improving safety, but policies and regulations will be needed to ensure that all road users benefit equally.

Safe people encompasses education and coordination focused on reducing traffic and road rule compliance. Programs such as Safe Routes to School provide foundational transportation behavior training. Campaigns, messaging, media and public perception all inform how people operate and travel within the public right-of-way.

[18] The safe systems approach to road safety, Brake the road safety charity, UK (September 2015) http://www.brake.org.uk/facts-resources/15-facts/1484-safe-systems-facts-page

[19] Safety Study: Reducing Speeding-Related Crashes Involving Passenger Vehicles, National Transportation Safety Board (2017)

Figure 2: Vision Zero Safe System Approach
Source: Vision Zero Network

Governments are increasingly using the Safe System approach because it is proving to be effective in the countries where it has been in place for decades. Many countries, states, and cities that have adopted a Safe System approach have reduced road fatalities at a faster rate than others that followed the traditional approach.[20]

❸ Data driven decision making

A data driven approach to safety uses crash data, risk factors, and other supported methods to identify the best possible locations to achieve the greatest benefits. Within the Safe System approach the focus is on fatal and severe injury crashes, not all crashes, and systemic approaches to prevent serious crashes from occurring.

Policies at all levels of government emphasize collecting and tracking data on fatal and severe injury crashes, crash risks, contributing factors and countermeasures to crashes to inform plans and investments. Understanding why fatal and severe injury crashes occur and who is most vulnerable is used to direct limited investments and to develop policies and actions to reduce fatal and severe crashes.

Strategies to improve data collection and availability (timelines, accuracy, etc), types of data available (post-hospital data, demographics, etc) must be pursued to support data driven plans and policies. Also needing greater attention is how crash risk is defined and addressed. Crash risk must be carefully defined based on data.

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[20] Sustainable and Safe: A Vision and Guidance for Zero Road Deaths (2017) World Resources Institute and Global Road Safety Facility

Figure 3: Data driven safety analysis
Source: Federal Highway Administration

The Federal **Highway Safety Improvement Program** (HSIP) requires a data driven, strategic approach to improving highway safety that focuses on performance. Beginning in 2016, the HSIP National Summary Report includes an evaluation of how states are using data-driven safety decision making to support their safety action plans.[21]

The Oregon Department of Transportation's **All Roads Transportation Safety** program (ARTS) uses federal funds from the Highway Safety Improvement Program, and uses a data driven approach that addresses safety for all public roads in the state of Oregon.[22]

The **2018 Metro State of Safety Report** documents roadway crash data and patterns in the region. The Oregon Department of Transportation has assembled and distributed statewide crash data since 2007. The data includes numerous information fields for each geocoded crash and is complemented by Metro datasets of transportation infrastructure, transportation operations, and spatial data. The combination of these provides the opportunity of detailed analyses of the safety of the region's transportation system and land use patterns.

❹ Applying a racial equity and public health lens

A review of current policies shows that there is a growing need to more explicitly link equity and public health with transportation safety planning.

- Recognizing that transportation related injuries and fatalities are a public health priority and applying public health principles to solve a population health issue is one way that a public health lens is being applied to transportation safety.

- Recognizing the disproportionate impact of serious traffic crashes on people of color, people with low incomes and older adults and taking equity driven actions to reduce the disproportionate impact on these populations is one way that an equity lens is being applied to transportation safety.

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[21] U.S. Department of Transportation, Federal Highway Administration, Highway Safety Improvement Program (HSIP) https://safety.fhwa.dot.gov/hsip/ (April, 2017)
[22] Oregon Department of Transportation, All Roads Transportation Safety, http://www.oregon.gov/ODOT/Engineering/Pages/ARTS.aspx

The Regional Safety Strategy applies a public health and race and income equity lens to the policies, strategies and actions. Additionally, it looks at the safety issues for other vulnerable groups such as children, older adults, and people walking, bicycling or riding motorcycles.

Equity

Numerous reports and studies, mostly at the national level, are providing data showing that your risk of dying in a motor-vehicle involved crash is higher if you are a person of color, are over 65 or have a lower income.[23] These disparities in public health and safety outcomes demonstrate the need and necessity to apply an equity and public health lens.

Title VI of the Civil Rights Act of 1964 prohibits discrimination of any person based on race, color, and national origin in programs and activities receiving federal financial assistance, including transportation. This important legislation is a cornerstone to providing an equitable transportation system, however it does not address the systemic effects of racism which continue to create inequitable outcomes for communities of color, including in transportation safety. Applying a racial equity lens in analysis and in the development of policies, strategies and actions begins to identify ways to address the systemic effects of racism.

In 2016, Metro adopted the Strategic Plan to Advance Racial Equity, Diversity and Inclusion.[24] The Racial Equity Strategy, as it is known, lays the foundation for the region's policy approach to reducing disparities and eliminating barriers for people of color. The Metro Council provided policy direction that the Regional Transportation Plan and its topical and modal plans to use a racial and income equity lens when developing policies, strategies and actions.

Racial equity, as defined in the Regional Transportation Plan, is when race can no longer be used to predict life outcomes and outcomes for all groups are improved.

[23] *Motor Vehicle Traffic-Related Pedestrian Deaths — United States, 2001–2010*, Centers for Disease Control and Prevention (2013); *Dangerous by Design*, National Complete Streets Coalition (2016); *Income Disparities in Street features that Encourage Walking*, Bridging the Gap (2012); *Pedestrians Dying at Disproportionate Rates in America's Poorer Neighborhoods*, Governing, August 2014; *America's Poorer Neighborhoods Plagued by Pedestrian Deaths*, Governing Research Report (August 2014)
[24] Racial Equity Strategy, Metro, June 2016 https://www.oregonmetro.gov/strategic-plan-advance-racial-equity-diversity-and-inclusion

Figure 4: Metro's Racial Equity Strategy

Public health

Public health and transportation have long been linked, and more recently traffic deaths and serious injuries are being seen as a public health crisis. As part of the built environment, where you live and travel (and your zip code) is one of the social determinants of health.

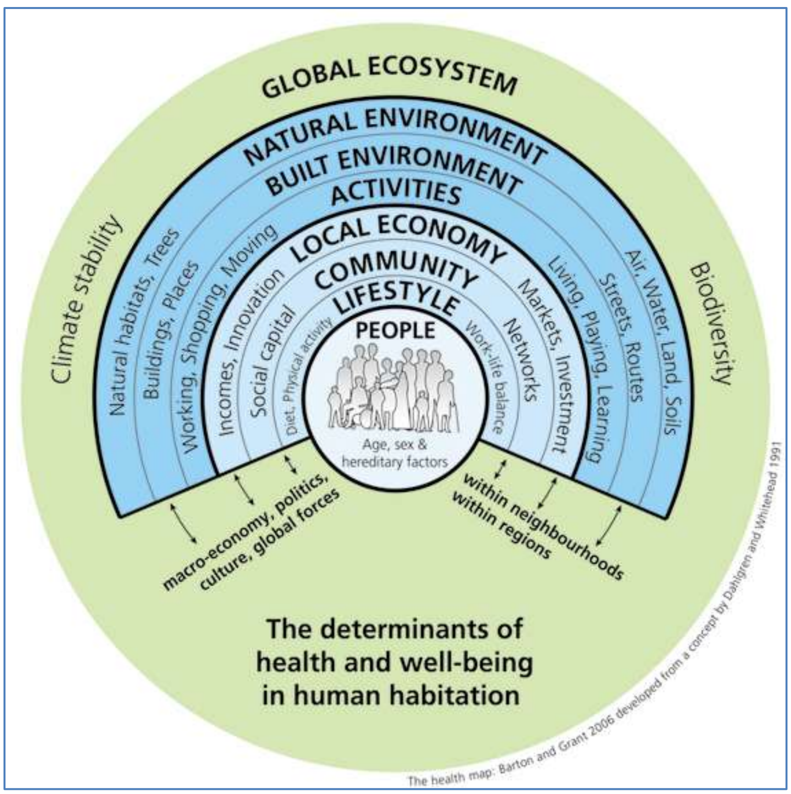

Figure 5: Health map showing streets and transportation routes are one of the determinants of health
Source: Barton and Grant, 2006

The Safe System approach to transportation safety recommends that all areas of government, including public health and transportation, must work together and coordinate to achieve zero serious crashes.

The Centers for Disease Control has identified reducing serious crashes as a "winnable battle" because of the large-scale impact to public health, because evidence-based interventions exist and can be broadly implemented and intensive focus and efforts could have a significant impact in a relatively short period of time.[25]

Applying public health principles to transportation safety requires looking at safety from a different perspective. For example, public health principles focus on upstream interventions that have increasing population impact and decreased individual effort. Interventions that require high amounts of individual effort have a relatively small population impact, while interventions that require low individual effort have a high population impact.[26]

> ***The health of Oregonians is also directly connected to transportation safety.***
>
> ***-Oregon Transportation Options Plan, 2015***

❺ Prioritize vulnerable users

Vulnerable users are people that are more vulnerable to being killed or seriously injured in crashes. Vulnerable users are pedestrians, bicyclists, motorcycle operators, children, older adults, road construction workers, people with disabilities, people of color and people with low income.

Emphasizing this policy theme in the Regional Safety Strategy helps identify strategies and actions to reduce disparities for these populations and provide safe travel for all.

The most recent Dangerous by Design report identifies people of color, people with low incomes and older adults as the populations most vulnerable to traffic deaths. The report states that between 2005 and 2014, Americans were 7.2 times more likely to die as a pedestrian than from a natural disaster.[27]

The U.S. Department of Transportation launched the **Safer People, Safer Streets Initiative** in early 2015, recognizing that bicyclist and pedestrian injuries and fatalities have steadily

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[25] CDC Winnable Battles Final Report
Winnable battles are high burden, high priority public health work focused n aligning and accelerating intra- and inter-agency work and encouragement programs to think more broadly about partnerships beyond traditional public health partners.

[26] Health Impact Pyramid. Thomas Friedman.

[27] Dangerous by Design 2016 (January 2017) Smart Growth America, National Complete Streets Coalition

increased since 2009 while motor vehicle crash fatalities have declined.[28] The goal of the Initiative is to increase safety for people walking and bicycling, and states that supporting walking and bicycling "supports national goals."

In order to reduce the risk of increased exposure to traffic injury and air pollution for all road users, PHD recommends that Metro prioritize the design and maintenance of non-automobile facilities by:

- ***Including safety features for pedestrians and bicyclists such as separation from motorized traffic when possible. Prioritize non-automobile users in design and maintenance of streets.***
- ***Providing a parallel bicycle route one block removed from high-volume roads when feasible to reduce exposure to localized pollution while still maintaining access to community destinations.***

- Oregon Health Authority, Community Climate Choices Health Impact Assessment

1.3 Relationship to other plans

Transportation safety is an element of all state, regional and local land use and transportation plans and is achieved through the implementation and update of these plans. This section describes plans that relate to the Regional Safety Strategy.

A safer transportation system is sustainable and can help meet broader environmental, social and health goals identified in our land use and comprehensive plans. Increasing and promoting public transportation, walking and bicycling can help mitigate climate change and improve air quality by reducing carbon dioxide emissions from motor vehicles. Increasing the safety and security of public transportation, walking and bicycling also increases people's physical activity and enhances their quality of life and ability to access jobs and education. A transportation system that offers a variety of safe transportation options can better address the needs of a variety of demographic groups, including people of color, women, people with low incomes, people with limited mobility, youth and older adults.

[28] Safer People, Safer Streets: Summary of the U.S. Department of Transportation Action Plan to Increase Walking and Biking and Reduce Pedestrian and Bicyclist Fatalities (September 2014)

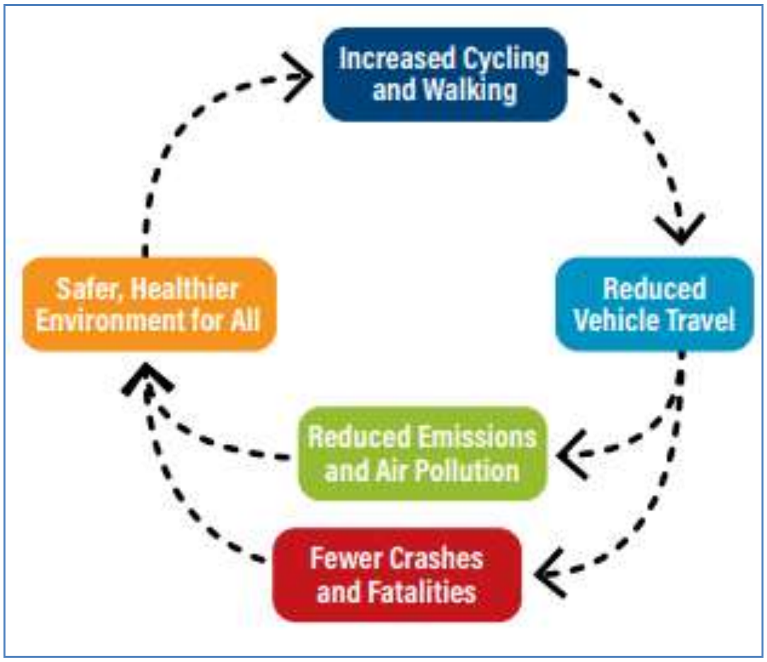

Figure 6: Environmental and Health Benefits of a Safe Transportation System
Source: Sustainable and Safe: A Vision and Guidance for Zero road Deaths (2017)

Transportation Planning Rule (TPR)

The Oregon Transportation Planning Rule (TPR) is located in Division 12, Chapter 660 of the Oregon Administrative Rules and implements Statewide Planning Goal 12 (Transportation) which "promotes the development of safe, convenient and economic transportation systems." The rule emphasizes a reduction in vehicle miles traveled specifies what local governments and state agencies are responsible for with transportation planning to meet the broad objectives of Goal 12.

Specifically, the Transportation Planning Rule requires jurisdictions within a Metropolitan Planning Organization area to adopt a Transportation System Plan that contains specific elements including a public transportation plan, a bicycle and pedestrian plan, a parking plan and transportation financing program. While safety is a theme and element of the Transportation Planning Rule, there is currently no requirement that transportation safety plans be developed as part of the Transportation System Plan.

Action 6.14 of the Regional Safety Strategy recommends updating sections of OAR 660-012-0000 the Transportation Planning Rule to require Transportation System Plans to include a transportation safety plan and to identify safety as a need and to clarify that making a known safety problem worse constitutes a "significant effect."

Oregon Transportation Safety Action Plan (TSAP)

The Federal Highway Administration requires every state to have a Strategic Highway Safety Plan, a statewide coordinated safety plan providing a comprehensive framework for reducing fatalities and severe injuries. The Oregon Transportation Safety Action Plan serves as the Oregon Strategic Highway Safety Plan and must be updated every five years.

In 2016, the Oregon Transportation Commission adopted an updated Oregon Transportation Safety Action Plan with a target of zero traffic deaths and severe injuries by 2035. The plan identifies Emphasis Areas for near term focus, goals, policies and strategies. It addresses all modes on all public roads in Oregon.

The Oregon Transportation Safety Action Plan shapes regional and local safety plans, including the Regional Safety Strategy, and is in turn shaped by and responsive to the needs identified in local, county, regional and Tribal safety plans.

2040 Growth Concept

The 2040 Growth Concept is the greater Portland area's long-range growth management plan and provides a concept of land-use and transportation policies. Among other things, it emphasizes providing transportation choices and safe neighborhoods.

The Urban Growth Management Functional Plan provides tools to meet goals of the 2040 Growth Concept and the Regional Transportation Functional Plan (see below) implements the transportation elements of the 2040 Growth Concept.

Both the 2040 Growth Concept and the Urban Growth Management Functional Plan provide the land use context to which transportation decisions, including actions to reduce crashes and increase transportation safety, are guided by.

Regional Transportation Plan (RTP)

The Regional Transportation Plan is the transportation system plan for the greater Portland area and lays out the region's transportation concepts and policies to support a complete and interconnected transportation system that supports all modes of travel and implementation of the 2040 Growth Concept.

For the 2018 update, safety was identified as a key policy area. The Regional Safety Strategy is a topical plan of the 2018 Regional Transportation Plan and updates the transportation safety elements.

Regional Transportation Functional Plan (RTFP)

The Regional Transportation Functional Plan is the implementing plan of the Regional Transportation Plan and specifies what local Transportation System Plans are required to include. It serves as the primary transportation policy implementation of the 2040 Growth Concept.

For safety, the Regional Transportation Functional Plan specifies that:

- New street construction and re-construction must be designed to improve safety (3.08.110 A);
- Cities and counties must consider safety improvements (along with TSMO strategies and operational and access management improvements) before other strategies to meet transportation needs and performance targets and standards (3.08.220);

- Each city and county shall include performance measures for safety (3.08.230 D);

The Regional Safety Strategy includes Action 6.13 which recommends updating the Regional Transportation Functional Plan to require Transportation System Plans to include a transportation safety action plan, with data analysis that addresses all modes and is based on a safety inventory based on both an analysis of crash rates and an analysis of crash risks; to require that Transportation System Plans identify safety as a need; and to require that transportation projects do not make a known safety problem worse, and to be consistent with the Regional Safety Strategy.

Topical and modal plans of the Regional Transportation Plan
Transportation safety is a component of other regional topical and modal plans of the Regional Transportation Plan, including the Climate Smart Strategy, Regional Freight Plan, Regional Transit Plan, Regional Travel Options Plan, Transportation System Management and Options Plan, RTX the Emerging Technologies Strategy and the Regional Active Transportation Plan. Implementing these plans helps achieve Vision Zero. Additionally, Metro's regional street and trail design guidelines emphasize engineering and design treatments to achieve Vision Zero streets.

Local Comprehensive Plans
Oregon's statewide planning goals are achieved through local comprehensive plans. Comprehensive plans are long-range plans which include the goals and policies to help jurisdictions prepare for and manage expected population and economic growth.

Local Transportation System Plans and Transportation Safety Action Plans are parts of the overall Comprehensive Plan; local Transportation System Plans must "conform with local and regional comprehensive land use plans." This planning hierarchy reinforces the approach that transportation decisions, including how to address safety, should respond to the context of the surrounding land use.

Local Transportation System Plans (TSP)
Local transportation system plans, or TSPs, developed by cities and counties in the region must be consistent with the Regional Transportation Plan and are required by the Oregon Transportation Planning Rule. Transportation System Plans are long-range plans that guide transportation investments to achieve desired goals and outcomes. The plans include policies, plans for different transportation modes, and a finance plan.

Typically, safety is a theme and goal in Transportation System Plans but there is not a separate plan or section with specific safety strategies, actions or projects. As more jurisdictions in the greater Portland area are developing Transportation Safety Action Plans and benefitting from them, the need for specific safety plans as part of Transportation System Plans is being recognized.

The Regional Safety Strategy includes Actions 6.13 and 6.14 which recommends updating the Regional Transportation Functional Plan and the Transportation Planning Rule to require Transportation System Plans to include a Transportation Safety Action Plan, including analysis of crash data to identify common crash types and contributing factors, identification of high risk and high injury locations, and recommended actions and projects.

Local Transportation Safety Action Plans (TSAP)
Several cities and counties in the region have adopted or are in the process of developing local transportation safety action plans. Clackamas County was the first county in the state to adopt a Transportation Safety Action Plan in 2012. Portland adopted the first Vision Zero Plan in the region, Hillsboro adopted a Transportation Safety Action Plan in 2017 with a Vision Zero target, and Washington County completed a Transportation Safety Action Plan in 2017. Coordinating implementation of these plans is an important element of achieving Vision Zero.

1.4 Planning process and public engagement

The Regional Transportation Safety Strategy was updated in coordination with and as part of the update of the Regional Transportation Plan between May 2016 and December 2018. Throughout the planning process, transportation safety was repeatedly identified as a major issue for the region. In Metro quick polls and public opinion surveys safety was identified as a top concern. Elected and community leaders highlighted safety as one of eight policy focus areas for the 2018 Regional Transportation Plan and indicated early support for adoption of a Vision Zero framework and target. A technical work group provided technical review and expertise as the Safety Strategy was developed.

Regional leadership

The Metro Council, the Joint Policy Advisory Committee on Transportation (JPACT), Metro Policy Advisory Committee (MPAC), and community and business leaders provided policy direction for the Regional Safety Strategy. Early on in the process regional leaders provided direction to use a Vision Zero goal and framework. They supported the development of Regional High Injury Corridors and Intersections to help guide investments and supported identifying specific projects in the Regional Transportation Plan as safety projects.

Regional leaders provided policy direction at four Regional Leadership Forums and safety was consistently one of the top policy issues. Additionally, the Metro Council committed to supporting a Regional Safety Strategy with a Vision Zero target and framework with a racial and income equity lens.

"What's your goal?" video

Metro interviewed people in the greater Portland area and asked them what the traffic fatality goal should be for their family – everyone said zero. They were all asked if that should be the goal for everyone – they all said yes.

Figure 7: What's your Goal? Video
Source: Metro, KidFestNW Portland Expo Center, February 18, 2017

Focus groups and stakeholder interviews

To develop the work plan for the update the Regional Transportation Plan, Metro conducted focus groups and stakeholder interviews. Input from these processes was used to shape the work program and policy focus areas for the update. Safety was confirmed as a priority focus area through the input.

In June 2015, Metro sought input from culturally-based and youth focus groups on questions related to equity, transportation, housing, parks and natural areas, and community engagement. Input related to safety included bicycle safety, personal safety on the MAX, and safety at bus shelters including lighting and presence of a shelter, lack of sidewalks and lack of safe routes to get to parks. [29]

Figure 8: Participants in the Metro Discussion Groups, June 2015

In October 2015, Metro conducted stakeholder interviews for the update of the Regional Transportation Plan. Interviewees included elected officials, businesses, and community organizations from across the greater Portland area. Input related to safety that emerged from the interviews were: making safety the highest priority, allowing for mode separation of modes, such as separated bicycle facilities, to improve traffic flow and safety, improving safety around schools, and lack of sidewalks.[30]

Online public comment opportunities

For the update of the Regional Transportation Plan Metro provided opportunities for the public to comment online about transportation priorities. Safety was consistently a top concern and need identified by the people that commented.

[29] Metro Discussion Groups (August 2015) https://www.oregonmetro.gov/sites/default/files/2016/01/29/RTP-2018-DiscussionGroupReport-20150805.pdf

[30] 2018 RTP Update Stakeholder Interview Report (October 2015) https://www.oregonmetro.gov/sites/default/files/2015/10/30/RTP-2018-StakeholderInterviews-20151027.pdf

Metro conducted an online quick poll in July and August 2015. After traffic, safety was identified as a top transportation issue, and it was identified as the top transportation issue in Multnomah County.[31]

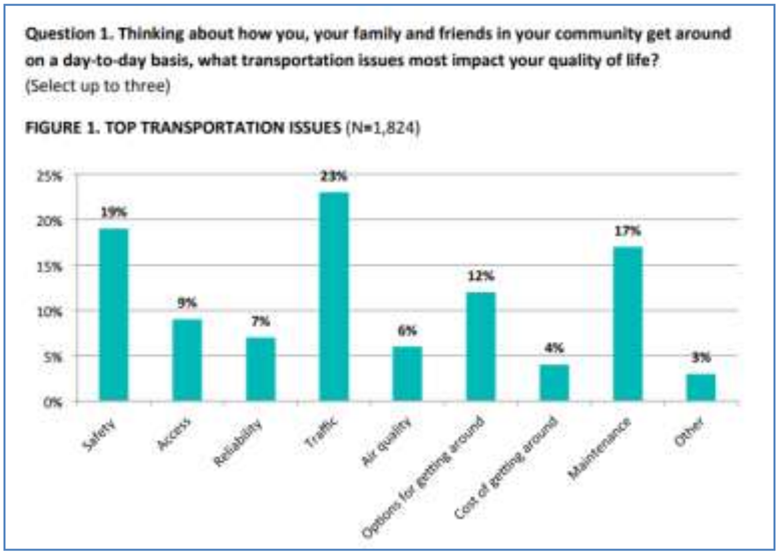

Figure 9: Metro Quick Poll, August 2015

In the online public comment period in March 2017, reducing fatal ad severe injury crashes for people walking, bicycling and driving was identified as the highest need after maintaining the transportation system.[32]

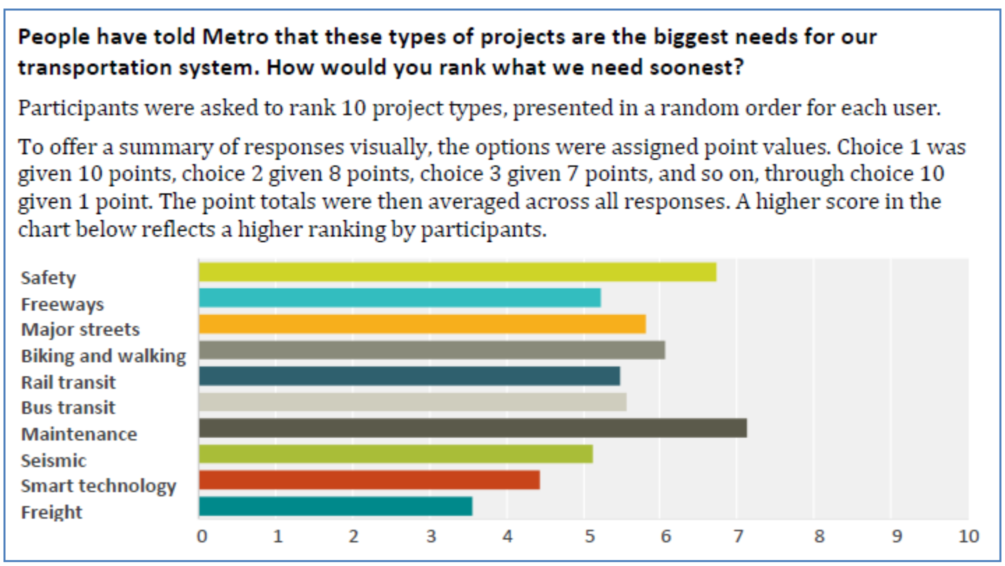

Figure 10: Metro On-line Survey, March 2017

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[31] 2018 RTP Update Online Quick Poll 1 report (October 2015) https://www.oregonmetro.gov/sites/default/files/2015/10/21/RTP-QuickPoll1-Results-20151021.pdf

[32] 2018 RTP Update Public Comment Report: Priorities for our transportation future (May 2017) https://www.oregonmetro.gov/sites/default/files/2017/05/12/RTP-winter-comment-report-051217.pdf

Safety Technical Work Group

A Regional Transportation Safety Technical Work Group was formed in April 2016 and provided the primary technical work and guidance on the update of the Regional Safety Strategy. The work group developed the updated safety targets and support for the Vision Zero and Safe Systems framework.

The Regional Transportation Plan's Transportation Equity and Performance Measure Work Groups provided review and substantial input on the Safety Strategy throughout the process. The Transportation Equity Work Group supported adopting a Vision Zero target and proposed two safety system evaluation measures to better understand the impact of the 2018 Regional Transportation Plan investment strategies on areas with historically underserved communities. The Transportation Equity Work Group also recommended considering how racial equity and public health were impacted by the Safety Strategy.

The technical work group included representation from the following agencies and organizations. Families for Safe Streets, police and fire were not represented on the work group. This gap in representation needs to be rectified in future regional safety work groups.

- Federal Highway Administration
- Oregon Department of Transportation, Region 1
- Clackamas County
- Multnomah County Public Health
- Washington County
- City of Beaverton
- City of Gresham
- City of Hillsboro
- City of Lake Oswego
- City of Portland
- City of Wilsonville
- TriMet
- National Safe Routes to School Partnership
- Oregon Walks
- The Street Trust

Figure 11: First meeting of the safety work group in May 2016

Metro technical advisory committees

In addition to the Regional Transportation Plan technical work groups, Metro's technical advisory committees, Transportation Policy Advisory Committee (TPAC) and Metro Technical Advisory Committee (MTAC), provided valuable review and input on the development of the Regional Safety Strategy.

1.5 Document organization

The Regional Safety Strategy is organized into six chapters, with a foreword, executive summary, and back matter such as a glossary and list of acronyms. Supporting documents are provided as stand-alone appendices. This section provides an overview of the different parts of the document.

[To be finalized when draft is finalized]

Foreword
Introduces the genesis, purpose, limitations, and scope of the plan.

Executive Summary
Provides a short summary and key elements of the plan.

We Remember
Describes why it is important to take serious action to end traffic violence through community stories.

Chapter 1: Introduction
Provides and introduction to and context for understanding the strategy.

Chapter 2: Regional Transportation Safety Policy
Describes regional safety goals, objectives, targets and policies, including reoginal high injury corridors and targets.

Chapter 3: Trends and Factors in Serious Crashes
Provides key findings from analysis of the crash data used to identify the strategies and actions. Identifies the top three findings.

Chapter 4: Strategies and Actions
Describes data-driven strategies and actions to help achieve Vision Zero.

Chapter 5: Implementation
Describes how the Regional Safety Strategy will be implemented in the next few years by Metro and partners.

Chapter 6: Measuring Progress
Describes performance measures to monitor progress towards achieving Vision Zero.

Acronyms
Defines acronyms used in the document.

List of Partners
Lists agencies, organizations, non-profits, private entities, industry and the public that could play a role in implementing the Regional Safety Strategy.

Resources
Provides a list of resources for further information.

Glossary
Defines terms used in the document.

Appendix
2018 Metro State of Safety Report
Describes the data used in the analysis, the attributes of the data, and any data limitations. Describes the process Metro used to analyze the data. The2018 Metro State of Safety Report presents the findings, identifying trends and relationships of serious crashes with environmental factors including roadway and land use characteristics and serves as the foundation for the Regional Safety Strategy.

CHAPTER 2 REGIONAL TRANSPORTATION SAFETY POLICY

This chapter describes adopted regional policies related to transportation safety, including vision, goals, objectives, targets and performance measures. Chapters 4 and 5 describe the strategies and actions to take to achieve regional goals and targets.

The information in this chapter is included in the policy chapter of the 2018 Regional Transportation Plan. To move from vision to action the Regional Safety Strategy uses a strategic plan framework where strategies and actions are informed by and build off of a strong policy foundation. The Regional Transportation Plan and each regional modal and topical plan starts with the regional transportation vision, identifies desired goals, measureable objectives for each goal, specific policies that describe what must be done to achieve desired outcomes, and then specific actions to implement policies. Each strategy is a series of actions. Targets and performance measures track progress (see Chapter 6).

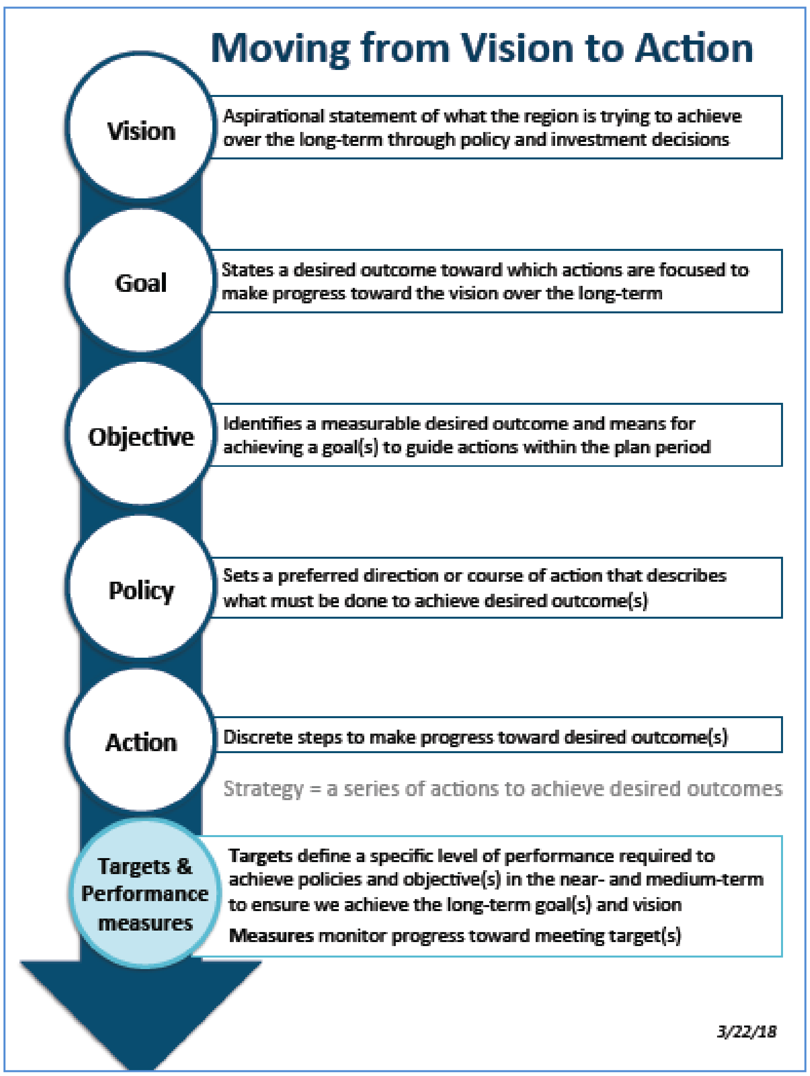


Figure 12: Components of the Regional Transportation Plan and topical and modal plans

2.1 Regional Transportation Plan vision

The 2018 Regional Transportation Plan provides a vision for the transportation system. Transportation safety is a crucial element of the vision.

> ***In 2040, everyone in the Portland metropolitan region will share in a prosperous, equitable economy and exceptional quality of life sustained by a safe, reliable, healthy, and affordable transportation system with travel options.***

2.2 Safety and security goal and objectives

The 2018 Regional Transportation Plan has ten goals for the regional transportation system. Goal 5 is the transportation safety and security goal.

Public and personal security has an important relationship to transportation safety, especially for people of color. Fear of harassment or being targeted can deter people of color from walking, bicycling or using transit.

Goal 5: Increase Safety and Security

People's lives are saved, crashes are avoided and people and goods are secure when traveling in the region.

Objective 5.1 Transportation Safety

Eliminate fatal and severe injury traffic crashes for all modes of travel.

Objective 5.2 Security

Reduce vulnerability of the public, goods movement and critical passenger and freight transportation infrastructure to crime and terrorism.

2.3 Vision Zero safety target

The Regional Safety Strategy updates the regional transportation safety target in the Regional Transportation Plan with a Vision Zero target.

By 2035 eliminate transportation related fatalities and serious injuries for all users of the region's transportation system, with a sixteen percent reduction by 2020 (as compared to the 2015 five year rolling average), and a fifty percent reduction by 2025.

The target year of 2035 will not change in subsequent Regional Transportation Plan updates and progress towards meeting the target will be monitored each year. Refer to Chapter 6 for a description of how progress towards meeting the 2035 target, and the 2020 and 2025 interim targets, will be tracked.

The Vision Zero target is consistent with 2016 Oregon Transportation Safety Action Plan target of "no deaths or life changing injuries on Oregon's transportation system by 2035."

2.4 Regional safety policies

Policies in the Regional Transportation Plan guide investments in the region in support of meeting the regional transportation vision and goals.

Each of the regional network concepts in the Regional Transportation Plan - for transit, freight, arterials and throughways, bicycle and pedestrian – identifies supporting policies to develop and implement the regional transportation system. Polices are also identified for Racial and Social Equity, Emerging Technologies, Transportation System Management and Operations and Safety.

Transportation safety is mentioned in many of the Regional Transportation Plan policies. The 2018 Regional Transportation Plan is the first plan to include separate section dedicated to safety and security policies. See Chapter in this document 4 for strategies and actions.

Policy 1 Focus safety efforts on eliminating traffic deaths and severe injury crashes

Policy 2 Prioritize safety investments on high injury and high risk corridors and intersections

Policy 3 Prioritize vulnerable users with higher risk of being involved in a serious crash, including people of color, people with low incomes, people with disabilities, people walking, bicycling, and using motorcycles, people working in the right-of-way, youth and older adults

Policy 4 Increase safety and security for all modes of travel and for all people through the planning, design, construction, operation and maintenance of the transportation system

Policy 5 Make safety a key consideration in all transportation projects, and avoid replicating a known safety problem with any project or program

Policy 6 Employ a Safe System approach and use data and analysis tools to support data-driven decision making

Policy 7 Utilize safety and engineering best practices to identify low-cost and effective treatments that can be implemented systematically in shorter timeframes than large capital projects

2.5 Regional High Injury Corridors and Intersections

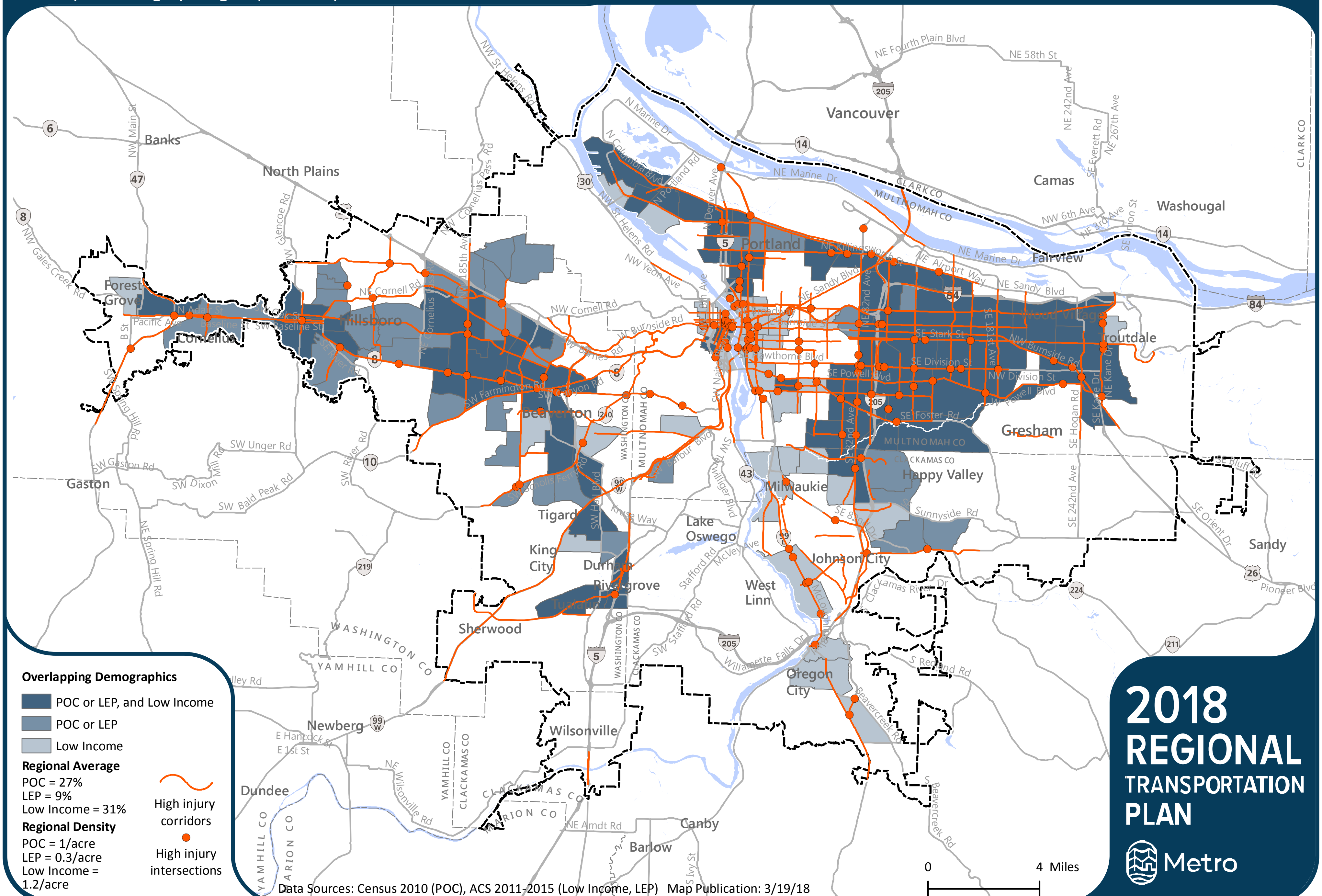
Using 2010-2014 crash data, Regional High Injury Corridors and Intersections identifies regional roadways and intersections where a majority of fatal and severe injury crashes for all modes are occurring. Sixty percent of fatal and severe injury crashes for motor-vehicle occupants, pedestrians and bicyclists occur on just six percent of the roadway miles in the region.[33]

The following map illustrates the High Injury Corridors and Intersections in the greater Portland region. A majority of high injury corridors are in communities with higher concentrations of people of color, people with low incomes and English language learners. The Regional High Injury Corridors and Intersections are identified to help prioritize safety investments.

[33] High injury corridors for serous crashes for all modes were identified, as were high injury corridors for auto only serious crashes, bicycle/auto only serious crashes, and pedestrian/auto only serious crashes. The map on the following page shows the combined corridors for all modes where 60 percent of all fatal and serious crashes occurred between 2010 and 2014, and were identified by using the following methodology: Fatal and Injury A (serious) crashes for all modes were assigned to the network; "Injury B", "Injury C", and "PDO (property damage only)" crashes involving bikes and pedestrians were also added to the network. Fatal and Injury A crashes are given a weight of 10; roadways are analyzed in mile segments; if a segment has only one Fatal or Injury A crash it must also have at least one B/C (minor injury) crash, for the same mode, to be included in the analysis. Roadway segments were then assigned an N-score (or “crash score”) by calculating the weighted sum by mode and normalizing it by the roadway length. To reach 60 percent of Fatal and Severe Injury crashes, roadway segments had to have an N-score of 39 or higher; high injury Bicycle Corridors had to have an N-score of 6 or more, and high injury Pedestrian Corridors had to have an N-score of 15 or more. Intersections with the highest weighted crash scores were also identified; 5 percent of intersections had an N-score (or “crash score”) higher than 80 and are also shown on the map, and 1 percent of intersections (the top 1%) had to have an N-score higher than 128.

High Injury Corridors Overlapping Communities of Color, English Language Learners, and Lower-Income Communities

This map shows the overlap of regional high injury corridors and road intersections with census tracts with higher than regional average concentrations and double the density of one or more of the following: people of color, people with low income, and English language learners. Census tracts where multiple demographic groups overlap are identified.



2018
REGIONAL
TRANSPORTATION
PLAN

Metro

There can be multiple factors that contribute to a crash
Source: Metro

CHAPTER 3 TRENDS AND FACTORS IN SERIOUS CRASHES

This chapter **highlights key findings** from the analysis of five years of Oregon Department of Transportation crash data, 2011-2015, documented in the **2018 Metro State of Safety Report**. Data and findings from other national and state data sources and studies are also referenced.

"Serious crashes" are Fatal and Severe Injury (Injury A) crashes combined

Refer to the 2018 Metro State of Safety Report for the comprehensive data analysis for the greater Portland region.

Using data to identify trends and understand the underlying contributing factors in fatal and severe injury crashes is the first step in identifying the **data-driven strategies and actions** in the next chapter, and is an element of a Safe Systems approach to transportation safety.

3.1 Top three findings

Three top findings emerged from the analysis of serious crashes in the region and highlight a need for urgent action and focused strategic direction.

❶ Traffic deaths are increasing and are disproportionately impacting people of color, people with low incomes and people over age 65.

❷ Traffic deaths are disproportionately impacting people walking.

❸ A majority of traffic deaths are occurring on a subset of arterial roadways.

Making headway on these three findings is central to the region advancing Vision Zero, and will require focusing safety efforts on the most serious crashes, focusing investments in High Injury Corridors and low-income and communities of color and prioritizing pedestrian safety.

Each of the top three findings is described in more detail below. The remainder of the chapter identifies other key findings from the data, including findings on vulnerable users, roadway design, speed and speeding, alcohol and drugs, and aggressive and distracted driving.

Roadway improvements make it safer for this older adult to walk across SE Division Street in Portland
Source: Metro

❶ Traffic deaths are increasing and are disproportionately impacting people of color, people with low incomes and people over age 65.

- Serious crashes (fatal and severe injury crashes combined) have fluctuated since 2007, but have more recently been increasing. Initial data from 2016, 2017 and 2018 indicate that the trend is continuing. This is a trend that is also happening at the state and national levels.
- The regional annual fatality rate by population and vehicle miles traveled (for 2011-2015) has increased compared to the 2012 Metro State of Safety Report.[34]
- Your risk of dying in a motor-vehicle involved crash is higher if you are a person of color, are over 65 or have a lower income.[35]

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[34] Fatality rates for traffic related crashes are the proportion of all crashes, person deaths or severe injuries for every 1 million people or every 100 million vehicle miles traveled.

[35] *Motor Vehicle Traffic-Related Pedestrian Deaths — United States, 2001–2010,* Centers for Disease Control and Prevention (2013); *Dangerous by Design*, National Complete Streets Coalition (2016); *Income Disparities in Street features that Encourage Walking*, Bridging the Gap (2012); *Pedestrians Dying at Disproportionate Rates in America's Poorer Neighborhoods*, Governing, August 2014; *America's Poorer Neighborhoods Plagued by Pedestrian Deaths*, Governing Research Report (August 2014)

- A majority of Regional High Injury Corridors are in communities with higher densities of people of color, people with low incomes and English language learners.
- A majority of pedestrian deaths are in are in communities with higher densities of people of color, people with low incomes and English language learners.
- Older drivers are twice as likely to die in a traffic crash. For male drivers age 70 to 79 and female drivers age 75 to 85 and older the share of serious crashes is double that of drivers in other age groups.
- In Oregon, American Indians/Alaska Natives have the highest average rate of vehicle related deaths (5.9 per 100,000) 1.8 times the rate among whites (3.3 per 100,000), and American Indians/Alaska Natives and Black or African American had the highest hospitalization rate -52.2 and 46.2 per 100,000, compared to 45.5 for whites and 20.8 Asian Pacific Islander for traffic related injuries.[36] This data is not currently available at the regional level.

❷ Traffic deaths are disproportionately impacting people walking.

- Auto-only crashes comprise ninety-one percent of all crashes, and thirty-eight percent of all fatal crashes. Pedestrian crashes make up two percent of all crashes, and thirty-six percent of all fatal crashes.
- Pedestrian traffic deaths are steadily increasing, are the most common type of fatal crash, and have the highest severity of any crash type.
- Pedestrian fatalities have steadily increased to 2015.
- A pedestrian crash is more than 26 times as likely to be fatal than a crash not involving a pedestrian, and more than 110 times as likely to be fatal as a rear end crash, the most common crash type.
- Roadway design is critical to pedestrian safety. Seventy-seven percent of serious pedestrian crashes occur on arterial roadways.

❸ A majority of traffic deaths are occurring on a subset of arterial roadways.

- Arterial roadways are the location of the majority of the serious crashes in the region. Sixty-six percent of all serious crashes occur on a roadway designated as an arterial.
- In the region, seventy-three percent of non-freeway serious crashes occur on a roadway designated as an arterial; seventy-seven percent of serious pedestrian crashes occur on a roadway designated as an arterial; sixty-five percent of serious bicycle crashes occur on a roadway designated as an arterial.
- Many of these arterial roadways are identified as Regional High Injury Corridors and Intersections.

[36] Oregon Public Health Authority, 2008-2014 crashes

3.2 All crashes

This section provides key findings for all crashes. Refer to the 2018 Metro State of Safety Report for additional information.

Serious crashes are increasing. Since 2007, the total reported crashes and all injury crashes have increased, region wide and in every city and county. Serious crashes (fatal and severe injury crashes combined) have fluctuated since 2007, but have more recently been increasing. Initial data from 2016, 2017 and 2018 indicate that the trend is continuing. This is a trend that is also happening at the state and national levels.

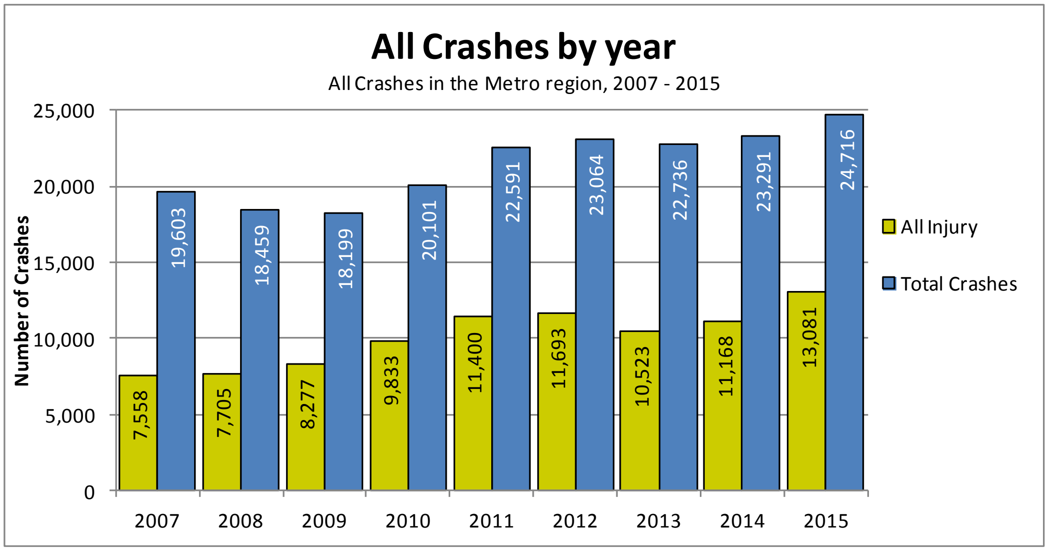


Figure 13: All crashes by year
Source: 2018 Metro State of Safety Report

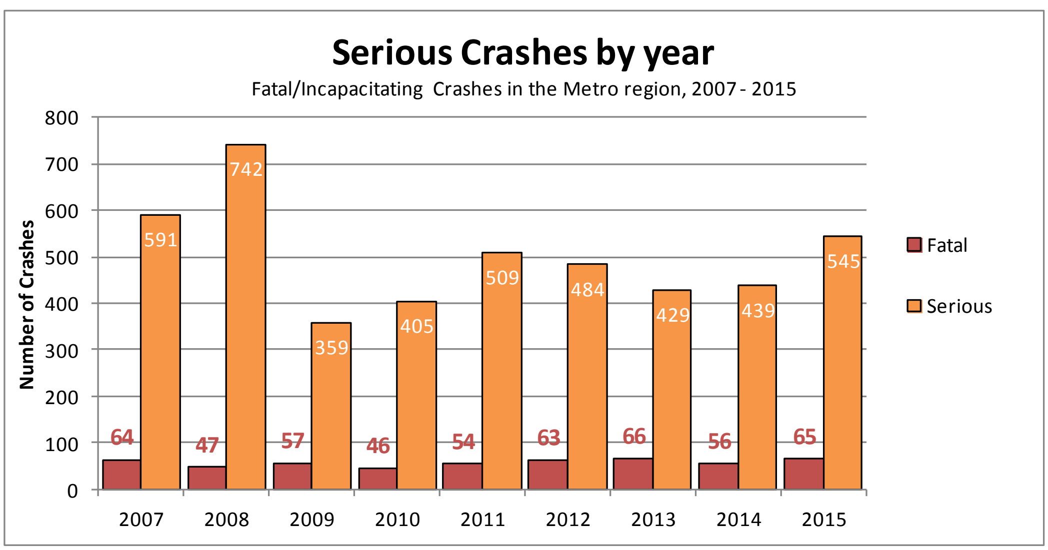


Figure 14: Fatal and Serious Crashes by year
Source: 2018 Metro State of Safety Report

Between 2011 and 2015, there were 304 fatal crashes killing 311 people, 2,102 crashes resulting in a life-changing injury, and 57,865 crashes resulting in some sort of injury.

On average, 62 people die each year on the region's roadways and 420 people experience a life changing injury. Nearly two people are either killed or severely injured every day in our region. Every 10 days a person riding a bike is killed or severely injured. Every 5 days a person walking is killed or severely injured.

Year	Total Crashes	Fatal Crashes (Fatalities)	Injury A Crashes	Injury B Crashes	Injury C Crashes	All Injury Crashes (Injuries)	Serious Crashes
2011	22,591	54 (54)	455	2,487	8,404	11,400	509
2012	23,064	63 (66)	421	2,654	8,555	11,693	484
2013	22,736	66 (68)	363	2,428	7,666	10,523	429
2014	23,291	56 (57)	383	2,512	8,217	11,168	439
2015	24,716	65 (66)	480	2,655	9,881	13,081	545
METRO	**116,398**	**304 (311)**	**2,102**	**12,736**	**42,723**	**57,865 (81,718)**	**2,406**

Figure 15: Crashes by year in the greater Portland area, 2011-2015
Source: Metro State of Safety Report, 2018

Traffic fatality rates are increasing. The regional annual fatality rate by population and vehicle miles traveled (for 2011-2015) has increased compared to the 2012 Metro State of Safety Report. The serious crash rate has decreased, and the all injury crash rate has increased.

			All injury		Serious Crashes		Annual Fatal crashes	
2007-2009	**Population (2010)**	**Annual VMT**	**per 1M residents**	**per 100M VMT**	**per 1M residents**	**per 100M VMT**	**per 1M residents**	**per 100M VMT**
Metro	1,481,118	9,308,676,259	5,106	81.2	359	5.7	36	0.59

			Annual Injury crashes		Annual Serious crashes		Annual Fatal crashes	
2011-2015	**Population (2015)**	**Annual VMT (2015)**	**per 1M residents**	**per 100M VMT**	**per 1M residents**	**per 100M VMT**	**per 1M residents**	**per 100M VMT**
Metro	1,603,229	10,437,000,000	7,219	111	300	4.6	39	0.60

Figure 16: Source 2012 and 2018 metro State of Safety Reports

Clackamas County has the lowest serious crash rate per population and vehicle miles traveled, compared to Portland, East Multnomah County, and Washington County. Clackamas County was the first local jurisdiction in Oregon to have an adopted safety plan. While annual fatality rates in the region have increased, annual serious crash rates by population have slightly decreased in the region overall, Clackamas and Multnomah Counties and the City of Portland, and have increased in Washington County. Annual serious crash rates by vehicle miles decreased in the region as a whole, Clackamas, East Multnomah, and Washington Counties and increased in the City of Portland.

2007-2009 Annual Crashes						
			All injury		Serious Crashes (Fatal/Incapacitating)	
Sub-Region	**Population**	**Annual VMT**	**per 1M residents**	**per 100M VMT**	**per 1M residents**	**per 100M VMT**
Clackamas	256,986	1,615,525,690	4,210	67	593	9.4
Portland	583,627	4,376,272,685	6,500	87	388	5.2
East Multnomah	136,130	654,385,044	4,856	101	333	6.9
Washington	499,259	2,669,124,479	4,030	75	210	3.9
METRO	**1,481,118**	**9,308,676,259**	**5,106**	**81**	**359**	**5.7**

Figure 17: 2007-2009 annual crashes by population and VMT, 2012 Metro State of Safety Report

2011-2015 Annual Crashes						
			Annual Injury crashes		Annual Serious crashes	
Sub-Region	**Population (2015)**	**Annual VMT (2015)**	**per 1M residents**	**per 100M VMT**	**per 1M residents**	**per 100M VMT**
Clackamas	290,630	2,102,000,000	6,269	87	226	3.1
Portland	620,540	4,303,000,000	8,918	129	387	5.6
Multnomah (excl. Portland)	152,611	744,000,000	6,664	137	296	6.1
Washington	539,448	3,287,000,000	5,932	97	242	4.0
METRO	**1,603,229**	**10,437,000,000**	**7,219**	**111**	**300**	**4.6**

Figure 18: 2011-2015 annual crashes by population and VMT, 2018 Metro State of Safety Report

With the highest population and vehicle miles traveled, Portland has the largest share of the region's serious crashes.

	2011-2015 Annual Crashes						
Sub-Region	**All**	**Fatal (Fatalities)**	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Clackamas	3,482	10.2 (10.4)	55	395	1,362	1,822	66
Portland	11,475	31.2 (31.8)	209	1,216	4,078	5,534	240
Multnomah (excl. Portland)	1,870	6.2 (6.2)	39	245	727	1,017	45
Washington	6,452	13.2 (13.6)	117	692	2,378	3,200	130
METRO	**23,280**	**60.8 (62.2)**	**420**	**2,547**	**8,545**	**11,573**	**481**

Figure 19: 2011-2015 annual crashes by sub-region, 2018 Metro State of Safety Report

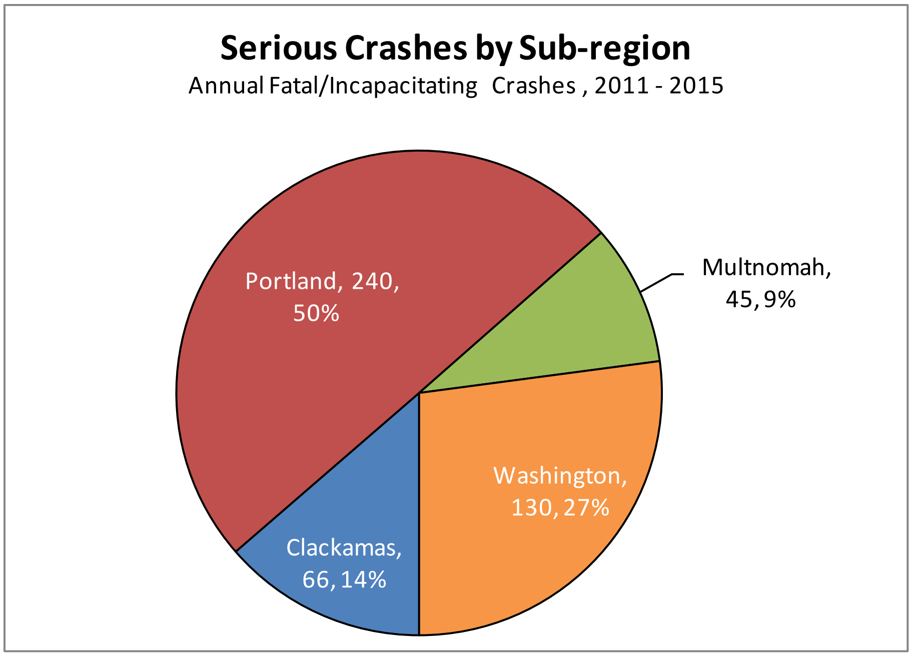


Figure 20: Serious crashes by sub-region, 2018 Metro State of Safety Report

Seatbelt use in the region exceeds ninety-nine percent. Serious crashes have a higher percentage of no seat belt use - nearly nine percent, compared to less than one percent for all crashes. Males were seventy-one percent more likely than females to be reported without a seat belt.

Seat Belt Use (All crashes, 2011-2015)					
Gender	**Seat Belt Use**	**No Seat Belt**	**Unknown**	**% Seat Belt Use**	**% No Seat Belt**
Males	81,267	769	47,229	99.1%	0.9%
Females	80,854	445	34,213	99.5%	0.5%
Unknown	245	2	6,261	99.2%	0.8%
METRO	**162,366**	**1,216**	**87,703**	**99.3%**	**0.7%**

Seat Belt Use (Serious crashes, 2011-2015)					
Gender	**Seat Belt Use**	**No Seat Belt**	**Unknown**	**% Seat Belt Use**	**% No Seat Belt**
Males	622	79	164	88.7%	11.3%
Females	768	51	100	93.8%	6.2%
Unknown	0	0	0	-	-
METRO	**1,390**	**130**	**264**	**91.4%**	**8.6%**

Figure 21: Seat belt use, 2011-2015
Source: 2018 Metro State of Safety Report

Not all communities have the same safety issues. Portland has the highest number of fatal and serious crashes, and Gladstone, Beaverton and Portland have the highest serious crash rate per captia. West Linn, Lake Oswego and Wilsonville have the lowest serious crash rate per capita.

City	2011-2015 Annual Crashes						
	All	Fatal	Injury A	Injury B	Injury C	All Injury	Serious
Beaverton	1,987	3.0	35	179	729	946	38
Cornelius	101	0.0	4	11	37	52	4
Durham	13	0.0	0	1	6	7	0
Fairview	88	0.2	1	13	35	49	1
Forest Grove	137	0.6	5	19	45	69	5
Gladstone	136	0.4	2	16	51	70	2
Gresham	1,356	3.4	27	170	546	747	30
Happy Valley	221	1.0	3	28	91	123	4
Hillsboro	1,413	3.6	26	177	545	751	29
Johnson City	0	0.0	0	0	0	0	0
King City	9	0.0	0	1	1	2	0
Lake Oswego	282	0.0	4	29	96	130	4
Maywood Park	27	0.0	1	2	12	15	1
Milwaukie	210	0.4	5	28	77	109	5
Oregon City	588	1.8	8	62	232	304	10
Portland	11,479	31.2	209	1,216	4,079	5,536	240
Rivergrove	1	0.0	0	0	0	0	0
Sherwood	160	0.2	2	18	58	79	3
Tigard	935	1.6	12	91	353	457	13
Troutdale	167	0.8	4	22	63	89	5
Tualatin	486	0.4	7	50	199	256	7
West Linn	213	0.6	2	23	78	104	3
Wilsonville	218	0.0	2	23	76	102	2
Wood Village	67	0.2	1	7	24	32	1
Unincorp Clack	1,651	6.0	30	187	670	893	36
Unincorp Mult	155	1.6	4	29	45	81	6
Unincorp Wash	1,180	3.8	26	144	397	571	30
METRO	**23,280**	**60.8**	**420**	**2,547**	**8,545**	**11,573**	**481**

Figure 22: 2011-2015 annual crashes, 2018 Metro State of Safety Report

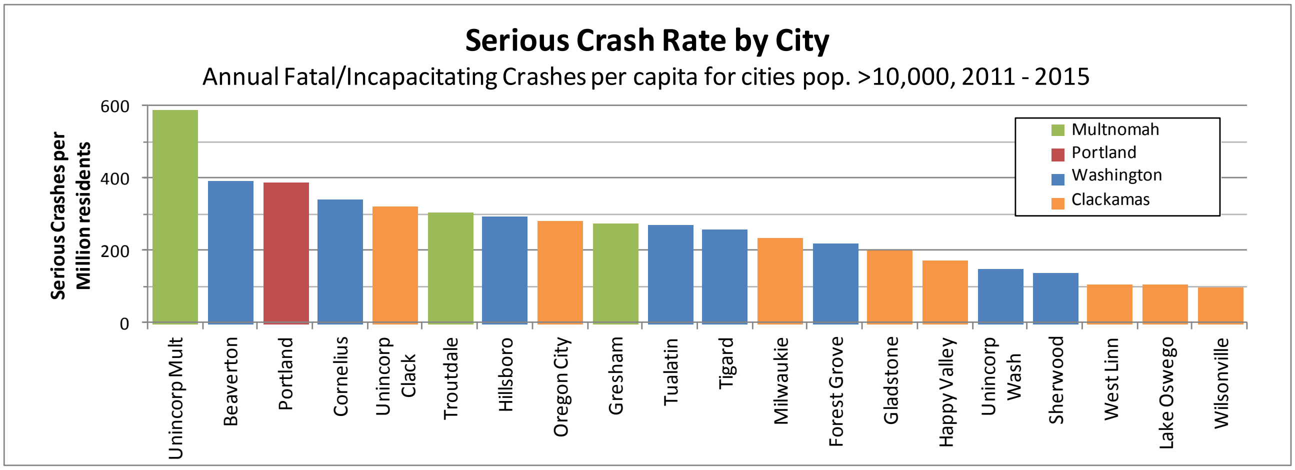


Figure 23: 2018 Metro State of Safety Report

The greater Portland region has one of the lowest roadway fatality rates of any urban metro area with a population greater than 1 million, most likely due to land use and transportation policies. The worst regions in the nation for overall fatality rates are concentrated in Florida and the Sun Belt, where driving is the completely dominant mode of travel. The safest regions in the nation for overall fatality rates are Boston, Minneapolis-St. Paul, Portland, New York, and Chicago. In general, the safest urban regions are those that exhibit dense urban environments and higher usage of non-auto travel modes. These findings indicate that regional and local land use and transportation plans, policies and investments are increasing transportation safety.

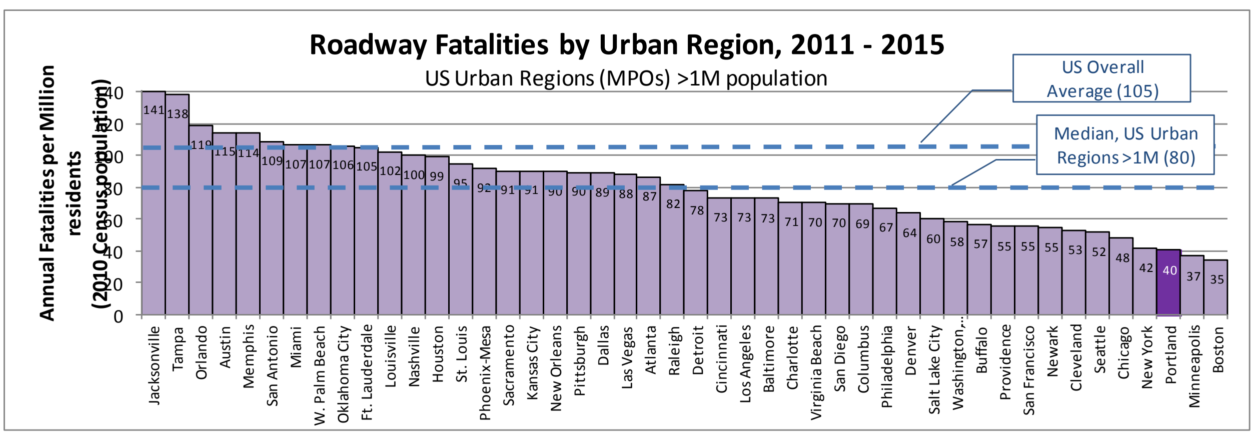


Figure 24: Roadway fatalities by urban region, 2011-2015
Source: Metro State of Safety Report, 2018

The City of Portland's fatality rates are higher than regional fatality rates, but both Portland and the region's fatality rates are lower than the State of Oregon (especially when the Portland region is excluded), and lower than the U.S. The greater Portland region has 39 fatalities per capita, Oregon has 88 fatalities per capita, and the U.S. has 109 fatalities per capita. The United Kingdom and European Union data are included for reference as international best practice.

2011 - 2015	Average Annual Fatalities	Population (2015)	Annual VMT (2015)	Annual Fatality rate per 1M residents	Fatality rate per 100M VMT
Metro	62.2	1,603,229	10,437,000,000	39	0.60
Median, regions >1M pop.*				*78*	n/a
City of Portland	31.8	620,540	4,303,000,000	51	0.74
*Median, cities >300,000 pop.**				*72*	n/a
Oregon	356	4,028,977	36,000,000,000	88	0.99
Oregon excl. Metro region	294	2,425,748	25,562,000,000	121	1.15
US	*35,092*	*321,418,820*	*3,095,373,000,000*	*109*	*1.13*
UK**	2,123	64,128,226	520,600,000,000	33	0.41
EU – 28**	32,463	506,592,457	4,322,500,000,000	64	0.75

* All data for other regions and cities is 2010 - 2014

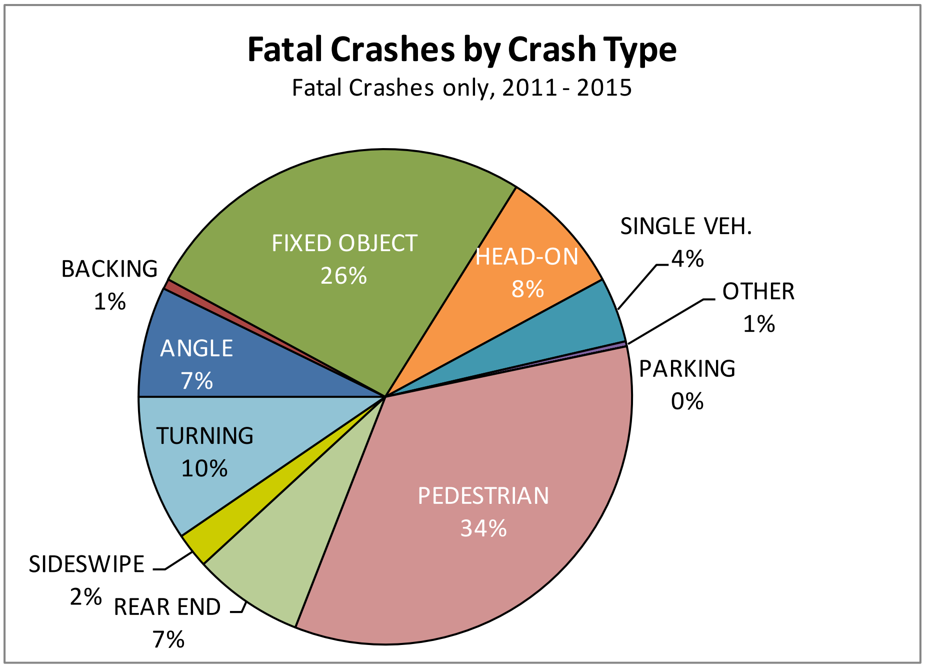
** All data for UK and EU is for year 2013

Figure 25: Metro crash rates per 100 million VMT and 1 million people, compared to other places, 2011-2015
Source: 2018 Metro State of Safety Report

There is a strong correlation between fatality rates and annual per capita vehicle miles traveled. States with higher vehicle miles traveled (VMT) typically also have higher per capita fatality rates, as the typical exposure to risk is increased. The District of Columbia has the lowest per capita VMT at 5,610, and exhibits one of the lowest annual fatality rates of 65 per million people – less than one-third of the national average. Wyoming, with the highest per capita VMT of 17,900, also has the highest annual fatality rate at 310 per million people– two-hundred thirty-five percent of the national average. The national average is 9,500 VMT per capita and 109 fatalities per million residents.

Oregon statistics are 8,650 VMT per capita (ninety-one percent of the national average) and 85 fatalities per million people (eighty-one percent of the national average). The greater Portland region statistics are 6,506 VMT per capita and 39 fatalities per million people. The City of Portland has a slightly higher VMT per capita at 6,934 and 51 fatalities per million people.

For all crashes, the most common fatal crash types were pedestrian and fixed object. The most common serious crash types were turning and rear end. For the purpose of establishing crash type, bicycles are considered vehicles, and so there is no separate bicycle crash type.



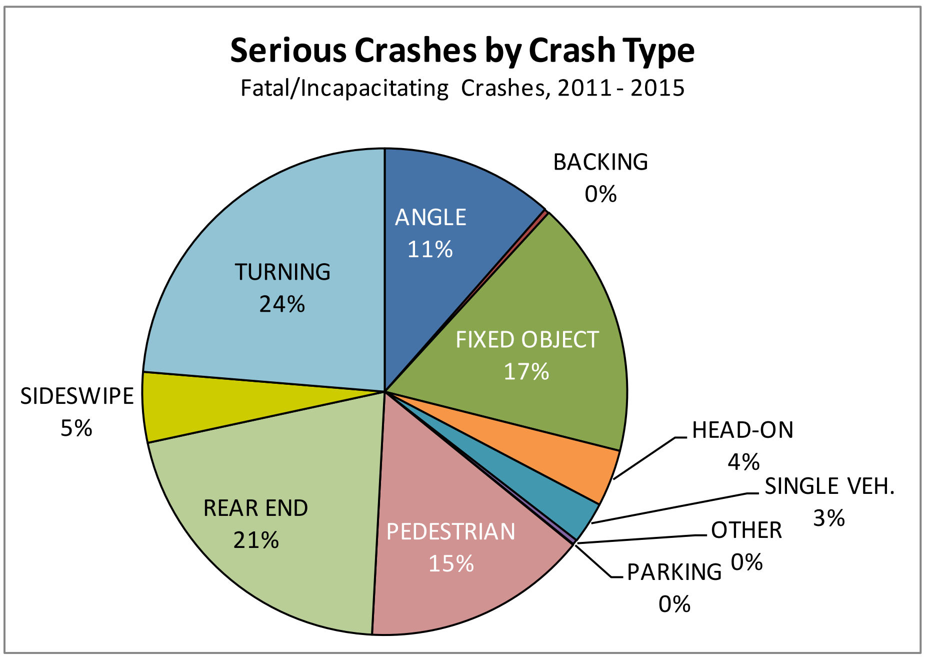


Figure 26: Serious and fatal crash types, 2011-2015
Source: 2018 Metro State of Safety report

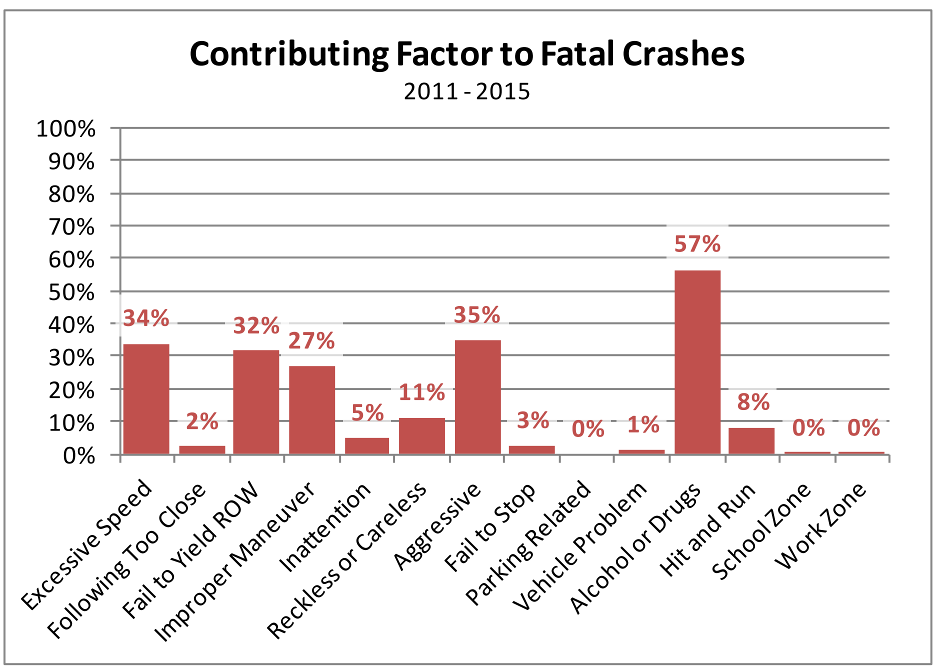
A **pedestrian crash** results when the first harmful event is any impact between a motor vehicle in traffic and a pedestrian. It does not include any crash where a pedestrian is injured after the initial vehicle impact. Pedestrian is the most common fatal crash type in the region, and the most common crash type to be fatal. Pedestrian crashes constitute thirty-four percent of fatal crashes, fifteen percent of serious crashes, though only two percent of all crashes in the region. Alcohol or drugs and failure to yield ROW are the most common contributing factors in serious pedestrian crashes.

A **fixed object crash** results when one vehicle strikes a fixed or other object on or off the roadway. Though not a common crash type, fixed object is the second most common fatal crash type in the region. Fixed object crashes constitute twenty-six percent of fatal crashes, seventeen percent of serious crashes, though only seven percent of all crashes in the region.

A **turning crash results** when one or more vehicles in the act of a turning maneuver is involved in a collision with another vehicle (including bicycles). Turning is the second most common crash type in the region, as well as the most common serious crash type. Turning crashes constitute ten percent of fatal crashes, twenty-four percent of serious crashes, and twenty-two percent of all crashes in the region.

Rear end crashes are the most common type of crash in the region. They are rarely fatal, but often serious. Rear end crashes constitute seven percent of fatal crashes, twenty-one percent of serious crashes, and forty-five percent of all crashes in the region. Aggressive driving, fail to stop, following too closely, and excessive speed are factors in a substantial proportion of serious and fatal rear end crashes.

Alcohol and drugs, excessive speed, fail to yield right-of-way, and aggressive driving (defined as excessive speed and/or following too close) are the most common factors in serious crashes. Each crash may have several contributing factors. Crashes involving alcohol and drugs have a much higher likelihood of being fatal than other crashes.



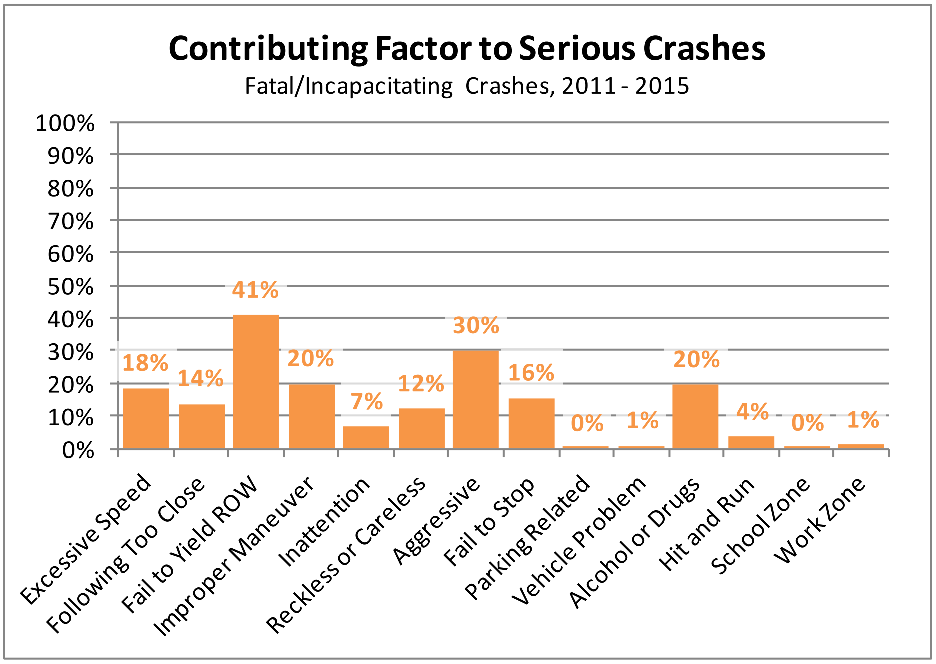


Figure 27: Serious and fatal crashes by contributing factor, 2011-2015
Source: 2018 Metro State of Safety Report

Traffic crashes contribute to congestion and cost the region more than congestion. Traffic deaths and life changing injuries impact the lives of our families, friends, neighbors and community members. They also have a major economic cost – estimated at $1 billion for our region. According to analysis conducted by Cambridge Systematics in a report for AAA of America, the total cost of crashes per person in the greater Portland-Vancouver region $1,220. The report found that in urbanized areas the total cost of traffic crashes is over three times the cost of congestion. In large urban areas, such as the greater Portland region, costs resulting from crashes are over three times more than congestion.[37] According to FHWA, in 2009 dollars, the cost of a single motor vehicle fatality is $6,000,000.[38]

3.3 Vulnerable users are at a higher risk

This section provides key findings for vulnerable users. Refer to the 2018 Metro State of Safety Report for additional information.

Vulnerable users can have higher fatality rates and are at greater risk of death or severe injury in the event of a crash. Vulnerable users are pedestrians, bicyclists, motorcycle operators, children, older adults, and road construction workers, people with disabilities, people of color and people with low income. Increasing safety for vulnerable users increases safety for all transportation users.

[37] Crashes vs. Congestion: What's the Cost to Society (November 2011) AAA and Cambridge Systematics.
[38] The 11 comprehensive cost components include property damage; lost earnings; lost household production (non-market activities occurring in the home); medical costs; emergency services; travel delay; vocational rehabilitation; workplace costs; administrative costs; legal costs; and pain and lost quality of life.

Slower speeds and pedestrian oriented design create a safe and welcoming street in downtown Lake Oswego

Crashes involving people on motorcycles, people walking and people riding bicycles tend to be more serious compared to auto-only crashes. Auto-only crashes comprise ninety-one percent of all crashes, and thirty-eight percent of all fatal crashes. Pedestrian crashes make up two percent of all crashes, and thirty-six percent of all fatal crashes. Motorcycle crashes comprise two percent of all crashes, and eighteen percent of all fatal crashes, and bicycle crashes comprise two percent of all crashes and four percent of fatal crashes. Figure X shows all reported crashes and serious crashes by mode.

Year	Pedestrians		Bicyclists		Autos Only		Motorcycle		Truck Involved	
	All Injury	Serious	All Injury	Serious	All Injury	Serious	All Injury	Serious	All Injury	Serious
2011	418	65	481	32	10,502	412	312	72	250	20
2012	511	88	560	37	10,622	359	353	63	277	16
2013	428	67	485	33	9,607	327	356	76	238	11
2014	480	81	509	38	10,179	320	302	55	281	22
2015	474	81	477	35	12,129	429	339	86	320	19
METRO	**2,311**	**382**	**2,512**	**175**	**53,039**	**1,847**	**1,662**	**352**	**1,366**	**88**

Figure 28: All reported crashes, by mode and year
Source: 2018 Metro State of Safety Report

Pedestrian crashes are the most common type of fatal crash. There were an average of 62 traffic related deaths between 2011 and 2015. More than one third of those deaths were pedestrians.

Pedestrian crashes have the highest severity of any crash type. A pedestrian crash is more than twenty-six times as likely to be fatal than a crash not involving a pedestrian, and more than 110 times as likely to be fatal as a rear end crash, the most common crash type.

Pedestrian deaths are increasing. Serious pedestrian crashes increased somewhat over the 5-year period. Pedestrian fatalities have steadily increased to 2015. If the region continues in its trend of pedestrian deaths will continue to rise. Figure x below shows the linear trendline for pedestrian deaths and life changing injuries if changes are not made. Similar figures in Chapter 6 show a steep decline in motor-vehicle only serious crashes.

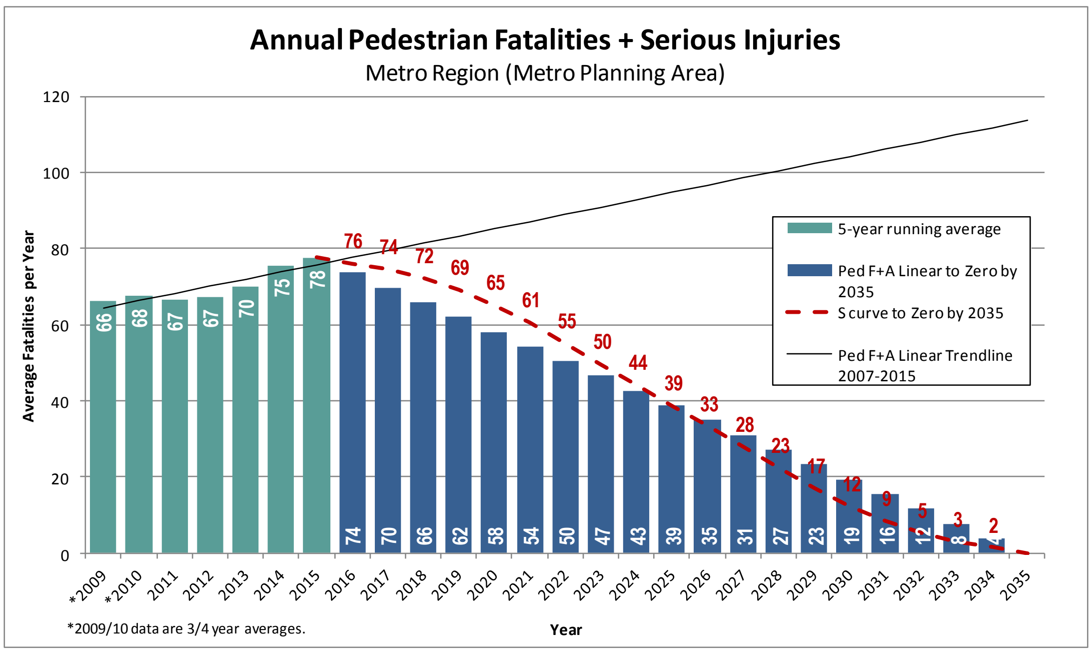


Figure 29: Trend of annual pedestrian fatalities and serious injuries, 2011-2015

Pedestrian safety is not the same across the region. The City of Portland has the highest number of annual pedestrian deaths, and Gladstone, Gresham and Portland have the highest serious pedestrian crash rate per capita. Happy Valley, West Linn and Tualatin have the lowest serious pedestrian crash rate per capita.

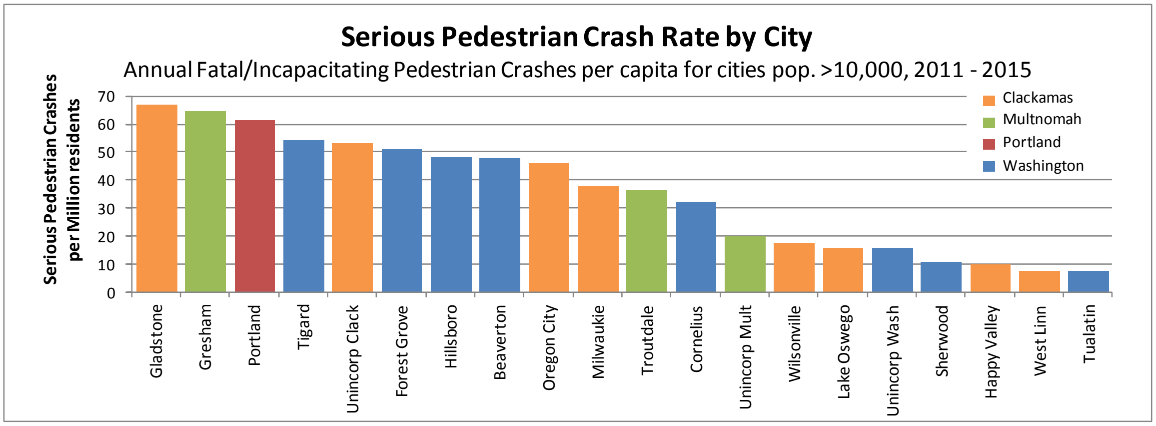


Figure 30: Serious pedestrian crash rate by city, per capita
Source: 2018 Metro State of Safety Report

A majority serious pedestrian crashes occur in areas with higher densities of people of color, people with low incomes and English language learners. Sixty-one percent of pedestrian deaths and sixty-six percent of severe injury pedestrian crashes occur in these areas, while only thirty-nine percent of the region's population lives in these areas. Data is not available on the race and ethnicity or income of the people killed or severely injured.

Fatality rates for pedestrians are more than three times as high in neighborhoods where more than a quarter of the population lived in poverty. There were 12.8 pedestrian deaths per 100,000 residents, compared to 3.5 pedestrian deaths per 100,000 residents, in areas with poverty rates below the national rate of fifteen percent.[39]

Your risk of dying in a motor-vehicle involved crash is higher if you are a person of color, are over 65 or have a lower income.[40] While no published national or Oregon data assesses the income or poverty status of those killed in traffic crashes, multiple analyses on the location of crashes confirms that in poorer areas and in communities of color risk of death from a traffic crash is higher. A report published in 2013 by the Centers for Disease Control and Prevention examined mortality data from 2001-2010 and found racial and ethnic minorities recorded higher annualized death rates. People 75 and older also had significantly higher death rates in the study.

The 2016 Dangerous by Design report found that African Americans and Latinos are twice as likely to be killed as a pedestrian in a traffic crash. Bridging the Gap, a program of the Robert Wood Johnson Foundation, conducted field research measuring the presence of sidewalks, lighting, crosswalks and traffic calming devices in 154 communities. The

[39] Governing, 2014

[40] *Motor Vehicle Traffic-Related Pedestrian Deaths — United States, 2001–2010*, Centers for Disease Control and Prevention (2013); *Dangerous by Design*, National Complete Streets Coalition (2016); *Income Disparities in Street features that Encourage Walking*, Bridging the Gap (2012); *Pedestrians Dying at Disproportionate Rates in America's Poorer Neighborhoods*, Governing, August 2014; *America's Poorer Neighborhoods Plagued by Pedestrian Deaths*, Governing Research Report (August 2014)

resulting study, “Income Disparities in Street Features that Encourage Walking,” found such infrastructure was more common in high-income communities.

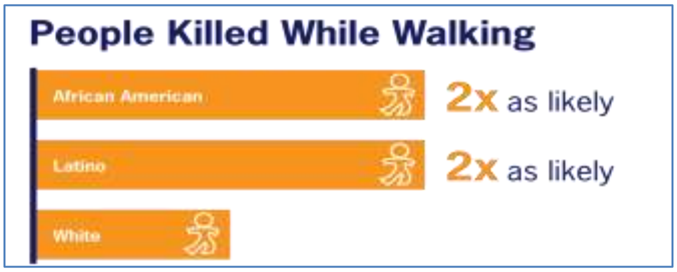


Figure 31: National pedestrian traffic deaths, 2008-12, and race by census tract
Source: Dangerous by Design, 2011 and Safe Routes to School National Partnership

Figure 32: National pedestrian traffic deaths, 2008-12, and census tract per capita income
Source: Governing, 2014 and Safe Routes to School National Partnership

In Oregon, American Indians/Alaska Natives have the highest average rate of vehicle related deaths (5.9 per 100,000) 1.8 times the rate among whites (3.3 per 100,000), and American Indians/Alaska Natives and Black or African American had the highest hospitalization rate - 52.2 and 46.2 per 100,000, compared to 45.5 for whites and 20.8 Asian Pacific Islander for traffic related injuries.[41] This data is not currently available at the regional level.

A majority of Regional High Injury Corridors are in communities with higher concentrations of people of color, people with low incomes and English language learners. In the greater Portland region a majority of high injury corridors and intersections are in communities of color and low-income communities, and forty percent are in communities that are both low-income and communities of color. Refer to the map of Regional High Injury Corridors and Intersections in Chapter 2 to see how they overlap with race and income marginalized communities.

[41] Oregon Public Health Authority, 2008-2014 crashes

	% high injury corridors	Corridor miles	% high injury intersections	Number of intersections
Communities of color & English language learner	50%	250	51%	71
Low-income communities	54%	268	75%	104
Overlap of communities of color, English language learner and low-income	40%	198	46%	64
Region-wide	100%	499	100%	138

Figure 33: Overlap of regional high injury corridors & intersections, communities of color, English language learners, and low-income communities Source: Metro Equity Analysis, 2018

Older drivers are twice as likely to die in a traffic crash. For male drivers age 70 to 79 and female drivers age 75 to 85 and older, the share of serious crashes is double that of drivers in other age groups.

	Total Male Drivers (2011 – 2015)			Total Female Drivers (2011 – 2015)		
Age Group	All Crashes	Serious	Percent Serious	All Crashes	Serious	Percent Serious
14-17	3,076	17	0.6%	3,579	42	1.2%
18-21	9,572	99	1.0%	9,413	93	1.0%
22-24	7,518	91	1.2%	7,466	77	1.0%
25-29	12,431	96	0.8%	11,968	123	1.0%
30-34	11,897	114	1.0%	10,804	105	1.0%
35-39	10,343	122	1.2%	9,247	67	0.7%
40-44	10,421	63	0.6%	8,898	86	1.0%
45-49	9,218	87	0.9%	8,053	70	0.9%
50-54	9,114	77	0.8%	7,500	43	0.6%
55-59	8,248	115	1.4%	6,810	53	0.8%
60-64	6,734	66	1.0%	5,529	38	0.7%
65-69	4,589	41	0.9%	3,823	38	1.0%
70-74	2,408	48	2.0%	2,180	22	1.0%
75-79	1,428	33	2.3%	1,306	24	1.8%
80-84	820	4	0.5%	813	21	2.6%
85+	747	10	1.3%	777	15	1.9%
Unknown	15,669	16	0.1%	11,098	14	0.1%
METRO	**124,233**	**1,099**	**0.9%**	**109,264**	**931**	**0.9%**

Figure 34: Age and gender of drivers involved in crashes, regardless of fault
Source: Metro 2018 State of Safety Report

For young people below the age of 25, motor vehicle crashes are a leading cause of death and the leading cause of years of life lost. Traffic crashes are the leading cause of unintentional injury death for people ages 5 to 24 in Multnomah, Washington and Clackamas County, and the second leading cause of unintentional injury death for people ages 25 to 84.[42]

Serious bicycle crashes are on a downward trend. Serious bicycle crashes have fluctuated over the 5-year period and fatal crashes have declined. Figure x below shows the linear trendline for bicyclist deaths and severe injuries. A better understanding of what has contributed to this positive direction should be developed to continue the investments, programs, or other elements that have made it safer to ride a bicycle in the region.

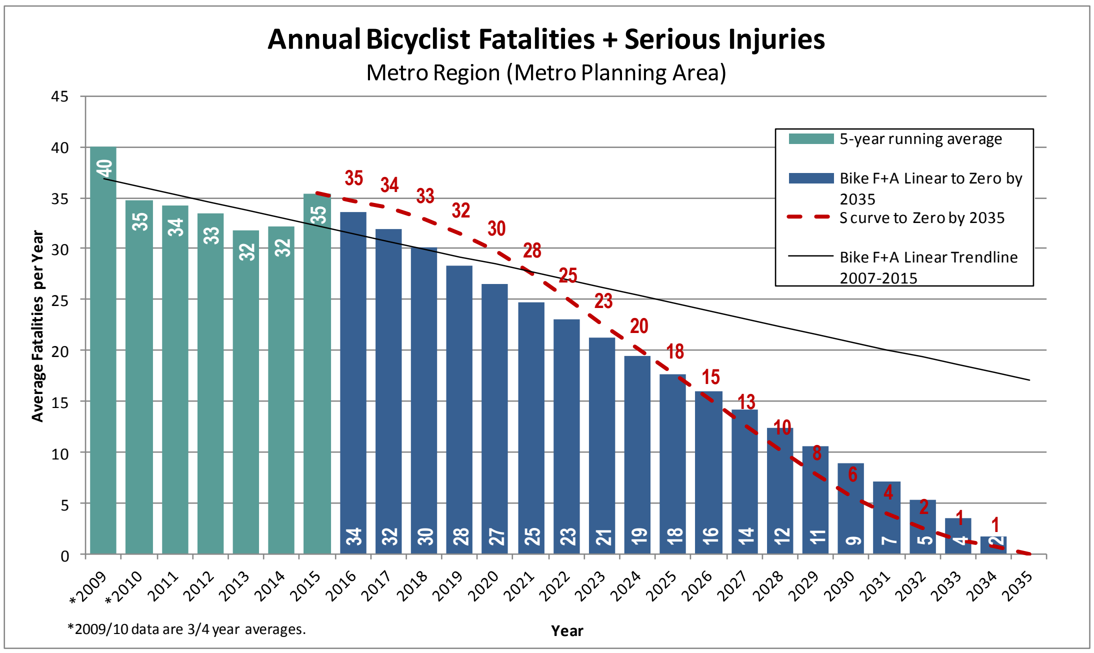


Figure 35: Annual Bicycle Fatalities and Serious Injuries

[42] Oregon Death Certificates: Center for Health Statistics, Center for Public Health Practice, Public Health Division, Oregon Health Authority. Accessed March 13, 2018. For 2012-2016. Unintentional injuries were the 4th leading cause of death (just about tied for third with cerebrovascular disease/stroke); within the category of unintentional injury deaths, transport injuries are the third leading cause behind falls and poisoning (poisoning includes drug overdoses).

Motorcyclist fatalities and severe injuries are increasing. While all injury motorcycle crashes have remained relatively flat between 2011 and 2015, serious motorcycle crashes are trending upward. Motorcycle crashes tend to be severe. Motorcycle crashes comprise two percent of all crashes, and eighteen percent of all fatal crashes.

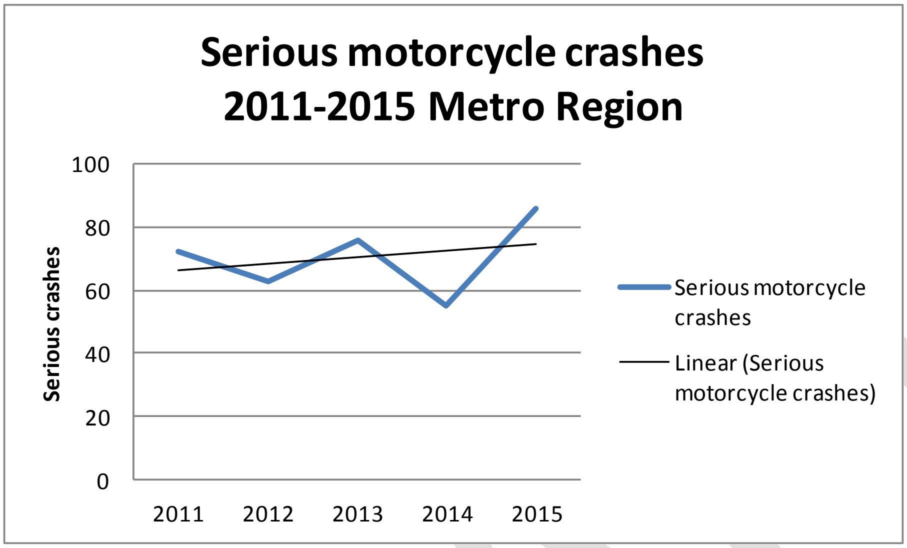


Figure 36: 2011-2015 ODOT crash data

3.4 Roadway design is a factor in serious crashes

This section provides key findings for the relationship between roadway design and serious crashes. Analysis of the regional roadway network included functional classification, number of lanes, and vehicle miles traveled by functional class. Other design elements of the roadways, such as presence of biking and walking facilities and degree of separation, on-street parking, access management, median separation, enhanced crossings, or presence or absence of street lighting were not included the analysis. These types of design elements can enhance safety for all modes. Future analysis should include these elements to help illustrate that not all arterial roadways have the same safety issues. Additional analysis could also look at major roadways where no serious crashes are occurring to develop an understanding of what characteristics those roads have. Refer to the 2018 Metro State of Safety Report for additional information.

Arterial roadways have the highest serious crash rate per road mile and per vehicle mile traveled. Analysis of the crash data provide information on the type of roadways where most fatal and severe crashes are occurring. The analysis found that a majority of fatal and severe crashes are occurring on arterial roadways.

Roadway Classification	Total Road-Miles	Annual VMT (2015)	Annual Crashes per Road-Mile		Annual Crashes per 100M VMT	
			All Injury	Serious	All Injury	Serious
Freeway	304	4,455,000,000	5.9	0.16	40	1.1
Arterial	772	4,281,000,000	9.8	0.41	176	7.4
Collector	994	1,081,000,000	1.7	0.09	158	8.2
Local	4,565	620,000,000*	0.1	0.01	87	4.3
METRO	**6,635**	**10,437,000,000**	**1.7**	**0.07**	**111**	**4.6**

*** VMT for local streets is a low-confidence estimate**

Figure 37: Annual crashes per road mile and VMT by functional class, 2018 Metro State of Safety Report

Arterial roadways have the highest percentage of serious crashes. Seventy-three percent of the region's non-freeway serious crashes, sixty-six percent of all serious crashes (including freeways), seventy-seven percent of the serious pedestrian crashes, and sixty-five percent of the serious bike crashes occur on arterial roadways (arterial roadways comprise twelve-percent of the non-freeway roadway network).

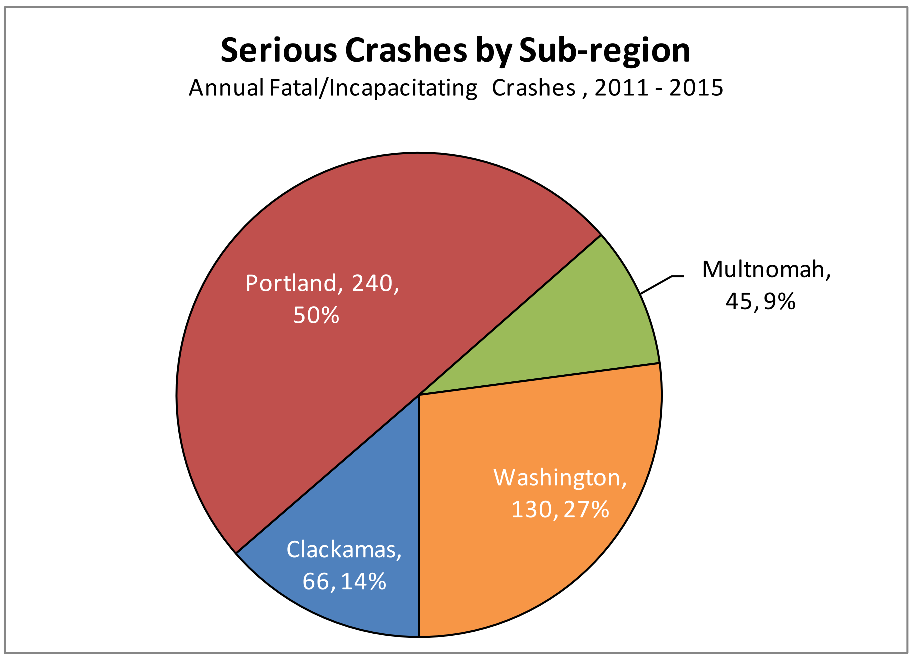


Figure 38: Serious crashes by roadway class
Source: 2018 Metro State of Safety Report

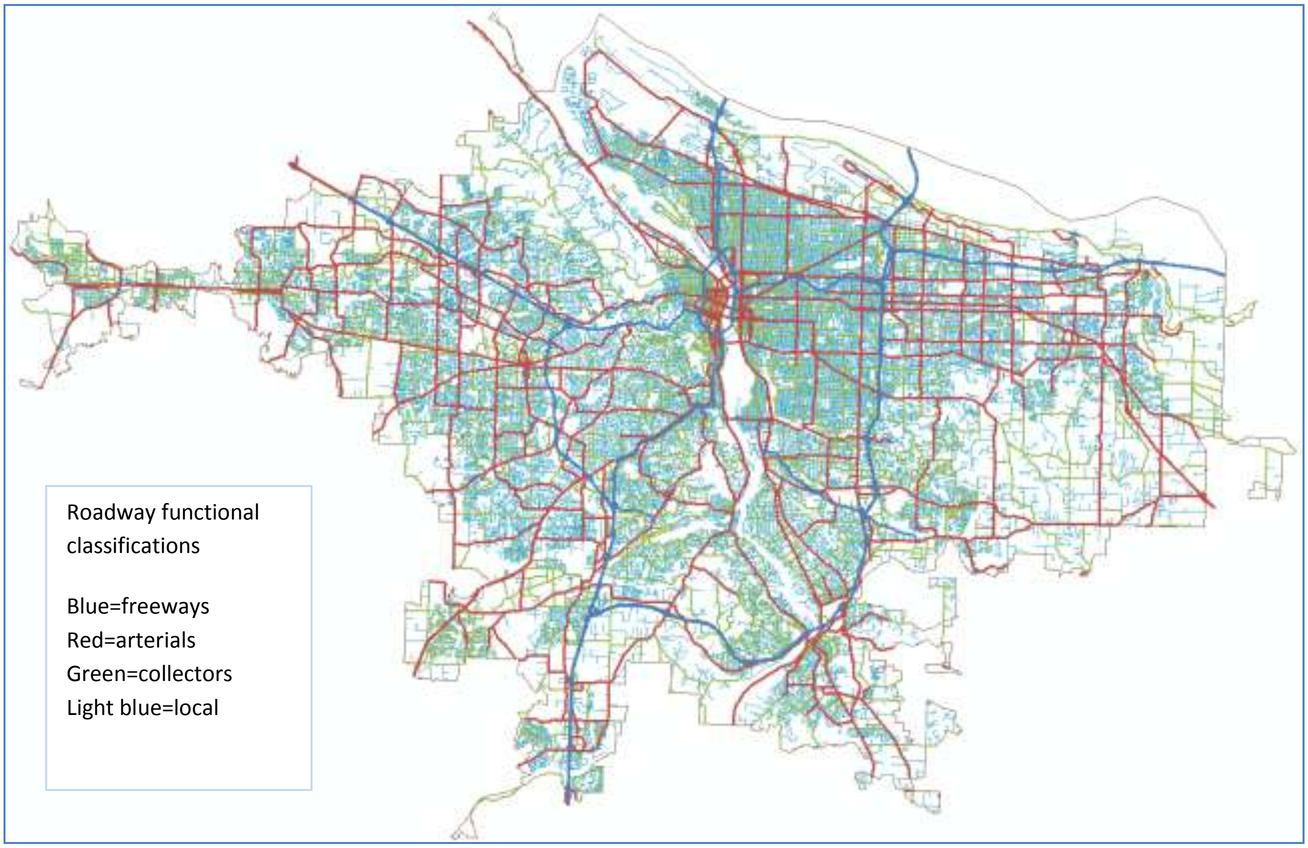


Figure 39: Roadway functional classifications in the greater Portland region

Most Regional High Injury Corridors are arterial roadways. Sixty percent of all fatal and severe injury crashes occur on just six percent of the region's roadways. These roadways are identified as Regional High Injury Corridors and Intersections. Many of these roadways also have the characteristics of high risk corridors, and a majority of these roadways are frequent transit corridors.[43]

Streets with more traffic lanes have higher fatal and severe injury crash rates per mile. Roadways with more traffic lanes have higher fatal and severe injury bicycle crash rates per mile. The serious bicycle crash rate per road mile increases dramatically for roadways with 4 or more lanes. When normalized by motor vehicle traffic volume, the serious bike crash rate on narrower roads is higher than on wider roads. While the reason for this is not clear from the data, it may be related to a higher use of narrower roads by cyclists relative to traffic volume as compared to multi-lane roadways.

Wider roadways are the location of a disproportionate number of serious crashes in relation to both their share of the overall system and the vehicle-miles travelled they

[43] Characteristics if high risk roads are identified by looking at crash history on an aggregate basis to identify particular severe crash types (e.g. pedestrian) and then use the roadway characteristics associated with particular crash types (e.g. arterial roadways with four-or more lanes, posted speed over 35 mph, unlit streets) to understand which roadways may have a higher risk of the same type of severe crash.

serve. Fifty-four percent of fatal and severe crashes occur on roadways with 4 or more traffic lanes. Roadways with 4 or more traffic lanes comprise nineteen percent of the regional roadway network. Wider roadways are particularly hazardous to pedestrians. The serious pedestrian crash rate increases dramatically for roadways with 4 or more lanes. Even when normalized by motor vehicle traffic volume, the serious pedestrian crash rate on wider roadways is still substantially higher than on narrower roads. This follows trends documented in AASHTO's Highway Safety Manual. Roads with more lanes have an especially high serious crash rate for pedestrians, producing higher crash rates per mile and per vehicle mile traveled as compared to other modes.

Intersection design is critical to bicycle safety. A majority of fatal and severe injury bicycle crashes occur at an intersection, and fail-to-yield right-of-way is the top contributing factor in serious bicycle crashes. Seventy-three percent of serious bicycle crashes occurred at an intersection, compared to forty-nine for all serious crashes for all modes. Fail to yield to right-of-way was a contributing factor in eighty-two percent of serious bicycle crashes and fifty percent of fatal bicycle crashes. The data do not specify whether the driver, the bicyclist, or both were under the influence of alcohol. Other factors, such as Fail to Yield ROW, Excessive Speed, and Aggressive Driving, are for the driver.

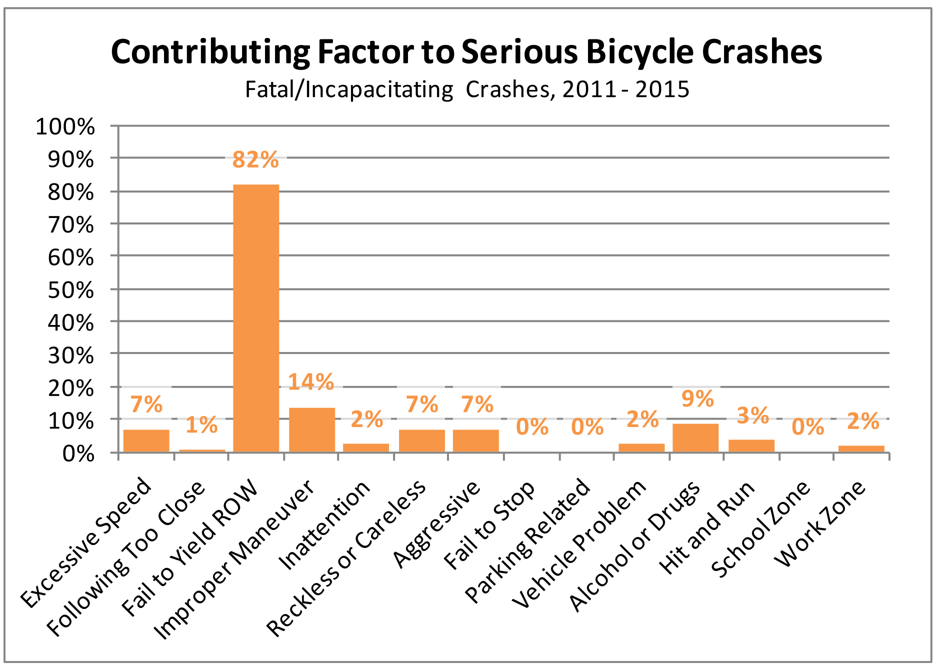


Figure 40: 2018 Metro State of Safety Report

Crash factors differ by roadway type. For freeway crashes, alcohol and drugs is the most common factor for fatal crashes and aggressive driving is the most common factor for serious crashes. For non-freeway crashes, alcohol or drugs is the most common factor for fatal crashes and fail to yield right-of-way is the most common factor for serious crashes.

Serious pedestrian crashes are disproportionately represented after dark. While thirty-nine percent of all serious crashes happen at night, sixty-four percent of serious pedestrian crashes happen at night, indicating that visibility of pedestrians is an important safety feature.

3.5 Speed and speeding are major factors in serious crashes

This section provides key findings related to speeding.[44] Refer to the 2018 Metro State of Safety Report for additional information.

Speed is a fundamental contributing factor in crash severity. Crashes involving higher speeds will tend to increase the severity of the crash and likelihood of death. Reducing speeds and preventing speeding saves lives. On average, 1,000 Americans are killed every month in speed-related crashes. In Oregon, speeding is the most common behavioral issue associated with fatal and serious injury crashes.

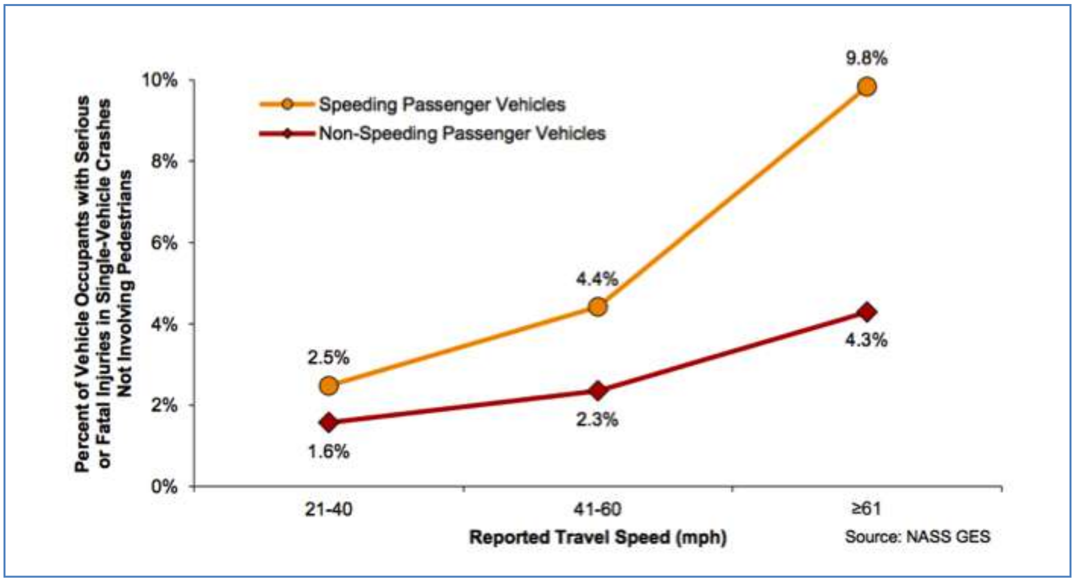


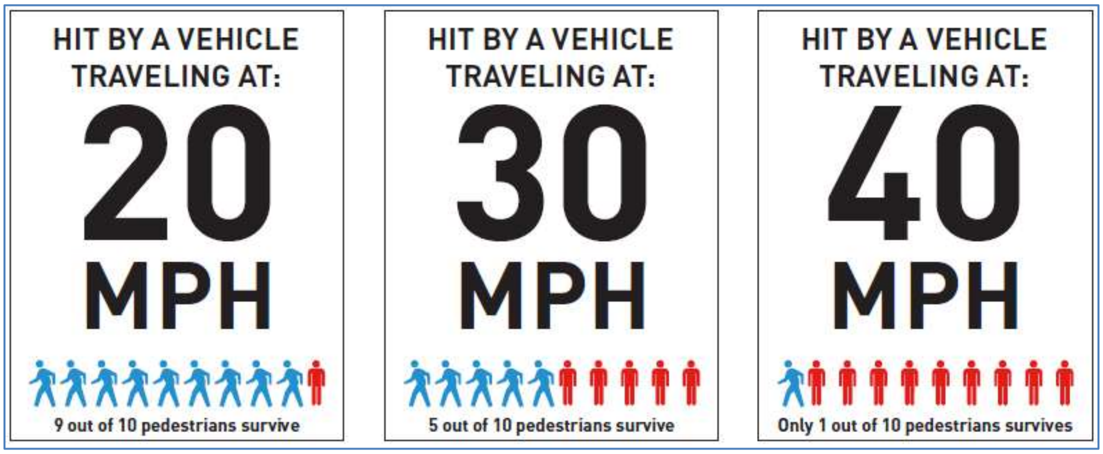
Figure 41: Percent of passenger vehicle occupants sustaining serious or fatal injuries in speeding-related and all crashes, by reported travel speed, 2014
Source: National Automotive Sampling System (NASS) General Estimates System (GES)

Crash severity increases with the speed of the vehicle at impact. Inversely, the effectiveness of restraint devices like air bags and safety belts, and vehicular construction features such as crumple zones and side member beams decline as impact speed increases. The probability of death, disfigurement, or debilitating injury grows with higher speed at impact.

Pedestrians, bicyclists and motorcyclists are more vulnerable to dying or being seriously injured in a speed related crash. Nine out of ten pedestrians will survive being

[44] In the 2018 Metro State of Safety Report, Excessive speed is defined as speed too fast for conditions; driving in excess of posted speed; speed racing; failed to decrease speed for slower moving vehicle. Fatal and severe crashes occurring at higher speeds, but not fitting these definitions, are not counted as speed-related crashes.

hit by a vehicle traveling 20 mph, whereas only one out of ten pedestrians will survive being hit by a vehicle traveling 40 mph.



Source: Vision Zero Network

Alone or in combination with other factors, excessive speed is a major factor in fatal and severe injury crashes. While seven percent of all crashes involve speed as a factor, speed is a major factor in thirty-four percent of fatal and severe crashes. Ninety-seven percent of serious speed related crashes involved aggressive behavior, and thirty-eight percent involved alcohol. Forty-one percent of fatal freeway crashes involve excessive speed. Thirty-five percent of fatal crashes involved aggressive behavior, defined as either excessive speed or following too close.

A majority of excessive speed related serious crashes occur on arterial roadways. Fifty-five percent of serious excessive speed related crashes occurred on an arterial roadway, and seventy-one percent occurred at a non-intersection.

3.6 Aggressive and distracted driving are major factors in serious crashes

This section provides key findings aggressive and distracted driving related crashes. Refer to the 2018 Metro State of Safety Report for additional information.

Dangerous behaviors include those that arise from aggressive or distracted driving. Dangerous behaviors arising from aggressive and distracted driving include failing to yield the right of way, following too close, and excessive speed.

Distracted driving is any activity that diverts attention from driving, including talking or texting on the phone, eating and drinking, talking to people in the vehicle, fiddling with the stereo, entertainment or navigation system—anything that takes attention away from the task of safe driving. Texting is the most alarming distraction. Sending or reading a text takes your eyes off the road for 5 seconds. At 55 mph, that's like driving the length of an entire football field with your eyes closed.

Cell phone use while driving is a growing concern in transportation safety. Drivers use their cell phones 88 out of 100 trips (analysis of 570 million trips in US). On average, more than 8 people are killed and 1,161 more are injured in crashes involving a distracted driver each day in the U.S.   In 2015, the number rose to 10 people every day.

Based on limited data, Oregon appears to have the lowest rate of driving and cell phone use in the country; states with hands free cell phone laws have lower rates of cell phone use while driving and it can be assumed lower distracted driving related crashes.

Distracted driving crashes occur frequently. On average, a crash involving a distracted driver occurs every 2.5 hours in Oregon.[45]

A majority of drivers in Oregon drive distracted. In Oregon, seventy-five percent of drivers drive distracted when alone, and forty-four percent when driving with passengers. [46] A national study found that drivers sue their phones during eighty-eight out of 100 trips.[47]

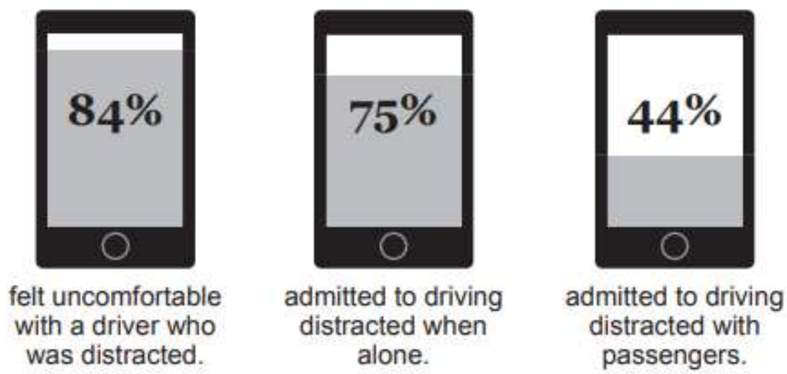


Figure 42: Distracted driving in Oregon
Source: Reducing Distracted Driving in Oregon, ODOT 2017

Dangerous behaviors are a major contributing factor in fatal and severe injury crashes. Aggressive driving is a factor in thirty-six percent of fatal crashes. Forty percent of serious crashes are fail to yield right of way involved.

Aggressive behavior is a major contributing factor in auto only crashes, compared to other modes. Forty-one percent of auto-only serious crashes involved aggressive behavior, compared to nine percent of pedestrian involved crashes and eight percent of bicycle involved crashes. Sixty-four percent of serious freeway crashes involved aggressive behavior.

45

46 Southern Oregon University. Distracted Driving: An Epidemic, A Study of Distracted Driving Attitudes, Behaviors and Barriers Preventing Change (2016). — www.oregon.gov/ODOT/Documents/Distracted Driving

47 *Zendrive Research: Largest Distracted Driving Behavior Study.* (April 2017) http://blog.zendrive.com/distracted-driving/ The research analyzed 5.6 billion miles, 570 million trips and 3 million drivers

Aggressive behavior is a major contributing factor in rear end crashes, the second most common type of serious crashes. Rear end crashes account for twenty-one percent of serious crashes, and seventy-three percent of those crashes involved aggressive behavior.

3.7 Alcohol and drugs are major factors in serious crashes

This section provides key findings for crashes involving drugs and alcohol. Refer to the 2018 Metro State of Safety Report for additional information.

Crashes involving alcohol and drugs have a much higher likelihood of being fatal than other crashes. Fifty-seven of fatal crashes involved alcohol or drugs, while five percent of al crashes involved alcohol and drugs.

Nationally, the percentage of fatally injured drivers who were drinking was highest for Native Americans (57%) and Hispanics or Latinos (47%). [48]

A majority of serious alcohol and drug involved crashes are auto only crashes. Fifty-six percent of serious alcohol involved, and fifty-seven of serious drug involved crashes are auto-only crashes.

Pedestrian crashes have a high likelihood of involving alcohol or drugs. Thirty-eight percent of serious pedestrian crashes are alcohol and/or drug involved. Twenty-seven percent of serious alcohol involved, and twenty-nine percent of serious drug involved crashes are pedestrian involved.

[48] This report looks at two primary figures – fatalities per VMT (by age and ethnic group) and CIR of male drivers by the same categories. Both figures point to higher numbers for people of color. The report offers some potential cultural explanations for the stark differences, none of which were numerically proven – the consensus though is that something needs to be done to address these differences but the proper route for creating change is unknown at this time. NHSTA, 2006

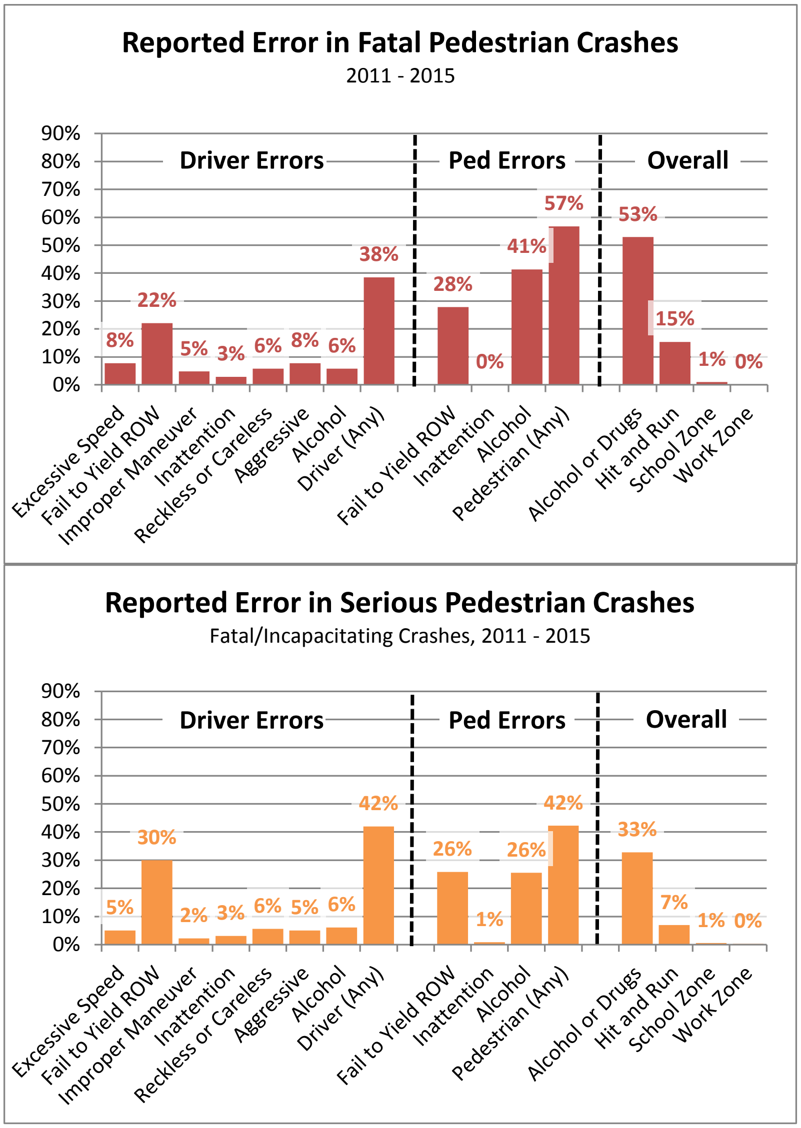


Figure 43: 2018 Metro State of Safety Report

The majority of serious alcohol and drug involved crashes occur at night. Seventy-seven percent of serious alcohol involved, and fifty-six percent of serious drug involved crashes occurred at night.

CHAPTER 4 STRATEGIES AND ACTIONS

The actions in the Regional Safety Strategy are based as much as possible on evidence-based counter measures. Data-driven transportation safety plans identify strategies and actions to address the most common causes and types of fatal and serious injury crashes identified through analysis of crash data.

Traffic safety problems are systemic. Addressing safety therefore requires a comprehensive systemic response that includes an array of evidence based actions. The Safe System approach provides a framework for strategies and actions that starts with safe travel for all, including reducing disparities for people of color and people with low incomes and for people walking and bicycling.

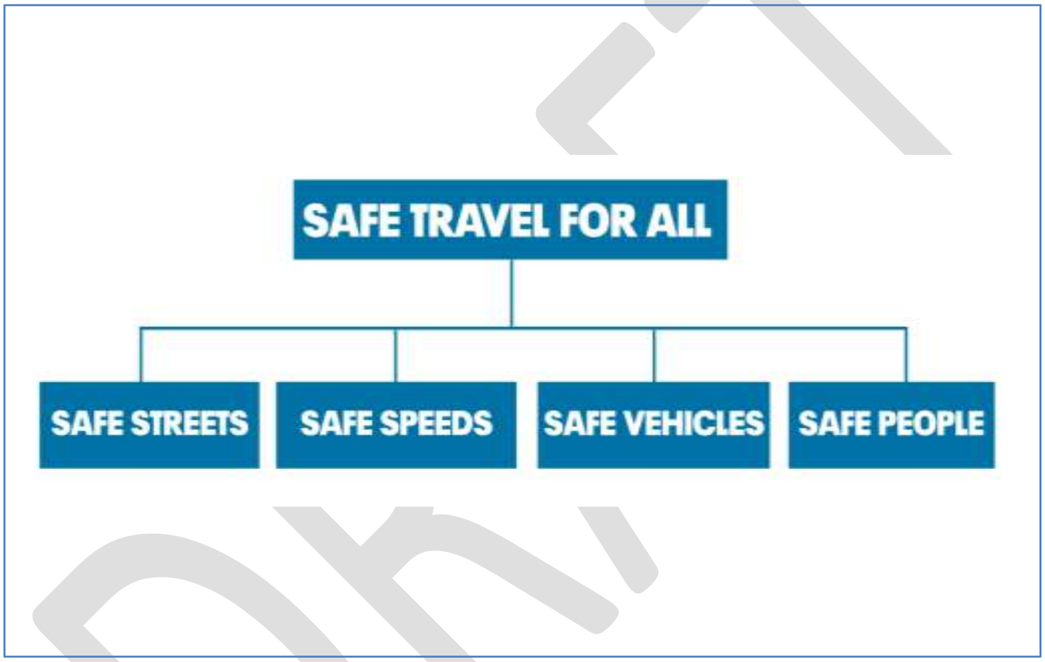


Figure 44: Vision Zero Safe System approach
Source: Vision Zero Network

The six strategies in the Regional Safety Strategy are of equal importance and represent a multi-pronged approach to reducing fatal and severe crashes in the region. Consistent with the Safe System approach the strategies and actions emphasize systemic solutions and de-emphasize individual behavior change, especially enforcement.

- **Enforcement related actions raise equity concerns** because of the potential disproportionate impact on people of color and people with low income.[49] While

[49] *A Billionaire and a Nurse Shouldn't Pay the Same Fine for Speeding.* New York Times (March 15, 2018)
The Constitutionality of Income-Based Fines. Alec Schierenbeck, University of Chicago Law Review, forthcoming (March 2, 2018)
The High Costs of Disparities for People of Color in Multnomah County, Lee Van Der Voo & Nick Budnick. (2017). http://invw.org/2017/02/02/being-black-in-multnomah-county/ This review found that

high visibility enforcement of speeding, impaired and distracted driving have been proven to be effective at reducing those types of crashes, the potential equity impacts must be weighed against the benefits. The enforcement actions in the Regional Safety Strategy prioritize automated enforcement and education. Action 4.1 which does recommend targeted enforcement also recommends taking actions to reduce disproportionate impacts either from racial profiling or fines.

- **Increasing personal security**, such as protection from harassment and violence on the street, is recognized as an important element of transportation safety. However it is beyond the scope of the Regional Safety Strategy to identify specific actions to address personal security.

Strategies and actions for the Regional Safety Strategy were developed with the recognition of existing city, county and state transportation safety and transportation plans as the foundation for reaching regional safety targets, goals and objectives.

The Regional Safety Strategy strategies and actions are recommended best practices, but are not mandated.

Implementation is contingent on the availability of funding and political will.

Strategies are broad areas of action designed to achieve an overall aim. The strategies identified respond to the most common causes of fatal and severe crashes in the region and the most common crash types. Each of the six strategies identifies specific recommended actions.

Actions are specific steps that a variety of partners can take to address specific safety problems. Actions in the Regional Safety Strategy were identified from multiple sources, including state and local transportation safety action plans, research of current best practices to address the primary factors in fatal and serious crashes.

Leads and partners for each action leads are identified for each action. A full list of partners with a role in transportation safety is provided at the end of the document. Many of the actions require multiple partners and/or could be implemented in various ways depending upon the lead agency or agencies. Actions where Metro is identified a lead agency indicates that Metro has committed taking steps to implement that action.

The effectiveness of each action to reduce fatal and severe injury crashes, based on research and studies, is noted.

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white residents charged in relatively minor cases in Multnomah County — those with a single count — paid a median fine of $181, while African-American defendants paid $261.

- Proven = proven to be effective based on several evaluations with consistent results
- Recommended = generally accepted to be effective based on evaluations or other sources
- Unknown = limited evaluation or evidence; experimental; outcomes inconsistent or inconclusive among studies

One recent study provided a Traffic Safety Best Practices Matrix that identifies strategies and actions that can best help implement Vision Zero and the Safe System approach that was especially useful.[50] Proven safety countermeasures included in the actions have been documented by the Federal Highway Administration and/or the Oregon Department of Transportation.[51]

Timing of implementing actions

Many of the actions are currently being implemented to varying degrees by some agencies and jurisdictions. Expanding the number of jurisdictions utilizing proven tools to reduce fatal and severe injury crashes is critical to implementing the Regional Safety Strategy.

While some of the actions, such as enacting safety legislation or updating plans are short term, many of the actions will require ongoing implementation and resources, such as convening safety work groups and education programs, to be successful. Early and aggressive implementation of the strategies and actions will result in more lives saved. When the Regional Safety Strategy is reviewed each time the Regional Transportation Plan is updated the timing and number of actions should be refreshed.

4.1 Protect vulnerable users and reduce disparities

Vulnerable users have higher fatality rates. Increasing safety for vulnerable users increases safety for all transportation users and will reduce disparities.

Vulnerable users are people that are more vulnerable to being killed or seriously injured in crashes. Vulnerable users are pedestrians, bicyclists, motorcycle operators, children, older adults, road construction workers, people with disabilities, people of color and people with low income.

This strategy is focused on protecting users of the transportation system who are more vulnerable to dying or being seriously injured. Research and practice has shown that

Actions for this strategy are focused on proven and recommended programs and education and data collection and monitoring that result in roadways that are safe for the youngest, oldest and most vulnerable users of the transportation system. These actions

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[50] *A Vision for Transportation Safety: Framework for Indentifying Best Practice Strategies to Advance Vision Zero.* Arielle Fleisher, Megan Wier, and Mari Hunter. Transportation Research Record: Journal of the Transportation Research Board, No. 2582. (2016)

[51] https://safety.fhwa.dot.gov/provencountermeasures and www.oregon.gov/ODOT/HWY/TRAFFIC-ROADWAY/docs/pdf/CRF_Appendix.pdf

compliment the other strategies, especially the reduce speeds and speeding and designing roadways for safety strategies.

#	Strategy 1 Actions	Lead	Partners	Effectiveness
1.1	Implement Safe Routes to School programs and infrastructure projects, prioritizing schools in areas with higher concentration populations of people with lower incomes, people of color, and low English proficiency.	ODOT, Metro, cities and counties	Schools, public health, advocates	Recommended
1.2	Provide culturally and age appropriate on-going education of traffic laws and street designs.	ODOT, cities and counties, advocates, public health	Advocates, Metro	Recommended
1.3	Increase opportunities to provide education and products to increase visibility of people walking and bicycling (e.g. lights, reflective materials).	ODOT, cities and counties, schools	Public health, advocates	Recommended
1.4	Continue to improve data collection and reporting of vulnerable users, including: • Collecting and making crash data on race and ethnicity of victims available; • Supporting and developing programs to coordinate and collect bicycle and pedestrian count data. • Evaluate motorcycle, pedestrian and bicycle crash locations and risk factors though analysis of existing data and development of new data sources.	ODOT, Metro cities, counties, police, research institutions	Public health, advocates	Recommended
1.5	Promote and advocate for opportunities to increase large vehicle industry awareness and implement safety benefits including, but not limited to, rear wheel and side guards, sensors, front and side mirrors, and high visibility cabs. Explore opportunities to collaborate with the US DOT, ODOT, Port of Portland, City of Portland and other agencies to increase use of such safety features.	Metro, cities, counties, ODOT, Port of Portland, US DOT	Advocates, large vehicle industry	Proven
1.6	Evaluate pedestrian and bicycle crash locations and risk factors in Transportation System Plans though analysis of existing data and development of new data sources.	Cities, counties, ODOT	Metro, research institutions	Recommended
1.7	Complete the regional active transportation network, filling sidewalk gaps and bicycle gaps on the designated regional pedestrian and bicycle network including arterial roadways, by 2040.	Metro, cities and counties, ODOT, TriMet, SMART	Senior advocates, advocates, public health	Recommended

1.9	Prioritize funding for projects that: • Reduce fatal and severe injury crashes; • Increase safety for vulnerable users, including people walking, bicycling and accessing transit and schools (increasing safety for vulnerable users has been shown to increase safety for all users); and/or • Are on a high risk or injury location, with demonstrated crash history, safety concern or other risk factor; and/or • Increases safety in areas with high concentrations of people of color, people with low-incomes and people with low English proficiency.	Metro, ODOT, counties and cities	Public health, advocates	Recommended
1.10	Pursue policies and tools to reduce vehicle miles traveled, including congestion pricing, multimodal facilities, transit and Transportation Demand Management programs. Reducing vehicle miles is a key element of the Safe System approach.	ODOT, Metro, cities and counties	Advocates, public health	Recommended

4.2 Design roadways for safety

Arterial roadways have the highest serious crash rate per road mile and per vehicle mile traveled. Prioritizing and standardizing safety in street design for all modes can prevent dangerous behaviors and save lives.

This strategy is focused on designing the transportation system, especially arterial roadways, to enable and encourage safe behaviors and reduce the severity of crashes when they do occur, primarily through greater separation and slower speeds. Designing roadways to be safe for children, older adults and people walking and bicycling makes the system safe for all users.

Arterial roadways have the highest serious crash rate for all modes, and should be the primary focus of regional safety efforts. Safety interventions that match solutions to the crash pattern and street and neighborhood context are needed. Many of the region's High Injury Corridors meet or largely meet adopted design standards so simply bringing roadways up to adopted standards does not fully address the needed safety improvements, especially for people walking and bicycling.

Actions for this strategy focus on designing for safe auto speeds on arterial roadways, providing greater separation and protection between people walking, bicycling and driving, adding medians, roundabouts, access management and other design solutions to prevent crashes. The safest arterial roadways are accessed managed, include street calming, provide separation between modes, provide safe crossing for vulnerable users, and provide intuitive visual cues that make it clear that people using different modes share the space. These roadways keep all people safer – even when they make mistakes.

#	Strategy ❷ Actions	Lead	Partners	Effectiveness
2.1	Implement/prioritize context sensitive and universal design and engineering solutions such as the Federal Highway Administration proven safety countermeasures, the Highway Safety Manual and other resources that have been shown to support safe speeds, protect vulnerable users and reduce fatal and severe crashes, focusing on arterial roadways and high injury corridors and intersections. Countermeasures with proven safety benefits include: • medians and pedestrian crossing islands • protected left turn signals • separation of travel modes on streets with higher traffic speeds, volumes, and truck volumes with protected bikeways and walkways • bicycle boxes • bicycle intersection treatments • lead pedestrian intervals • pedestrian hybrid beacons • roundabouts • road diets • access management • driveway consolidation • backplates with retroreflective borders • freight aprons Pedestrian design should account for the needs of all potential users, including those with physical or mental limitations. Design and engineering solutions should account for designated truck routes to safely move freight and agricultural equipment amid other modes.	Cities, counties, ODOT, Metro	TriMet, SMART, public health, advocates	Proven and/or recommended
2.2	Develop and adopt Complete Streets policies and Complete Streets checklists.	ODOT, Metro, cities and counties	Public health, advocates	Unknown
2.3	Provide context sensitive best practices for Vision Zero street design in the Designing Livable Streets regional street design guidelines and tools.	Metro	ODOT, cities and counties, public health, advocates	Unknown
2.4	Review standards for auto travel lane widths and develop criteria to explore making 10' travel lanes preferred standard for arterial roadways in certain contexts, allowing more right-of-way for wider sidewalks, protected bikeways and other safety features.	Cities, counties, ODOT, TriMet	Metro, public health, advocates	Recommended *(greater separation of modes)*

2.5	Develop criteria and spacing standards and/or policies for enhanced pedestrian crossings in areas with pedestrian activity (such as transit access) and where enhanced crossings are greater than 530 feet apart.	Cities, counties, ODOT	Metro, public health, advocates	Recommended
2.6	Explore policies to make protected bike lanes the preferred design for arterial roadways with posted speeds of 30 mph or higher, and/or average daily traffic above 6,000 autos per day, and/or heavy truck volumes. Connections at intersections should be re-evaluated as protected bike lanes are installed.	Cities, counties, ODOT	Metro, NACTO, public health, advocates	Recommended
2.7	Illuminate the transportation system appropriately by: • Requiring new development and redevelopment in the urban area to install street and sidewalk lighting. • Integrating street and sidewalk lighting into major transportation improvement projects, where appropriate. • Exploring a variety of lighting options and identify the appropriate contexts to use them. Considering street lighting designs and practices that limit impacts on neighborhoods, wildlife and agriculture.	Cities, counties, ODOT	Metro	Recommended
2.8	Investigate and perform engineering reviews for crashes that result in fatalities and severe injuries to determine effective countermeasures for preventing future severe crashes. Conduct routine evaluation of effectiveness of traffic safety interventions.	Police, cities, counties, ODOT, academic institutions	Metro, advocates, public health	Recommended
2.9	Standardize Highway Safety Manual crash prediction project analysis to guide project development as part of the traffic analysis procedure.	ODOT, cities and counties	Metro, academic research institutions	Recommended

Figure 45: Example of a vision zero street (1)ADA accessibility, (2)public amenities, (3) protected bike lanes, (4) narrow vehicle lanes, (5) pedestrian islands, (6) wide sidewalks, (7) dedicated mass transit facilities, (8) signal protected pedestrian crossings, (9) dedicated unloading zone, (10) signal retiming
Source: Vision Zero Streets.org

4.3 Reduce speeds and speeding

Speed is a fundamental contributing factor in crash severity. Reducing speeds and preventing speeding saves lives.

The Vision Zero Network recommends recognizing and prioritizing speed as a fundamental factor in crash severity as a key principle to achieving zero deaths and severe injuries.

This strategy is focused on reducing the prevalence of speeding as well as reducing motor-vehicle speeds on arterial roadways to survivable speeds. A comprehensive approach to reducing speeds and speeding is necessary and typically involves multiple countermeasures. For example, the National Highway Traffic Safety Administration states that "no single strategy will be appropriate for all locations, and combinations of treatments may be needed to obtain speed limit compliance and achieve crash reduction goals."

The National Transportation Safety Board's landmark report and recommendations on speeding recommend a new approach to setting speeds.[52] The report describes the Safe System approach to speed limits, which differs from the traditional view that drivers choose reasonable and safe speeds. In the Safe System approach, speed limits are set according to the likely crash types, the resulting impact forces, and the human body's ability to withstand these forces. It allows for human errors (that is, accepting humans will make mistakes) and acknowledges that humans are physically vulnerable (that is, physical tolerance to impact is

[52] National Transportation Safety Board, "Reducing Speeding-Related Crashes Involving Passenger Vehicles" (July 2017)

limited). Therefore, in this approach, speed limits are set to minimize death and severe injury as a consequence of a crash.

The National Transportation Safety Board includes 19 recommendations for decreasing the prevalence of speeding related injuries, including the following:

- increasing automated enforcement
- improving speeding related data collection
- increasing the availability of intelligent speed adaptation on new vehicles
- reconsidering the 85th percentile rule of thumb
- increasing the use of the Safe System approach to design in urban areas

Actions for this strategy are focused on proven countermeasures such as designing arterial roadways that result in slower speeds, lowering posted speeds, and increasing the use of automated speed enforcement. The focus is on the arterial roadways with higher serious crash rates and Regional High Injury Corridors.

#	Strategy 3 Actions	Lead	Partners	Effectiveness
3.1	Design arterial roadways to achieve appropriate safe target speeds, generally 35 mph or less, using design elements that have been shown to effectively result in lower speeds. A majority of excessive speed related serious crashes occur on arterial roadways.	Cities, counties, ODOT	Metro, TriMet, SMART, public health, advocates	Proven
3.2	Change state law to increase the number of jurisdictions eligible for fixed speed camera installation, especially at high injury locations. Utilize speed feedback cameras given the low cost and effectiveness and immediate information to drivers.	Cities, counties, ODOT	Metro, public health, advocates	Proven
3.3	Utilize authority provided through House Bill 2409 to issue speeding tickets through red light cameras. Change state law to increase the number of jurisdictions eligible to use this tool.	Cities, counties, ODOT, Metro	Public, health, advocates	Proven
3.4	Work with ODOT to modernize speed setting practices, including a multi-modal approach to set speed limits, incorporating factors such as land use, crash history and the presence of vulnerable road users.	Cities, counties, ODOT	ODOT, Metro, public health, advocates	Proven
3.5	Fund and install intelligent speed adaptation technologies that alert the vehicle traveling over the speed limit, prioritizing high risk and high injury corridors.	ODOT, cities, counties	Metro, public health, advocates	Proven

3.6	Utilize flexibility in setting posted speeds so that design speeds can be set at a target speed below the posted speed to increase safe operating speeds. Injury minimization or safe system approach: Speed limits are set according to the crash types that are likely to occur, the impact forces that result, and the human body's tolerance to withstand these forces.	ODOT, cities, counties	Public health, advocates, police, fire	Recommended
3.7	Change Oregon speed zone law from basic rule/limits to limits only statewide to reduce confusion and increase compliance with speed limit.	ODOT, cities, counties	Public health, advocates, police, fire	Unknown

4.4 Address distracted and aggressive driving

Aggressive or distracted driving can lead in an instant to injury or death. System design, education and policies can reduce and minimize the impact of bad decisions.

Dangerous behaviors arise from distracted or aggressive driving, including following to close, disregarding traffic signals or stop signs, failing to stop, failing to yield the right of way when turning, and excessive speeding. Aggressive driving is extremely common among U.S. drivers. A recent study by the AAA Foundation for Traffic Safety found that nearly eighty percent of drivers expressed significant anger, aggression or road rage behind the wheel at least once in the previous year. Distracted driving, especially the use of smart phones while driving is difficult to track though it is generally agreed that instances of 'texting while driving" are increasing.

This strategy is focused on reducing and minimizing the impact of dangerous behaviors. Dangerous behaviors often arise from larger social issues and norms that are difficult to address within the context of transportation alone. Seeking opportunities to partner and collaborate with partners working on these larger social issues and norms, including public health, schools and community and non-profit groups is important to address the root causes of aggressive and distracted driving.

Actions for this strategy focus on changing overall systems and using education and technology to reduce the prevalence of dangerous behaviors in the first place. Targeted high-visibility enforcement is included with an emphasis on taking actions to reduce the disproportionate impacts on and over policing of people of color and people with low incomes. Action 4.6 is a catch-all action to get at the larger social issues and norms that can lead to aggressive and distracted driving.

#	Strategy 4 Actions	Lead	Partners	Effectiveness
4.1	Focus high visibility enforcements on dangerous behaviors (speeding, failing to yield to pedestrians, signal violations, improper turns/illegal turns, texting while driving) and high injury corridors, taking actions to reduce the disproportionate impacts on people of color and people with low incomes, including fully implementing Oregon's anti-racial profiling bill (House Bill 2355). Research shows that high-visibility enforcement can reduce drunk driving fatalities by as much as 20%.	Police, cities, counties	Metro, ODOT, advocacy groups, public health	Recommended
4.2	Increase penalties for dangerous behaviors, identifying actions to reduce the disproportionate impacts from fines on people of color and people with low incomes, such as diversion classes and other non-monetary penalty options.	State, cities, counties, police	Metro, ODOT, advocacy groups, public health	Recommended
4.3	Support implementation of recommendations identified in Reducing Distracted Driving in Oregon report and House Bill 2597 "Distracted Driving Law."	ODOT, police, cities and counties, Metro	Public health, advocates, auto industry	Unknown
4.4	Support auto insurance companies to provide lower auto insurance costs to drivers that install technologies to turn off phone while driving.	ODOT, Metro, cities, counties, advocates	Public health, advocates	Unknown
4.5	Compile a comprehensive list and contacts of private sector companies that operate large numbers of vehicles in the region, and identify a process that supports state and local partners to engage in outreach regarding safe driving behaviors to members, workforces and customers – companies such as ride hailing services and trucking companies.	Metro, ODOT, cities and counties	ODOT, cities and counties, commercial vehicle companies	Unknown
4.6	Support legislation to increase frequency of driver education, testing, inclusion of urban transportation safety in test materials, and driver's license renewal.	Metro, ODOT, cities and counties	Advocates, public health	Recommended

4.5 Address impairment

Crashes involving alcohol and drugs have a much higher likelihood of being fatal than other crashes. Providing options to people using the roadways while drunk or intoxicated saves lives.

This strategy is focused on upstream solutions to reduce the prevalence of people using the roadways while impaired. Intoxication arises from larger social issues and norms that are difficult to address within the context of transportation alone. Seeking opportunities to partner and collaborate with partners working on these larger social issues and norms, including public health, schools and community and non-profit groups is important to address the root causes of aggressive and distracted driving.

Actions for this strategy focus on changing overall systems and using education and technology to prevent impaired driving from occurring. Targeted high-visibility enforcement is included with an emphasis on taking actions to reduce the disproportionate impacts on people of color and people with low incomes.

#	Strategy ❺ Actions	Lead	Partners	Effectiveness
5.1	Identify funding to send law enforcement to Drug Recognition Experts (DRE) training, and training to prevent profiling.	Police, cities, counties	State, public health, advocates	Recommended
5.2	Adopt National Transportation Safety Board recommendation to reduce Blood Alcohol Concentration limit to 0.05.	State	Advocates, public health, Metro, cities and counties	Proven
5. 3	Implement pre-paid morning parking programs in areas where appropriate (prevents towing/ticket for drivers who choose other way home).	Cities, counties	Public health, advocates	Recommended
5.4	Promote use of apps such as SaferRide developed by NHSTA, which provide people easy ways to find a safe ride home.	Cities, counties, ODOT, Metro	Public health, advocates	Recommended
5.5	Explore opportunities to support the U.S. DOT to work with industry groups and vehicle manufacturers to further the use of technology to reduce impaired driving.	ODOT, Metro, cities and counties	Public health, advocates	Recommended
5.6	Support culturally appropriate safety programs and educational messages, paired with outreach and investments, to curb the risk of impaired driving, using resources such as NHSTA's Impaired Driving Segmentation research (2017). Messaging is more effective when there	ODOT, Metro, cities and counties, advocates,	Public health, advocates	Recommended

	is an in-depth understanding of what messages work for different groups, and when paired with other investments. Coordinate with public health initiatives and partners.	public health		

4.6 Ongoing engagement and coordination

Many partners will implement Vision Zero. Ongoing engagement and coordination among all partners is essential.

One of the most challenging elements of a Safe System approach is bringing together all of the people and organizations that contribute to the safety of the transportation system. For this reason, coordination and leadership are critical to success.

This strategy focuses on the need to increase and maintain coordination and engagement among partners. As the region's Metropolitan Planning Organization, Metro plays an important role in convening and facilitating regional discussions and efforts to ensure partnerships are successful in achieving the regional vision.

Actions for this strategy focus on convening partners, setting work programs, tracking progress, maintaining and improving data, introducing and supporting legislation and updating regulations and policies.

#	Strategy 6 Actions	Lead	Partners	Effectiveness
6.1	Develop Metro work program to implement actions where Metro is a lead or one of several leads. Include work program elements to support implementing actions where Metro is not the lead.	Metro	Cities, counties, ODOT, public health, advocates, police, fire, TriMet, SMART	Recommended
6.2	Convene, as needed, transportation safety meetings with local and state partners to implement 2018 RTSS. Determine frequency of meetings in work program developed in Action 6.1. Identify police and fire representatives to participate in regional coordination meetings.	Metro	Cities, counties, ODOT, FHWA, public health, advocates, police, fire, TriMet, SMART	Recommended
6.3	Provide an annual Vision Zero report back to Joint Policy Advisory Committee on Transportation (JPACT) and Metro Council, reporting on MAP-21 safety targets and regional safety plan implementation.	Metro	Cities and counties, ODOT, TriMet, SMART, public health, advocates	Recommended

6.4	Review the strategies and actions of the Safety Strategy prior to each update of the Regional Transportation Plan and update as needed.	Metro	Cities and counties, ODOT, TriMet, SMART, public health, advocates	Recommended
6.5	Maintain and update Metro crash data. • Update Metro webpage annually with MAP-21 transportation safety performance measure data; include data on race and ethnicity as available. • Update and maintain regional crash map tool and crash map. • Develop a regional crash prediction modeling tool that utilizes and links social and environmental factors with injury data.	Metro	FHWA, ODOT, public health, academic inst.	Recommended /Proven
6.6	Identify opportunities to engage and partner with community based organizations and advocates, especially to increase opportunities for proactive monitoring and feedback gathering from the community on their safety issues and concerns. Conduct targeted outreach/education to communities near high injury arterials and intersections, focusing on historically marginalized communities.	Metro, ODOT, cities and counties	Public health, advocates	Recommended
6.7	Support development of city and county Transportation Safety Action Plans and Vision Zero targets; include a transportation safety plan, with data analysis that addresses all modes and is based on a safety inventory based on both an analysis of crash rates and an analysis of crash risks in the updates of Transportation System Plans; participate in local, regional and state safety task forces, and develop and participate in state, regional and city safety summits.	Metro, ODOT, DLCD, cities and counties	Public health, advocates, TriMet, SMART	Recommended
6.8	Identify opportunities to develop safety workshops for state, regional, county and city staff on Vision Zero framework and priorities, including racial equity and public health.	Metro, ODOT, TriMet, cities and counties	FHWA	Recommended
6.9	Convene regular local safety meetings made up of state and local transportation and public health professionals, equity representatives, police and fire, and community and advocacy organizations, to review progress on implementing safety plans and collaborate on specific topics, such as impairment, distracted driving, street design, and enforcement.	Local agencies	ODOT, Metro, public health, advocates, police, fire, TriMet, SMART	Recommended

	Integrate Vision Zero/Toward Zero Deaths framework and priorities, including racial equity and public health.			
6.10	Identify funding for and develop at least one annual coordinated culturally appropriate and targeted mass media safety campaign in the region, utilizing campaign materials developed by NHSTA, Drive Toward Zero, Vision Zero, Toward Zero Deaths and other sources as appropriate. Strong, targeted advertising with high-visibility enforcement and publicity about that enforcement have proven to be most effective.	Metro, cities, counties, ODOT	Advocates, public health	Proven
6.11	Support safety legislation, regulations and funding at the state and federal level that implement Vision Zero and do not increase racial disparities.	Metro, ODOT, cities, counties, advocates	Advocates, public health	Recommended
6.12	Monitor federal and state autonomous vehicle policies and ensure that they do not place the burden of safety on vulnerable users (such as requiring them to carry a sensor or install a phone application to be picked up by an autonomous vehicle), and require rigorous safety testing of all autonomous vehicles prior to public deployment.	Metro, ODOT, cities and counties	Advocates, public health, AV industry	Unknown
6.13	Update the Regional Transportation Functional Plan to require Transportation System Plans to include a transportation safety plan, with data analysis that addresses all modes and is based on a safety inventory based on both an analysis of crash rates and an analysis of crash risks, to require that Transportation System Plans identify safety as a need, and to require that transportation projects do not make a known safety problem worse, and to be consistent with the Regional Safety Strategy.	Metro	Cities, counties, ODOT, TriMet, advocates, public health	Unknown
6.14	Update the following sections of OAR 660-012-0000, the Oregon Transportation Planning Rule: • Section 0020 (2), requiring Transportation System Plans to include a transportation safety plan, with data analysis that addresses all modes and is based on a safety inventory based on both an analysis of crash rates and an analysis of crash risks. • Section 0030 (1) and (2) identifying safety as a need. • Section 0060 (1)(c) clarifying that making a known safety problem worse constitutes a	DLCD, Metro, ODOT	Cities and counties, advocates	Recommended

	"significant effect".			
6.15	Best practices recommend that police periodically review, update and conduct trainings to reflect new traffic safety priorities.	Police, state, cities, counties,	Advocates, public health	Recommended

CHAPTER 5 IMPLEMENTATION

In the Safe System approach coordination across all areas of government and partners is necessary to fully implement strategies and actions. Engagement and coordination actions are outlined in Strategy 6. Implementation is always contingent on the availability of funding and the political will to take steps which may be politically challenging. Prioritization of safety in transportation funding and projects, prioritization of vulnerable users – especially people walking - slowing speeds, education and ongoing coordination are all needed for the region to work towards Vision Zero.

There are **many efforts underway** in the greater Portland region that are increasing safety and reducing crashes. These efforts will need to be **sustained and increased** to keep pace with an increase in vehicle miles traveled and a growing economy – both which could result to more Serious crashes if plans are not implemented. Efforts underway that impact safety include:

- Implementing of adopted land use plans
- Developing and implementing county and city transportation safety action plans
- Filling sidewalk gaps and adding enhanced pedestrian crossings
- Adding protected bikeways and protected intersections
- Increasing awareness of Vision Zero and role of speed in serious crashes
- Investigating fatal and serious injury crash sites
- Collecting data on race and ethnicity in traffic stops
- Improving coordination among partners
- Increasing use of speed cameras to reduce speeding
- Increasing Safe Routes to School programs and infrastructure
- Increasing public access to safety data and ability to report safety issues
- Increasing focus on preventative actions on high risk roads
- Supporting better technology in motor-vehicles to increase safety
- Continuing widespread seat belt use
- Increasing police training to identify drug and alcohol use
- Increasing access to ride options such as Uber and Lyft to reduce impaired driving [53]
- Creating innovative public awareness campaigns

[53] "Does Uber Really Prevent Drunk Driving? It Depends on the Study" New York Times, April 7, 2017. – initial research suggests that the increase in availability of ride-hailing services such as Lyft and Uber could help lower the incidents of drunk driving, supporting the overall approach of providing travel options and other programs to support not driving drunk.

5.1 Metro work program

Metro will develop a work program (Safety Strategy Action 6.1) describing tasks and a timeline to take direct action or support partners in implementing the Regional Safety Strategy. Steps to implement actions where Metro is the lead or co-lead will be identified.

Metro's work program will focus on actions to be taken in the next five years following adoption of the 2018 Regional Transportation Plan.

An annual progress report will be given to the Metro Council, JPACT and MPAC (Safety Strategy Action 6.3). The progress report will include progress made towards meeting federally required transportation safety targets and progress on actions by Metro and partners.

5.2 Engagement and coordination

Ongoing engagement and coordination among all partners is essential to reach regional federally required safety targets and move towards Vision Zero.

Chapter 4 identifies recommended strategies and actions for reducing fatalities and life-changing injuries in the greater Portland region. Using a data-driven approach, the strategies and actions were identified as the most effective ways to address the most frequent contributing factors and types of serious crashes in the region, and they are consistent with the Safe System approach. As indicated in the Strategies and Actions Table, most actions require multiple partners for implementation.

Transportation safety and achieving zero deaths and serious injuries is everybody's business. Government alone cannot achieve the broader changes needed to reach Vision Zero. In addition to national, state, regional and local agencies, multiple organizations, private entities and the public play a role in achieving Vision Zero. Engineers, emergency medical service providers, law enforcement, educators, public health professionals, community based organizations and non-profits, the media, industry and business, research and academic institutions, and users of the transportation system all have a role.

Safety Strategy Actions 6.2 and 6.9 recommend convening safety work groups at the regional and local level, or continuing to support those that are already meeting. Complementing state safety committees and work groups, regular regional and local safety work groups will support state, regional and local coordination.

As noted in Safety Strategy Action 6.2, police and fire representatives need to be involved at the regional level; their perspective has not been fully integrated at the regional level of planning.

5.3 Implementing and updating plans

Implementing adopted land use and transportation system plans, including the 2040 Growth Concept, will help achieve Vision Zero. Building walkable and bikeable communities, reducing travel distances, locating jobs and housing near each other, making transit more accessible all contribute to safer communities.

As described in Chapter 3, the Portland region has one of the lowest roadway fatality rates of any urban metro area with a population greater than 1 million, and a lower fatality rate than Oregon and the U.S. The safest regions in the nation for overall fatality rates are Boston, Minneapolis-St. Paul, Portland, New York, and Chicago. In general, the safest urban regions are those that exhibit dense urban environments and higher usage of non-auto travel modes. These findings indicate that regional and local land use and transportation plans, policies and investments are increasing transportation safety.

The Regional Transportation Plan is updated every five years. As part of the update safety policies, strategies and actions should be reviewed. Crash data analysis in the Metro State of Safety Report should be updated to reflect five years of crash data.

Local Transportation System Plans are updated every four years to be consistent with the Regional Transportation Plan. Safety Strategy Actions 6.13 and 6.14 recommends updating the Transportation Planning Rule and the Regional Transportation Functional Plan to require that safety plans be included in Transportation System Plans.

5.4 Regional Transportation Plan safety projects and programs

This section to be updated after the 2018 Regional Transportation Plan project list is refined and finalized by state and local partners.

The 2018 Regional Transportation Plan includes a list of projects and programs that should address the highest public priorities and most immediate regional transportation challenges. The project list identifies the projects that are planned to be built in the next 25 years. Safety is a priority in Regional High Injury Corridors and Intersections and in race and income marginalized communities.

Each time the Regional Transportation Plan is updated it provides opportunity to identify safety focused projects that will reduce serious crashes. Identifying safety projects in the Regional Transportation Plan helps regional leaders and the public better understand how, when and where safety problems are being addressed. It also provides an understanding of how much investment is being planned for safety projects. All projects located in a Regional High Injury Corridor should identify safety as a primary purpose or secondary objective in the Regional Transportation Plan.

Definition of a safety project

In the Regional Transportation Plan, safety projects are identified as projects that have the primary purpose of addressing a documented safety problem at a documented high injury or high risk location with one or more proven safety counter measures.

The definition of a safety project was developed to be consistent with Highway Safety Improvement Program criteria.

A critical element of the Regional Safety Strategy is completing projects that make the transportation system safer and more secure, especially in high risk and High Injury Corridors and Intersections and in racial and income marginalized communities.

The 2018 Regional Transportation Plan project list has over 1,000 projects planned for cities and counties in the region. Of those projects:

- Three-hundred eighty two of the projects identify reducing crashes or serious crashes as a primary or secondary objective.
- Fifty-three identify reducing crashes or serious crashes as a primary objective.
- One third of the projects directly address safety and identify reducing crashes or serious crashes as a primary or secondary objective. A majority of these projects are on High Injury Corridors and/or in race and income marginalized communities.
- A majority of all projects in the list are on high injury corridors, representing an opportunity to address safety even if the project is not identified as a safety project.
- Safe Routes to School, Transit Oriented Development and Transportation System Management and Operations programs address safety.

[insert graphic showing project breakdown]

[insert map showing safety projects overlayed with High Injury Corridors]

CHAPTER 6 MEASURING PROGRESS

Progress towards Vision Zero will be measured by the number of fatal and severe injury crashes reduced annually.

In addition to tracking observed crashes, Metro will work to develop tools such as crash prediction models that will allow for and support system evaluation measures for future scenarios and planning. Metro will work with regional partners, the Oregon Department of Transportation and the Federal Highway Administration to develop ways to measure safety performance in the future to support decision making.

6.1 Annual safety targets

State Departments of Transportation and Metropolitan Planning Organizations must report on the federally required safety performance measure identified in MAP-21 and the FAST Act. Metro will report on these measures in each update of the Regional Transportation Plan, and in the Metropolitan Service District report of performance measures that Metro is required to submit in accordance with ORS 197.301 to the Department of Land Conservation and Development (DLCD) every two years. Additionally, Metro will report out annually to the Metro Council and the Joint Policy Advisory Committee on Transportation (JPACT).

To satisfy federal requirements, Metro will report on the five-year rolling average of the number of people killed and seriously injured in traffic crashes in the region, per 100 million miles traveled (per VMT) and the number of non-motorized fatalities and serious injuries, as shown in Figure X. Metro is also tracking the fatal and serious injuries per capita.

	FHWA Performance Measures						
		Fatality Rate			**Serious Injury Rate**		
Reporting Year (based on a 5-year rolling average)	**Fatalities (People)**	**Per VMT (People/ 100 MVMT)**	**Per capita (People/ 100k pop)**	**Serious Injuries (People)**	**Per VMT (People/ 100 MVMT)**	**Per capita (People/ 100k pop)**	**Non-Motorized Fatalities and Serious Injuries (People)**
2011 - 2015 (Base)	62	0.9	4.0	457	6.4	29.4	113
2014 - 2018	58	0.8	3.6	425	5.8	26.5	105
2015 - 2019	55	0.7	3.4	407	5.5	25.1	101
2016 - 2020	52	0.7	3.2	384	5.1	23.4	95
2017 - 2021	49	0.6	2.9	357	4.7	21.5	88

Note: Due to rounding, addition of numbers across modes may result in minor variation from totals.

Figure 46: Metro MPO Safety Performance Targets

Metro set the annual targets using the same methodology as the Oregon Department of Transportation in the 2016 Transportation Safety Action Plan. Targets are set using the "S-curve" as shown in Figures x and x.

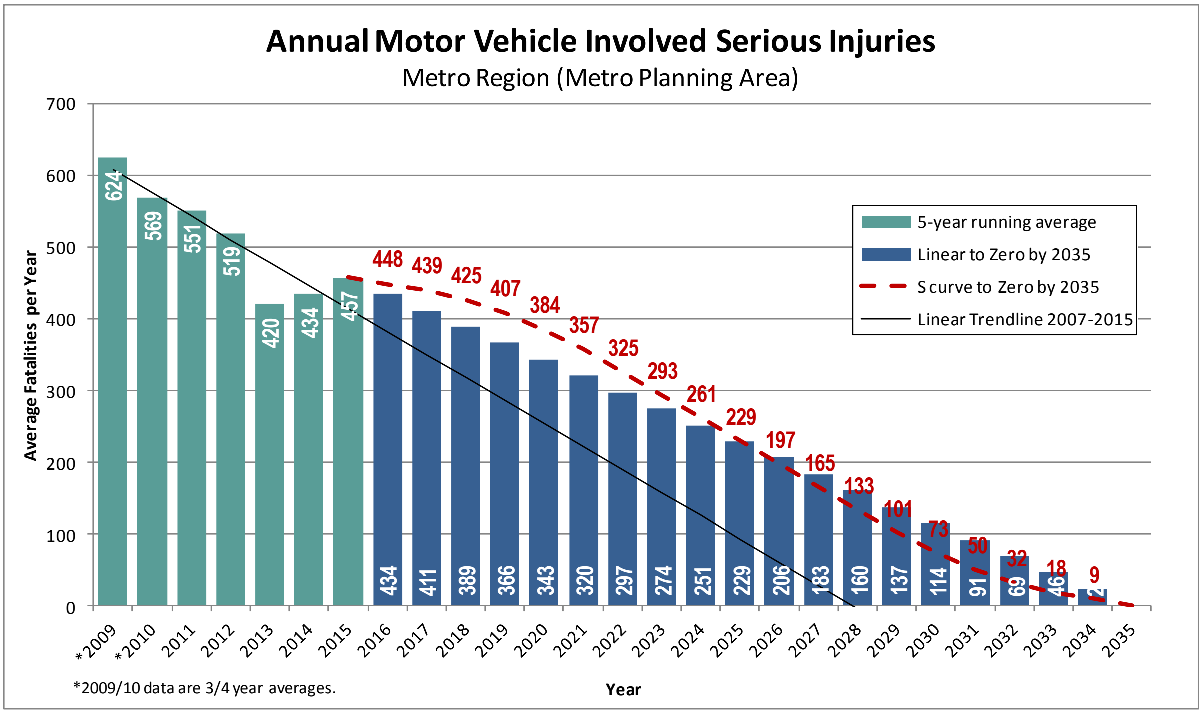

Figure 47: Annual Motor Vehicle Involved Serious Injuries

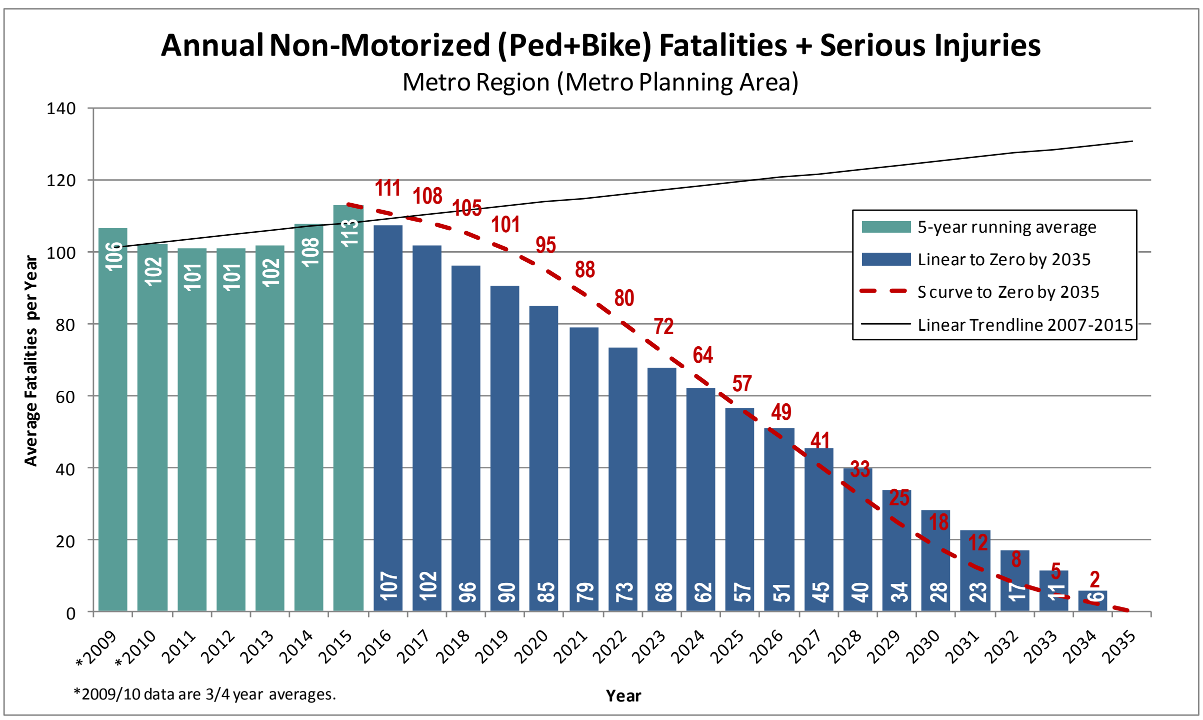

Figure 48: Annual Non-Motorized Fatalities and Serious Injuries

In addition to the required federal targets, Metro also set targets for the number of fatalities and serious injuries for each mode separately, as well as per VMT and per capita for each mode, as shown in Figures X-X.

	Motor Vehicle Only					
		Fatality Rate			Serious Injury Rate	
Reporting Year (based on a 5-year rolling average)	Fatalities (People)	Per VMT (People/ 100 MVMT)	Per capita (People/ 100k pop)	Serious Injuries (People)	Per VMT (People/ 100 MVMT)	Per capita (People/ 100k pop)
2011 - 2015 (Base)	38	0.5	2.4	368	5.2	23.7
2014 - 2018	35	0.5	2.2	343	4.7	21.3
2015 - 2019	34	0.5	2.1	328	4.4	20.2
2016 - 2020	32	0.4	1.9	309	4.1	18.8
2017 - 2021	30	0.4	1.8	287	3.8	17.3
Note: Due to rounding, addition of numbers across modes may result in minor variation from totals.						

Figure 49: Metro MPO Motor Vehicle Fatal and Serious Injury Safety Targets

	Pedestrians					
		Fatality Rate			Serious Injury Rate	
Reporting Year (based on a 5-year rolling average)	Fatalities (People)	Per VMT (People/ 100 MVMT)	Per capita (People/ 100k pop)	Serious Injuries (People)	Per VMT (People/ 100 MVMT)	Per capita (People/ 100k pop)
2011 - 2015 (Base)	22	0.3	1.4	56	0.8	3.6
2014 - 2018	20	0.3	1.3	52	0.7	3.2
2015 - 2019	20	0.3	1.2	49	0.7	3.0
2016 - 2020	18	0.2	1.1	47	0.6	2.8
2017 - 2021	17	0.2	1.0	43	0.6	2.6
Note: Due to rounding, addition of numbers across modes may result in minor variation from totals.						

Figure 50: Metro MPO Pedestrian Fatal and Serious Injury Safety Targets

	Bicyclists					
		Fatality Rate			Serious Injury Rate	
Reporting Year (based on a 5-year rolling average)	Fatalities (People)	Per VMT (People/ 100 MVMT)	Per capita (People/ 100k pop)	Serious Injuries (People)	Per VMT (People/ 100 MVMT)	Per capita (People/ 100k pop)
2011 - 2015 (Base)	2.2	0.03	0.14	33	0.5	2.1
2014 - 2018	2.0	0.03	0.13	31	0.4	1.9
2015 - 2019	2.0	0.03	0.12	30	0.4	1.8
2016 - 2020	1.8	0.02	0.11	28	0.4	1.7
2017 - 2021	1.7	0.02	0.10	26	0.3	1.6
Note: Due to rounding, addition of numbers across modes may result in minor variation from totals.						

Figure 51: Metro MPO Bicycle Fatal and Serious Injury Safety Targets

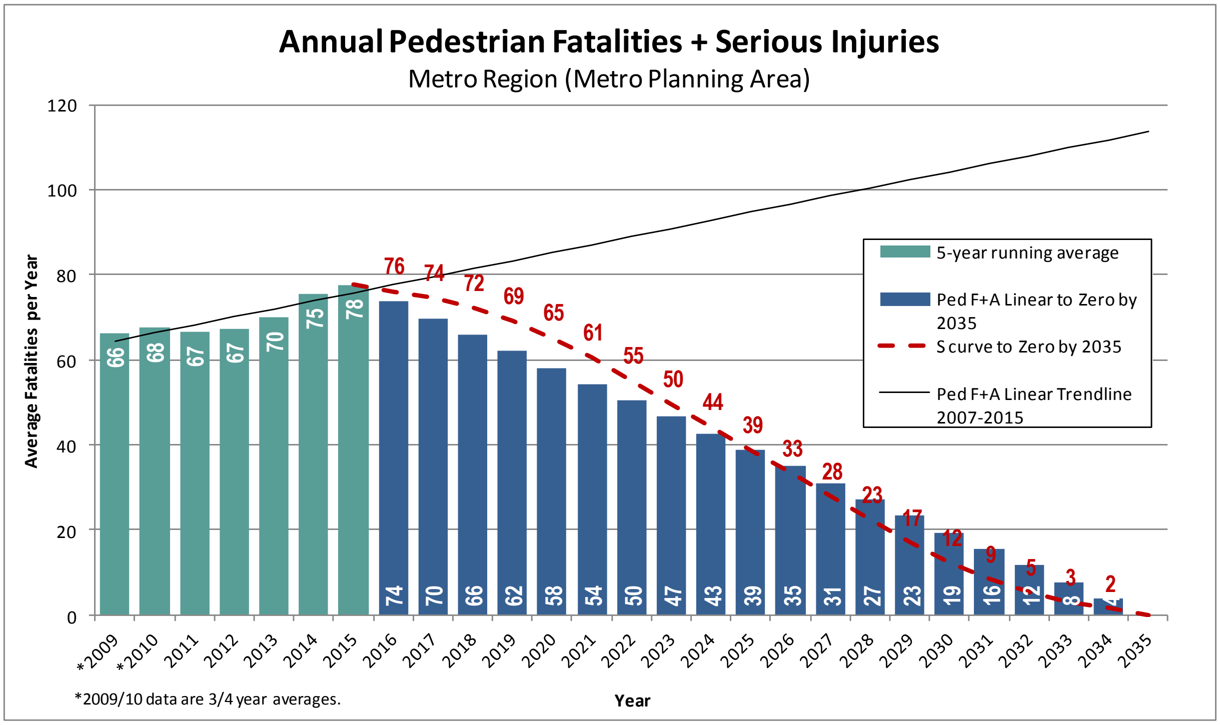

Figure 52: Annual Pedestrian Fatalities and Serious Injuries

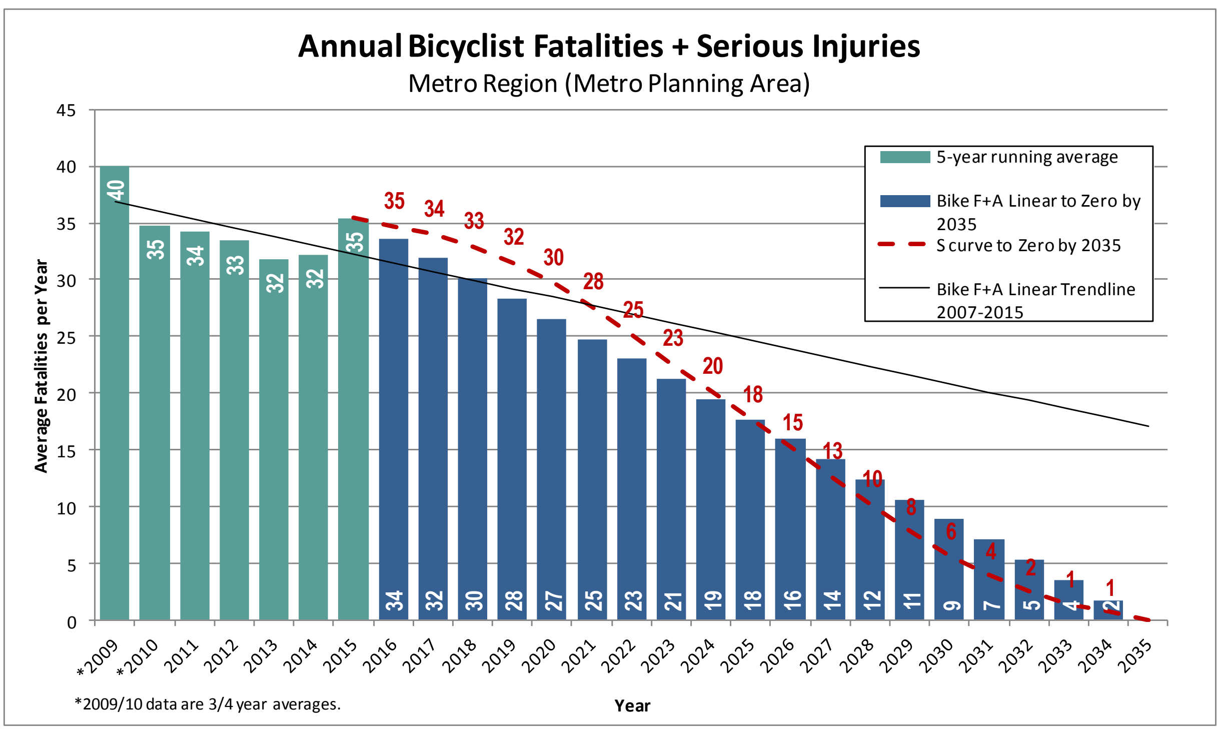

Figure 53: Annual Bicycle Fatalities and Serious Injuries

ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
DLCD	Department of Land Conservation and Development
FAST ACT	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HSM	Highway Safety Manual
HIC	High Injury Corridor
HSIP	Highway Safety Improvement Plan
JPACT	Joint Policy Advisory Committee on Transportation
MAP-21	Moving Ahead for Progress in the 21st Century Act
MMLOS	Multi Modal Level of Service
MPA	Metro Planning Area
MPAC	Metro Policy Advisory Committee
MTAC	Metro Technical Advisory Committee
NHSTA	National Highway Safety Traffic Administration
RATP	Regional Active Transportation Plan
RTFP	Regional Transportation Functional Plan
RTP	Regional Transportation Plan
	Regional Transportation Safety Strategy (Safety Strategy)
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
ODOT	Oregon Department of Transportation
OTP	Oregon Transportation Plan
UGMFP	Urban Growth Management Functional Plan
SHSP	State Highway Safety Plan
TPAC	Transportation Policy Alternatives Committee
TSAP	Transportation Safety Action Plan
TSP	Transportation System Plan
VMT	Vehicle Miles Traveled

LIST OF PARTNERS

Government alone cannot achieve the broader changes needed to end traffic fatalities. In addition to national, state, regional and local agencies, multiple organizations, private entities and the public play a role in achieving Vision Zero.

National agencies
U.S. Department of Transportation
Federal Highway Administration
National Highway Traffic Safety Administration
Centers for Disease Control

State agencies
Oregon Department of Transportation
Oregon Health Authority
Department of Motor Vehicles
Oregon State Police
Department of Land Conservation and Development
Oregon Liquor Control Commission

Regional Agencies and Districts
Metro
TriMet
SMART
Port of Portland

City and County transportation and land use agencies
Transportation and land use departments/staff for the three counties and twenty-five cities
County public health agencies
Clackamas County Public Health
Multnomah County Public Health
Washington County Public Health

Schools
Public and private, K-college

Elected officials
U.S. Representatives and Senators
State Representatives and Senators
Governor
Metro Council
Metro Joint Policy Advisory Committee on Transportation
City Mayors and Councils
County Commissioners

Appointed committees
Oregon Transportation Commission
Oregon Transportation Safety Committee

Oregon Bicycle and Pedestrian Advisory Committee
Oregon Freight Advisory Committee
Oregon Transit Advisory Committee
Portland pedestrian, bicycle and freight committees
City and county transportation committees

Emergency Service Providers and County and Local Police
Clackamas, Multnomah and Washington County Sheriff's Offices
City Police

County and City Fire & Rescue
Portland Fire and Rescue
Tualatin Valley Fire and Rescue
Clackamas Fire District #1
Multnomah County Fire District #14
Washington County Fires District #2
Gresham Fire
Hillsboro Fire
Cornelius Fire
Forest Grove Fire and Rescue
Gladstone Fire
Lake Oswego Fire

Advocacy and Community Organizations
Oregon Walks
Oregon and SW Washington Families for Safer Streets
Vision Zero Network
Toward Zero Deaths
Safe Routes to School National Partnership
AARP
Street Trust
Community Cycling Center

Commercial Vehicle Companies
Companies located and/or operating in the region

Industry Groups
Auto insurance companies
Auto manufacturers
AAA

Research and Academic Institutions
Portland State University
ODOT Research
Transportation Research Board (TRB)
Volpe Institute

RESOURCES

State and Local Transportation Safety Action Plans

- Beaverton Transportation Safety Action Plan (2017)
- Portland Vision Zero Action Plan (2016)
- Oregon Transportation Safety Action Plan (2016)
- Oregon Department of Transportation Pedestrian and Bicycle Safety Implementation Plan (2014)
- Hillsboro Transportation Safety Action Plan (2017)
- Washington County Transportation Safety Action Plan (2017 draft)
- Clackamas County Transportation Safety Action Plan (2013)

Vision Zero, Road to Zero and Toward Zero Deaths Resources

- *Sustainable and Safe: A Vision and Guidance for Zero Road Deaths*, World Resources Institute, Global Road Safety Facility (2017)
- *Moving from Vision to Action: Fundamental Principles, Policies and Practices to Advance*, Vision Zero Network
- *Vision Zero in the U.S.* (February 2017) http://visionzeronetwork.org/wp-content/uploads/2017/01/MinimumElements_Final.pdf
- 9 Components of a Strong Vision Zero Commitment; Vision Zero Network (2015)
- Toward Zero Deaths: A National Strategy on Highway Safety (2014)
- *Safer People, Safer Streets: Summary of the U.S. Department of Transportation Action Plan to Increase Walking and Biking and Reduce Pedestrian and Bicyclist Fatalities* (September 2014) https://www.transportation.gov/sites/dot.gov/files/docs/safer_people_safer_streets_summary_doc_acc_v1-11-9.pdf

Race and Ethnicity Safety Research

- *The High Costs of Disparities for People of Color in Multnomah County*, Lee Van Der Voo & Nick Budnick. (2017). http://invw.org/2017/02/02/being-black-in-multnomah-county/
- *Racial Bias in Drivers' Yielding Behavior at Crosswalks: Understanding the Effect.* Kimberly Kahn, Portland State University
- *Dangerous by Design*, National Complete Streets Coalition (2016)

- *Vision Zero, Equity& Law Enforcement*, Leah Shahum (2016) http://visionzeronetwork.org/vision-zero-equity-law-enforcement/
- *Motor Vehicle Traffic-Related Pedestrian Deaths — United States, 2001–2010,"* Centers for Disease Control (2013)
- *Income Disparities in Street features that Encourage Walking,* Bridging the Gap (2012) http://www.bridgingthegapresearch.org/_asset/02fpi3/btg_street_walkability_FINAL_03-09-12.pdf
- *Pedestrians Dying at Disproportionate Rates in America's Poorer Neighborhoods,* Governing, (August 2014) http://www.governing.com/topics/public-justice-safety/gov-pedestrian-deaths-analysis.html
- *Racial/Ethnic Differences in Fatality Rates from Motor Vehicle Crashes: An Analysis from a Behavioral and Cultural Perspective*, Huda Hamdan (2013) http://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=3983&context=etd
- *Alcohol and Highway Safety: A Special Report on Race/Ethnicity and Impaired Driving,* U.S Department of Transportation (2010) https://ntl.bts.gov/lib/61000/61600/61640/tt398.pdf
- NHSTA Traffic Safety Facts, Race and Ethnicity Equity (2006) https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/810995

Data and Research Resources

- *Safety Study: Reducing Speeding-Related Crashes Involving Passenger Vehicles*, National Transportation Safety Board (2017)
- *Safety for All Users Report: A Report Developed by the U.S. Department of Transportation Under Section 1442 of the Fixing America's Surface Transportation (FAST) Act* (December 2017).
- *A Right to the Road: Understanding and Addressing Bicyclist Safety*, Governors Highway Safety Association (2017)
- *Everyone Walks: Understanding and Addressing Pedestrian Safety,* Governors Highway Safety Association (2017)
- *A Vision for Transportation Safety: Framework for Indentifying Best Practice Strategies to Advance Vision Zero.* Arielle Fleisher, Megan Wier, and Mari Hunter. Transportation Research Record: Journal of the Transportation Research Board, No. 2582. (2016)
- *Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices*, Eighth Edition. DOT HS 812 202. Washington, DC: US Department of Transportation, NHTSA (2015)

- National Highway Traffic Safety Administration, State Traffic Safety Information https://cdan.nhtsa.gov/STSI.htm#
- Crash Modification Factors Clearinghouse http://www.cmfclearinghouse.org/
- Oregon Health Authority, Injury in Oregon: data report (2014) http://www.oregon.gov/oha/PH/DISEASESCONDITIONS/INJURYFATALITYDATA/Documents/Injury_in_Oregon_v2.3.pdf
- Traffic Safety Facts, 2015 Motor Vehicle Crashes: Overview, National Highway Traffic Safety Administration (2015) https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812318
- National Highway Traffic Safety Administration, Impaired Driving Segmentation Research (2017)
- Speed Enforcement Camera Systems Operational Guidelines, FHWA & NHTSA (2008)
- *Reducing Distracted Driving in Oregon: An Interdisciplinary Approach to a Statewide Problem*, Oregon Department of Transportation Distracted Driving Task Force. (2017)
- Southern Oregon University. *Distracted Driving: An Epidemic, A Study of Distracted Driving Attitudes, Behaviors and Barriers Preventing Change* (2016). www.oregon.gov/ODOT/Documents/Distracted Driving
- *Zendrive Research: Largest Distracted Driving Behavior Study.* (April 2017) http://blog.zendrive.com/distracted-driving/
- *Summary of Oregon Truck Safety and Guide to the 2017 Commercial Vehicle Safety Plan* (2017)

GLOSSARY

[Definitions are still being finalized]

Aggressive Driving One or more of driving too fast for conditions, following too closely, and/or driving in excess of posted speed was an attribute of the crash.

American Association of State Highway and Transportation Officials (AASHTO) Represents all five transportation modes: air, highways, public transportation, rail, and water and has a primary goal of fostering the development, operation, and maintenance of an integrated national transportation system.

Arterial Street A functional classification for surface streets. AASHTO defines arterials from the motor vehicle perspective as providing a high degree of mobility for the longer trip lengths and high volumes of traffic, ideally providing a high operating speed and level of service and avoiding penetrating identifiable neighborhoods.

Autonomous Vehicle (AV) Also known as a driverless car, self-driving car, robotic car is and unpiloted ground vehicle is that is capable of sensing its environment and navigating without human input.

Basic Rule Speed A speed that is reasonable and prudent considering the conditions at the time. Speeds in excess of the posted speed are evidence of the violation. Basic rule violations can apply on any roadway.

Best Practices For purposes of this document, the term "best practices" is used as a general term of preferred practices accepted and supported by experience of the applicable professional discipline. It is not prescriptive to a particular set of standards or a particular discipline.

Collector A functional classification for surface streets. AASHTO defines collectors as providing both land access and traffic circulation within neighborhoods and commercial and industrial areas. The role of the collector system, from the motor vehicle perspective, is to distribute traffic to and from the arterial system.

Complete Streets A transportation policy and design approach that requires streets to be planned, 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.

Context Sensitive Design A model for transportation project development that requires proposed transportation projects to be planned not only for its physical aspects as a facility serving specific transportation objectives, but also for its effects on the aesthetic, social, economic and environmental values, needs, constraints and opportunities in a larger community setting. Projects designed using this model:

Countermeasure An activity, initiative or design element to prevent, neutralize, or correct a specific safety problem.

Crash A violent collision, typically of one vehicle with another (vehicles include bicyclists, motorcyclists, freight trucks, school buses, transit buses, etc), a pedestrian, or with a stationary objects such as a pole or guard rail.

Crash Reduction Factor (CRF) The percentage crashes reduced that might be expected after implementing a given countermeasure at a specific site. For example, the installation of centerline rumble strips on a two-lane roadway can expect a fourteen percent reduction in all crashes and a fifty-five percent reduction in head-on crashes.

Design Speed Speed for which roadway elements such as curves are designed.

Designated Speed As opposed to statutory speeds (e.g., 35 mph on city arterial), and must be established by a defined speed zoning process and investigation. Designated speeds are approved by the Oregon Department of Transportation.

Distracted Driving Engagement in any activity that could divert a person's attention away from the primary task of driving. Typical distractions include eating, dealing with passengers or pets, changing settings on vehicle devices, and, increasingly, using a cellular phone or other electronic device.

Emerging Technologies Are the technical innovations representing progressive developments within a field aim at providing competitive advantage.

Emergency Medical Services (EMS)

Equity See Racial Equity and Social Equtiy

Fatal Analysis Reporting System (FARS) A nationwide census providing NHTSA, Congress and the American public yearly data regarding fatal injuries suffered in motor vehicle traffic crashes.

Fixing America's Surface Transportation Act (**Fast Act)** A funding and authorization bill to govern United States Federal surface transportation spending, signed by President Obama on December 4, 2015. It is subsequent to MAP-21, but does not replace all of the applicable requirements of that earlier law, so both must be referenced.

Fatal Crash Any motor-vehicle crash that results in one or more deaths within 30 days of the crash.

Fatality Rate The number of traffic fatalities per number of vehicle miles traveled or per population in a given year. The rate is usually expressed in terms of fatalities per one hundred million miles traveled and fatalities per one million or one hundred thousand people.

Federal Highway Administration (FHWA) An agency within the U.S. Department of Transportation that supports State and local governments in the design, construction, and maintenance of the Nation's highway system (Federal Aid Highway Program) and various federally and tribal owned lands (Federal Lands Highway Program).

Fixed Speed Camera A camera installed to detect traffic regulation violations.

Freeway 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.

Functional Classification The class or group of roads to which the road belongs. There are three main functional classes as defined by the United States Federal Highway Administration: arterial, collector, and local.

High Crash Location Highway or road segments that are susceptible to an inordinate number of crashes. Identification of high crash locations is part of the problem identification process.

High Injury Corridors and Intersections (regional) Roadways where the highest concentrations of fatal and severe injury crashes involving people in cars, biking and walking occur on the Regional Transportation Network. Corridors and intersections were analyzed to determine aggregate crash scores based on the frequency and severity of crashes, using the following methodology:

- Fatal and Injury A (serious) crashes for all modes are assigned to the network; "Injury B", "Injury C", and "PDO (property damage only)" crashes involving bikes and pedestrians are also assigned to the network.
- Fatal and Injury A crashes are given a weight of 10.
- Roadways are analyzed in mile segments; if a segment has only one Fatal or Injury A crash it must also have at least one B/C (minor injury) crash, for the same mode, to be included in the analysis.
- Roadway segments are assigned an N-score (or "crash score") by calculating the weighted sum by mode and normalizing it by the roadway length. To reach 60 percent of Fatal and Severe Injury crashes, roadway segments had to have an N-score of 39 or higher; high injury Bicycle Corridors had to have an N-score of 6 or more, and high injury Pedestrian Corridors had to have an N-score of 15 or more. Intersections with the highest weighted crash scores were also identified; 5 percent of intersections had an N-score (or "crash score") higher than 80 and are also shown on the map, and 1 percent of intersections (the top 1%) had to have an N-score higher than 128.

High Risk Roadways Characteristics if high risk roads are identified by looking at crash history on an aggregate basis to identify particular severe crash types (e.g. pedestrian) and then use the roadway characteristics associated with particular crash types (e.g. arterial roadways with four-or more lanes, posted speed over 35 mph, unlit streets) to understand which roadways may have a higher risk of the same type of severe crash.

High Visibility Enforcement (HVE) Law enforcement efforts that are highly visible and well publicized through paid and earned media support.

Highway Safety Improvement Program (HSIP) Projects, activities, plans, and reports carried out under 23 USC section 148.

Highway Safety Improvement Project (23 USC section 148) In general, the term "highway safety improvement project" means strategies, activities, and projects on a public road that are consistent with a state strategic highway safety plan and correct or improve a hazardous road location or feature; or address a highway safety problem.

Historically Marginalized Communities Are communities of people that have been historically excluded from critical aspects of social participation including, voting, education, housing and more. Historical marginalization is often a result of systematic exclusion based on devaluation of any individual existing outside of the dominant culture.

Highway Safety Manual (HSM) The recognized source of information and methods for quantitatively evaluating traffic safety performance on existing or proposed roadways.

Highway Safety Plan (HSP) Grant application submitted for Federal section 402 and similar funds. Funds are provided by the National Highway Traffic Safety Administration and the Federal Highway Administration.

Impaired Driving Driving a vehicle while the driver's reflexes have suffered from alcohol or other drugs to a point that is generally considered unsafe to operate a vehicle.

Injury A/ Incapacitating Injury/ Severe Injury Synonymous terms referring to an injury from a motor-vehicle crash that prevents the injured party from walking, driving, or normally continuing the activities they were capable of performing before the injury occurred. Examples include severed, broken or distorted limbs, skull or chest injuries, abdominal injuries, unconscious at or when taken from the crash scene, unable to leave crash scene without assistance, etc.

Injury B / Moderate injury/ Visible Injury Synonymous terms referring to injuries from a motor-vehicle crash which are evident to observers at the scene of the crash. Examples include a visible lump, abrasions, cuts, bruises, lacerations, etc.

Injury C/ Minor injury/ Complaint of Pain Synonymous terms referring to injuries indicated by the victim. Examples include momentary unconsciousness, complaint of pain, limping, nausea, etc.

Intelligent speed adaption technologies Are any system that ensures that vehicle speed does not exceed a safe or legally enforced speed. In case of potential speeding, a human driver can be alerted, or the speed reduced automatically.

KABCO Injury Scale An injury rating scale used to determine the severity of injuries ranging from Severe Injury (A) to Minor Injury (C), and property damage only (O).

Local Street A functional classification for surface streets that includes all public surface streets not defined as arterial or collector. Local streets are typically low-speed streets with low traffic volumes in residential areas, but also include similar streets in commercial and industrial areas.

Moving Ahead for Progress in the 21st Century Act (MAP-21) (P.L. 112-141) Reauthorization of Federal highway funding, signed into law by President Obama on July 6, 2012. Subsequent adoption of the FAST Act does not replace MAP-21 in all areas regulation of transportation safety planning and funding, so both must be referenced.

Metro Planning Area Boundary (MPA)

Minor Arterial Provides moderate-length trips and offers connectivity to the higher arterial system, providing intracommunity continuity.

Model Minimum Uniform Crash Criteria Guideline (MMUCC) A minimum, standardized data set for describing motor vehicle crashes and the vehicles, persons and environment involved. The Guideline is designed to generate the information necessary to improve highway safety within each state and nationally.

Monitoring Management and oversight of the day-to-day operations of grant and sub-grant supported activities to assure compliance with applicable Federal and state requirements and that performance goals are being achieved.

Motorcycle A motor vehicle with motive power having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground. The NHTSA defines "motorcycle" to include mopeds, two or three-wheeled motorcycles, off-road motorcycles, scooters, mini bikes and pocket bikes.

Metropolitan Planning Organization (MPO) Coordinates transportation planning in an urbanized area of the state.

Manual on Uniform Traffic Control Devices (MUTCD) A document issued by the Federal Highway Administration of the United States Department of Transportation to specify the standards by which traffic signs, road surface markings, and signals are designed, installed, and used.

National Highway Traffic Safety Administration (NHTSA) An agency of the Executive Branch of the U.S. government, part of the Department of Transportation. It describes its mission as "Save lives, prevent injuries, reduce vehicle-related crashes."

National Transportation Safety Board An independent U.S. government investigative agency responsible for civil transportation accident investigation. In this role, the NTSB investigates and reports on aviation accidents and incidents, certain types of highway crashes, ship and marine accidents, pipeline incidents, and railroad accidents.

Older adults (vulnerable) The Moving Ahead for Progress in the 21st Century (MAP-21) Act created a new Special Rule for older drivers and pedestrians under 23 USC 148(g)(2), which was continued under the Fixing America's Surface Transportation (FAST) Act. If the rate per capita of traffic fatalities and serious injuries for drivers and pedestrians over the age of 65 in a State increases over the most recent 2-year period, this Special Rule requires a State to include strategies to address the increases in those rates in their State Strategic Highway Safety Plan (SHSP). FHWA issued the Section 148: Older Drivers and Pedestrians Special Rule Final Guidance in May 2016.[54]

TriMet's Coordinated Transportation Plan for Seniors and Persons With Disabilities identifies several principles and actions related to addressing safety and security concerns getting to, at transit stops and on transit.

Oregon Department of Transportation (ODOT)

Operating Speed The speed at which motor vehicles generally operate on that road.

Per Capita Or, per person. Used to describe crash rate per population. Except where otherwise noted, crash rates are per million residents.

Per vehicle miles traveled (VMT): Is used to describe crash rate per motorized vehicle miles. Except where otherwise noted, crash rates are per 100-million motorized vehicle miles travelled.

Performance Measure A process of assessing progress toward achieving predetermined goals, including information on the efficiency with which resources are transformed into goods and services (outputs), the quality of those outputs (how well they are delivered to clients and the extent to which clients are satisfied) and outcomes (the results of a program activity compared to its intended purpose), and the effectiveness of government operations in terms of their specific contributions to program objectives.

Portland Metro Region Comprised of twenty-five cities and the urbanized area of Clackamas, Multnomah and Washington Counties. Is the geographic scope of this document, and is defined as area within the Metropolitan Planning Area boundary.

Posted Speed Violations In Oregon, posted speeds set the maximum speed that can be traveled, violations can be either speed limit or basic rule.

Posted Speed The speeds indicated on signs along the roadway. When speeds differ from statutory speeds there must be a posted sign indicating the different speed.

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[54] U.S. Department of Transportation, Federal Highway Administration Older Drivers and Pedestrians Special Rule. https://safety.fhwa.dot.gov/hsip/older/

Protected Bike Lanes (separated bike lane, cycle track)A bike lane that is physically separated from auto traffic, typically they are created using planters, curbs, parked cars, or posts and are essential for creating a complete network of bike-friendly routes. For bicyclists, safety increases significantly when there is physical separation from motorists through infrastructure. Fully protected bikeways can reduce bicycle injury risk up to 90 percent.[55] Another report found that on-street bike lanes that use barriers to physically separate bicyclists from motor vehicles are 89 percent safer than streets with parked cars and without bicycling infrastructure. When physical separation is not possible, infrastructure such as striped bike lanes, bicycle boulevards, and bike boxes help reduce the risk of conflict with motor vehicles.[56]

Public Health The health of the population as a whole, especially as monitored, regulated, and promoted by the state.

Racial Equity When race can no longer be used to predict life outcomes and outcomes for all groups are improved.

Road Safety Audit A formal safety performance examination of an existing or future road or intersection by an independent multidisciplinary audit team. (23 CFR § 924.3).

Road Users A motorist, passenger, public transportation operator or user, truck driver, bicyclist, motorcyclist, or pedestrian, including a person with disabilities. (23 USC section 148)

Roadway Departure Crash A type of crash. As used in this plan, note that the roadway or lane departure definition excludes intersections, pedestrian-related, and bicycle-related crashes.

Regional Transportation Plan for a Metropolitan Planning Organization

Safety (transportation) Protection from death or bodily injury from a motor-vehicle crash through design, regulation, management, technology and operation of the transportation system.

Safe Routes to School A comprehensive engineering/education program focused on youth school travel that aims to create safe, convenient, and fun opportunities for children to walk and roll (bike, scooter, etc.) to and from schools. City or school district based programs incorporate evaluation, education, encouragement, engineering, enforcement, and equity with the goal of increasing walking and rolling to school.

Safe System Approach (otherwise known as Vision Zero, Towards Zero Deaths, Road to Zero or Sustainable Safety) Views human life and health as paramount to all else and should be the first and foremost consideration when designing a road network.

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[55] "Route Infrastructure and the Risk of Injuries to Bicyclists: a Case-Crossover Study," Teschke, et al. American Journal of Public Health, Vol. 102, No. 12, December 2012.
[56] A Right to the Road, p.48, GHSA, 2017.

Safety Data Includes, but is not limited to, crash, roadway, and traffic data on all public roads. For railway- highway grade crossings, safety data also includes the characteristics of highway and train traffic, licensing, and vehicle data. (23 CFR § 924.3)

Security (public and personal) Protection from intentional criminal or antisocial acts while engaged in trip making through design, regulation, management, technology and operation of the transportation system.

Serious Crash In this document refers to the total number of Fatal and Severe Injury (Injury A) crashes combined.

Severity A measurement of the degree of seriousness concerning both vehicle impact (damage) and bodily injuries sustained by victims in a traffic crash.

Strategic Highway Safety Plan (SHSP) A comprehensive, multi-disciplinary plan, based on safety data developed by a State Department of Transportation in accordance with 23 U.S.C. 148.

Side Guard for Trucks Vehicle-based safety devices designed to keep pedestrians, bicyclists, and motorcyclists from being run over by a large truck's rear wheels in a side-impact collision.

Social Equity The idea that all members of a societal organization or community should have access to the benefits associated with civil society – the pursuit of an equitable society requires the recognition that there are a number of attributes that give members of a society more or less privilege and that in order to provide equitable situations the impacts of these privileges (or lack thereof) must be addressed. For transportation, equity refers to fair treatment or equal access to transportation services and options. In the context of safety, transportation equity relates to improving the travel choices, the safety of travel and not unfairly impacting one group or mode of transportation. More specifically it means improved safety for all transportation options and lessening the risks or hazards associated with different choices of transportation.

Speed Limit Speed limits are limited to specific roadways such as interstates, roadways within city limits, and school speed zones. In addition, speed limits apply to certain types of vehicles on any roadway – large trucks, school buses and vehicles transporting children or workers.

Speeding Driving too fast for conditions and/or driving in excess of posted speed.

Speed-Related Crashes Attributes of crash include driving too fast for conditions and/or driving in excess of posted speed (note that duplicate crashes are not counted more than once).

Safety Priority Indexing System (SPIS) A systemic scoring method that identifies potential safety problems on state highways.

Spot Safety Improvement An improvement or set of improvements that is implemented at a specific location on the basis of location-specific crash experience or other data-driven means.

State Strategic Highway Safety Plan A comprehensive, multi-disciplinary plan, based on safety data developed by a State Department of Transportation in accordance with 23 U.S.C. 148.

State Highway Safety Improvement Program A program of highway safety improvement projects, activities, plans and reports carried out as part of the Statewide transportation improvement program under section 135(g). (23 USC section 148)

Statutory Speeds Are posted as defined in statute (e.g., 25 mph on a neighborhood street) and any road authority may post applicable statutory speeds within their jurisdiction.

Statewide Transportation Improvement Program (STIP) Oregon Department of Transportation's capital improvement program for state and federally-funded projects.

Strategic Highway Safety Plan (SHSP) A comprehensive, multi-disciplinary plan, based on safety data developed by a State Department of Transportation in accordance with 23 U.S.C. 148.

Systemic Safety Improvement An improvement or set of improvements that is widely implemented based on high-risk roadway features that are correlated with particular severe crash types.

Toward Zero Deaths A term analogous to Vision Zero.

Transportation Demand Management (TDM) Application of strategies and policies to reduce travel demand.

Transportation Planning Rule (TPR) Oregon's statewide planning goals established state policies in 19 different areas. The TPR implements the Land Conservation and Development Commission's Planning Goal 12 (Transportation) which requires ODOT, MPOs, Counties and Cities, per OAR 660-012-0015 (2) and (3), to prepare a Transportation System Plan (TSP) to identify transportation facilities and services to meet state, regional and local needs, as well as the needs of the transportation disadvantaged and the needs for movement of goods and services to support planned industrial and commercial development, per OAR 660-012-0030(1).

Transportation Safety Action Plan (TSAP)

Vision Zero A system and approach to public policy developed by the Swedish government which stresses safe interaction between road, vehicle and users. Highlighted elements include a moral imperative to preserve life, and that the system conditions and vehicle be adapted to match the capabilities of the people that use them.

Vehicle miles traveled (VMT) The number of vehicle mile traveled within a given geography and time frame.

Vulnerable Users In this document, refers to groups of people that are more vulnerable to being killed or severely injured in traffic crashes. Vulnerable users are people that are more vulnerable to being killed or seriously injured in crashes. Vulnerable users are pedestrians, bicyclists, motorcycle operators, children, older adults, road construction workers, people with disabilities, people of color and people with low income.

APPENDIX

2018 Metro State of Safety Report

Describes the data used in the analysis, the attributes of the data, and any data limitations. Describes the process Metro used to analyze the data. The 2018 Metro State of Safety Report presents the findings, identifying trends and relationships of serious crashes with environmental factors including roadway and land use characteristics and serves as the foundation for the Regional Safety Strategy.

Access online at: [to be added]

If you picnic at Blue Lake or take your kids to the Oregon Zoo, enjoy symphonies at the Schnitz or auto shows at the convention center, put out your trash or drive your car – we've already crossed paths.

So, hello. We're Metro – nice to meet you.

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Printed on recycled-content paper

March 20, 2018

Metro State of Safety Report

A compilation of information on roadway-related crashes, injuries, and fatalities in the greater Portland region and beyond, 2011-2015 crash data

January 2018

Executive Summary

No death or life changing injury from a traffic crash is acceptable on our region's roadways, which is why Metro and regional partners are adopting a Vision Zero target for 2035 and implementing a safe systems approach to transportation safety.

The information in this State of Safety Report was used to inform the development of the 2018 Regional Transportation Safety Strategy and to develop performance measures to meet federal requirements required in the federal transportation bill MAP-21.

Between 2011 and 2015, there were 304 Fatal crashes in the Portland Metro region, killing 311 people, and an additional 2,102 crashes resulting in incapacitating injury. Nationwide, crashes killed an average of 33,305 people per year between 2011 and 2015, and roadway safety remains one of the most pressing health issues nationwide. The 8% increase in traffic deaths in 2015 is the highest increase in fifty years, and it is expected that the number of Serious crashes in 2016 and 2017 will be even higher. For young people between the ages of 5 and 24, motor vehicle crashes are the leading cause of death.

It is the Portland Metro region's adopted goal to progressively reduce the number of people killed or seriously injured on the region's roadways to zero by 2035. The purpose of this report is to document roadway crash data, patterns, and trends in the Portland Metro area and beyond to inform the pursuit of this goal. The Oregon Department of Transportation (ODOT) has assembled and distributed statewide crash data since 2007. This is a rich dataset, including numerous information fields for each geocoded crash, and is complemented by Metro's rich datasets of transportation infrastructure, transportation operations, and spatial data. The combination of these provides the opportunity of detailed analyses of the safety of the region's transportation system and land use patterns. Further, a large amount of US and international data is available to document national and international patterns and trends. This information is important to provide context for local data.

In 2010-2011, Metro staff worked with staff from cities and counties of the Metro region, ODOT, TriMet, and other local safety experts to develop a strategy for analyzing and summarizing this data from 2007 to 2009. The 2012 State of Safety report was the result of this collaboration. This report updates these findings, using the most recent five years of crash data – through 2015. It identifies trends and relationships of Serious crashes with environmental factors including roadway characteristics. This report provides the data for the update of the 2018 Regional Transportation Safety Action Plan.

The findings include:

- Nationally and in Oregon, fatalities have stabilized for automobile occupants and motorcyclists, while fatalities have been increasing for pedestrians and bicyclists. *(Section 1)*
- Higher levels of vehicle miles travelled (VMT) correlate with more Fatal and Serious crashes due to increased exposure. (*Section 1)*
- The Portland Metro region has less than half the annual fatalities per million residents compared to Oregon's and the national average. (*Section 1)*

- Arterial roadways comprise 73% of the region's Serious crashes, 77% of the Serious Pedestrian crashes, and 65% of the Serious Bicyclist crashes, while accounting for 12% of road miles. (*Sections 2, 5, and 6)*
- Alcohol or drugs were a factor in 57% of Fatal crashes. *(Section 2)*
- Excessive speed is a contributing factor in 33% of Fatal crashes, and aggressive driving is a factor in 34% of Fatal crashes. *(Section 2)*
- Seat belt use in the region as reported exceeds 99%. *(Section 2)*
- The percent of Serious crashes for male drivers age 70-79 and female drivers age 80-84 is double the regional average. (*Section 2)*
- Streets with more lanes have higher Serious crash rates per road mile and per VMT. This follows trends documented in AASHTO's Highway Safety Manual. *(Section 3)*
- Streets with more lanes have an especially high Serious crash rate for pedestrians, producing higher crash rates per mile and per VMT as compared to other modes. *(Section 5)*
- The most common Serious crash types were Turning and Rear End. For Fatal crashes, the most common types were Pedestrian and Fixed Object. *(Section 3)*
- Serious Pedestrian crashes are disproportionately represented after dark. While 39% of all Serious crashes happen at night, 64% of Serious Pedestrian crashes happen at night. (*Section 5)*

Table of Contents

Introduction

It is the Portland Metro region's adopted goal to progressively reduce the number of people killed or seriously injured on the region's roadways to zero by 2035. Part of a safe systems approach to transportation safety is to use a 'data-driven' approach identify what causes crashes and strategies and actions to address those causes.

The purpose of this report is to document roadway crash data, patterns, and trends in the Portland Metro area and beyond to inform the pursuit of this goal. The Oregon Department of Transportation (ODOT) has assembled and distributed statewide crash data since 2007. This is a rich dataset, including numerous information fields for each geocoded crash, and is complemented by Metro's rich datasets of transportation infrastructure, transportation operations, and spatial data. The combination of these provides the opportunity of detailed analyses of the safety of the region's transportation system and land use patterns.

Further, a large amount of US and international data is available to document national and international patterns and trends. This information is important to provide context for local data.

Methodology

In this report, crashes are broken down by a number of factors contained in the dataset provided by ODOT.

- Injury Type: Each crash is identified by the worst injury incurred in the crash: Fatal, Injury A (incapacitating), Injury B (moderate), Injury C (minor) or Property Damage Only (PDO). This report largely focuses on Fatal/Incapacitating crashes (the sum of Fatal and Injury A), referred to as 'Serious Crashes' throughout this report. These are the types of crashes that the region is primarily focused on eliminating.
- Location
- Date and Time
- Weather and Pavement Conditions
- Roadway Location: the location on the roadway system allows data from Metro's mapping databases to be attributed to the crash.
- Contributing Factors: These include speeding, alcohol, drugs, school zone, work zone, and hit and run.

ODOT's crash data is reliant on crash information collected by police. Quality of crash data is dependent upon thoroughness of information collected at the crash scene. ODOT checks the data for quality and geo-codes the data to the street network. This process results in Metro acquiring the crash data one to one and half years later.

Metro's mapping database includes:

- Roadway data, such as speed, geometry, traffic volumes, traffic congestion, transit routes, bicycle routes, and sidewalk inventory
- Spatial data, such as land use, population, density, socioeconomic factors, and walkability

Note that many figures in this document are in color, and while colors are generally selected to be legible when printed in black and white, they are most readable in full color.

Definitions

Terms that are used throughout this report are defined as follows:

"**Portland Metro region**" is the scope of this study, and is defined as the area within the Metropolitan Planning Area (MPA) as of December 31, 2016. The MPA is slightly larger than the Urban Growth Boundary (UGB).

"**Serious Crashes**" in this report refers to the total number of Fatal and Injury A crashes. The words "Serious" and "Fatal" are capitalized throughout the report for emphasis.

"**Injury A**" and "**Incapacitating injury**" are used interchangeably. Incapacitating injuries typically are injuries that the victim is not able to walk away from. They are synonymous with the term "**Severe injury**"

"**Injury B**" and "**Moderate injury**" are used interchangeably.

"**Injury C**" and "**Minor injury**" are used interchangeably.

Per capita is used to describe crash rate per population. Except where otherwise noted, crash rates are per million residents.

Per VMT is used to describe crash rate per vehicle miles. Except where otherwise noted, crash rates are per 100-million vehicle miles travelled.

Arterial is a functional classification for surface streets. AASHTO defines arterials from the motor vehicle perspective as providing a high degree of mobility for the longer trip lengths and high volumes of traffic, ideally providing a high operating speed and level of service and avoiding penetrating identifiable neighborhoods.

Collector is a functional classification for surface streets. AASHTO defines collectors as providing both land access and traffic circulation within neighborhoods and commercial and industrial areas. The role of the collector system, from the motor vehicle perspective, is to distribute traffic to and from the arterial system.

Local is a functional classification for surface streets that includes all public surface streets not defined as arterial or collector. Local streets are typically low-speed streets with low traffic volumes in residential areas, but also include similar streets in commercial and industrial areas.

Section 1 – Regional, State, National, and International Trends

Data from the National Highway Traffic Safety Administration (NHTSA) were compiled and analyzed along with population data from the US Census to identify trends in national, state, regional and city crashes. NHTSA summarizes traffic fatality data by state and by major city, including number of fatalities, fatalities per capita and per vehicle-miles travelled (VMT), and by travel mode. Five years of data between 2011 and 2015 were generally considered for this analysis, while longer term trends were identified where additional earlier years of data were available.

Travel and Fatality Patterns: US and Oregon

Travel patterns in the US have changed in the last decade due to a variety of external factors. While the population has continued to increase, VMT per capita and absolute VMT have declined. Roadway fatality rates declined after 2005, but have increased significantly since 2010. In Oregon, these trends have been consistent with national patterns, although fatalities in Oregon increased more dramatically since 2013. This rapid increase does not appear to be a statistical outlier as the trend has continued in 2016 and 2017 (official data is not yet available for 2016-17). Figures 1-1 and 1-2 show the national and state trends of population, VMT, and crash-related fatalities.

Figure 1-1

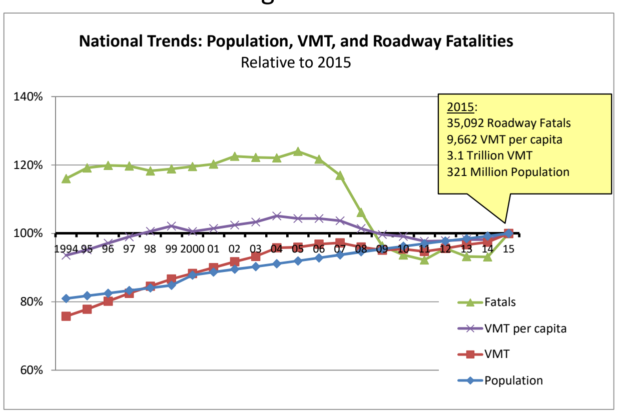
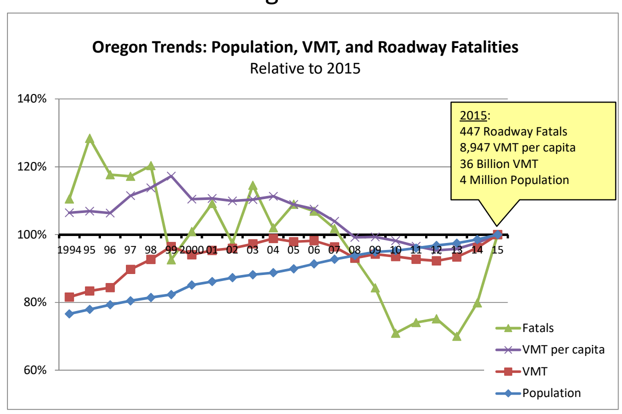


Figure 1-2



It is common practice to normalize roadway fatality rates by both population and traffic volumes. Normalization by population is useful in measuring the overall safety of the roadway system. Normalization by traffic volumes is useful in measuring the safety per distance travelled. Figures 1-3 and 1-4 show national and state trends for fatalities and fatality rates.

Figure 1-3

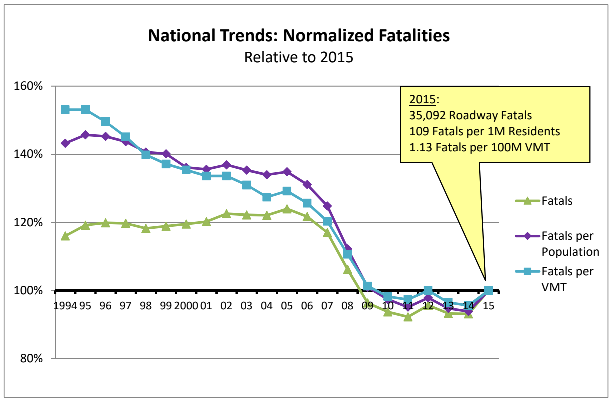
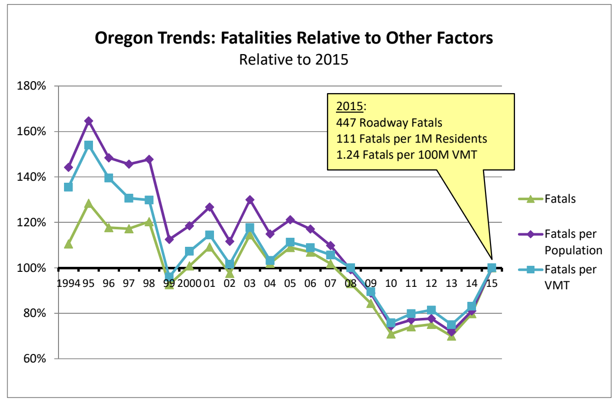


Figure 1-4



Total fatalities, fatalities per capita, and fatalities per VMT are all generally decreasing over time, although there has been a notable uptick since 2010. The increases in Oregon since 2013 are more pronounced than national trends.

Fatality Patterns by Mode: US and Oregon

The NHTSA data are broken out by mode: automobile occupants, motorcyclists, bicyclists, and pedestrians. Figures 1-5 and 1-6 show the recent national and state trends for each mode.

Figure 1-5

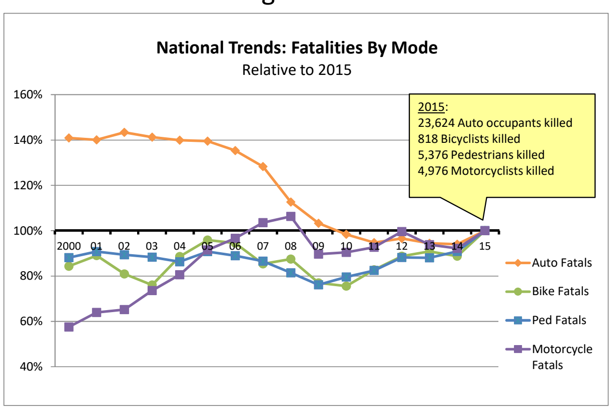
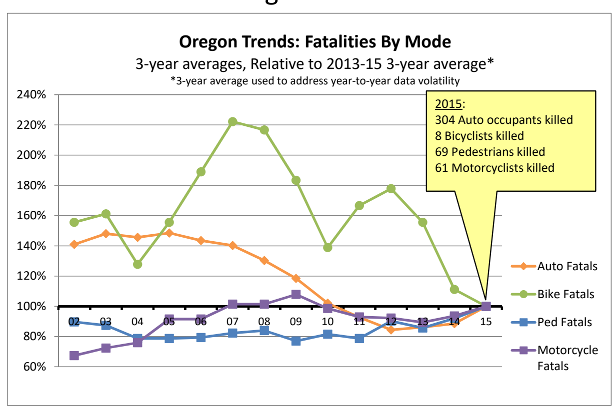


Figure 1-6



Fatalities have recently stabilized nationally for automobile occupants and motorcyclists, while Fatalities have been increasing nationally for pedestrians and bicyclists. The decrease in Fatalities for people in automobiles is likely due to advancements in vehicle technology, such as air bags.

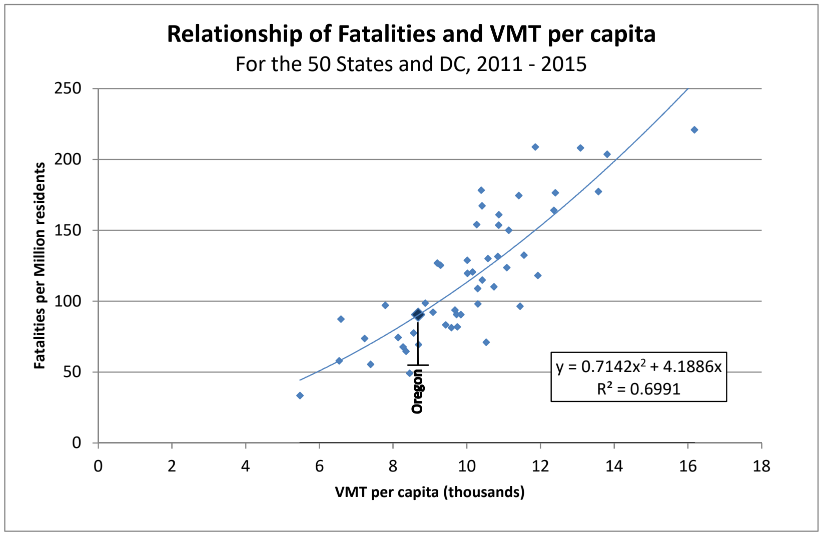
Annual Vehicle-Miles Traveled (VMT)

One of the clearest trends in crash data nationally and locally, is the correlation between fatality rates and annual per capita VMT. Figure 1-7 shows the relationship by US state for all fatalities, and Figure 1-8 shows the relationship for pedestrian or bicyclist fatalities.

States with higher per capita VMT typically also have higher per capita fatality rates, as the typical exposure to risk is increased. A polynomial equation with a good R-squared value can be fitted to the relationship between roadway fatalities and VMT, and is shown in Figure 1-7.

All Fatalities

Figure 1-7



It is apparent from the data that states with more auto travel typically exhibit higher fatality rates. The District of Columbia has the lowest per capita VMT at 5,480, and exhibits the lowest annual fatality rate of 33 per million residents – less than one-third of the national average. Of the states, Massachusetts has the lowest fatality rate, with the 7th lowest per capita VMT. Wyoming, with the highest per capita VMT of 16,200, also has the highest annual fatality rate at 221 per million residents – more than double the national average.

As with the 2012 State of Safety report, which looked at 2005 – 2009 data, a polynomial equation with a good R-squared value can be generated for the VMT-fatality relationship by setting the intercept to zero. While the equation is likely to vary slightly year-to-year, the relationship appears to be permanent. The relationship for 2011 – 2015 data is shown in Figure 1-7.

The national average is 9,500 VMT per capita and 105 fatalities per million residents.

Oregon statistics are 8,680 VMT per capita (91% of the national average) and 90 fatalities per million residents (86% of the national average).

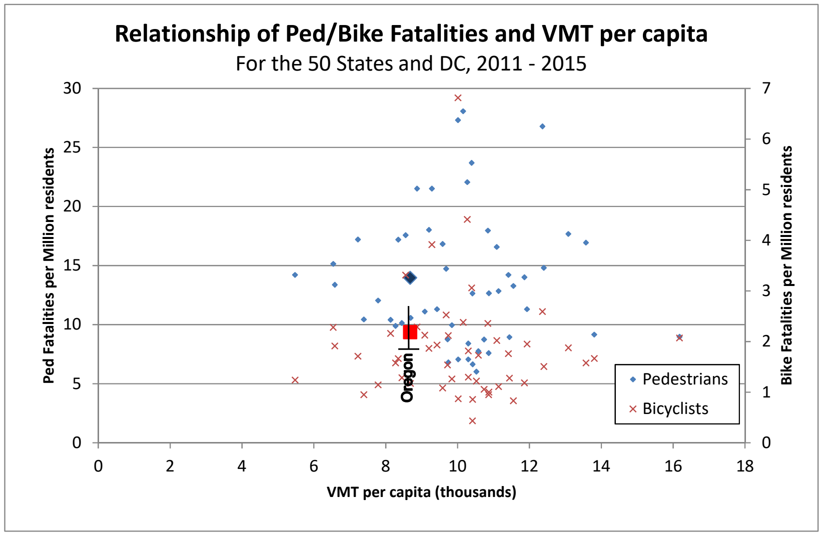
Pedestrian/Bicyclist Fatalities

The relationship between statewide VMT per capita and pedestrian/bicyclist fatalities is unclear. As can be seen in Figure 1-8, the data are scattered, and unlike the overall fatality data, no clear trend exists. This may be due to the complex relationships at play – higher VMTs can make pedestrian/bicyclist travel more dangerous, but discourage travel by these modes thereby reducing pedestrian/bicyclist exposure.

The national average (2011 – 2015) is 15.3 pedestrians killed in crashes per million residents and 2.3 bicyclists killed in crashes per million residents.

Oregon crash statistics are 14.0 pedestrians killed per million residents (91% of the national average) and 2.2 cyclists killed per million residents (94% of the national average).

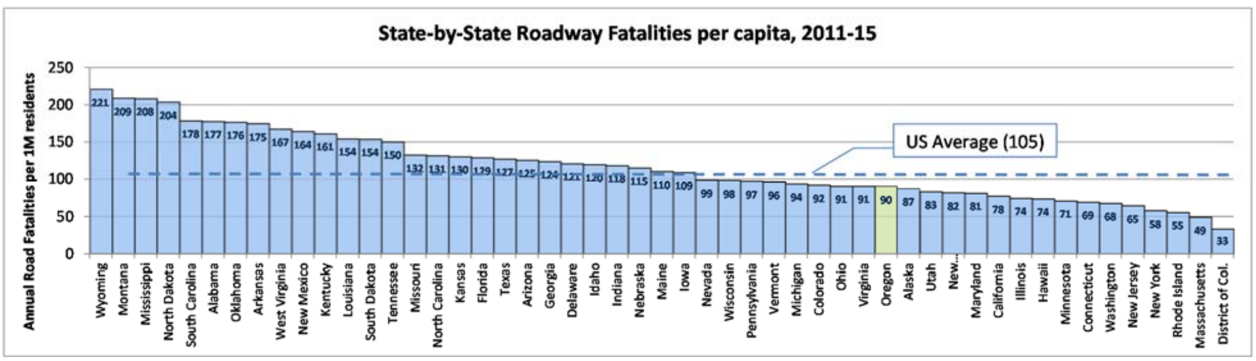
Figure 1-8



State-by-State Fatality Trends

Figure 1-9 shows the per capita fatality rate by state. Oregon is slightly better than the US average.

Figure 1-9



European Data

Data from the EU Road Federation's publication "European Road Statistics" were compiled in order to provide a comparison to US data. European practices are often considered as a best practice as their transportation systems are generally safer and more efficient than US systems.

Figures 1-10 and 1-11 present European roadway fatality rates per capita and per VMT.

Of the 28 EU countries, 22 of them exhibit lower rates of roadway fatality per capita than the US average. On a per-VMT basis, 19 of them exhibit lower fatality rates than the US average.

Figure 1-10

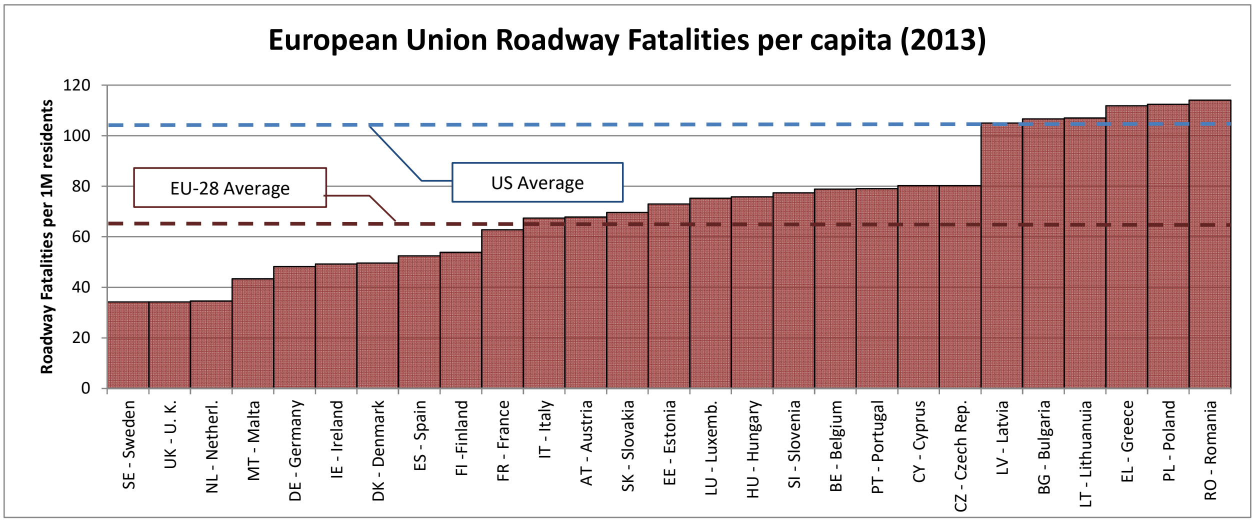
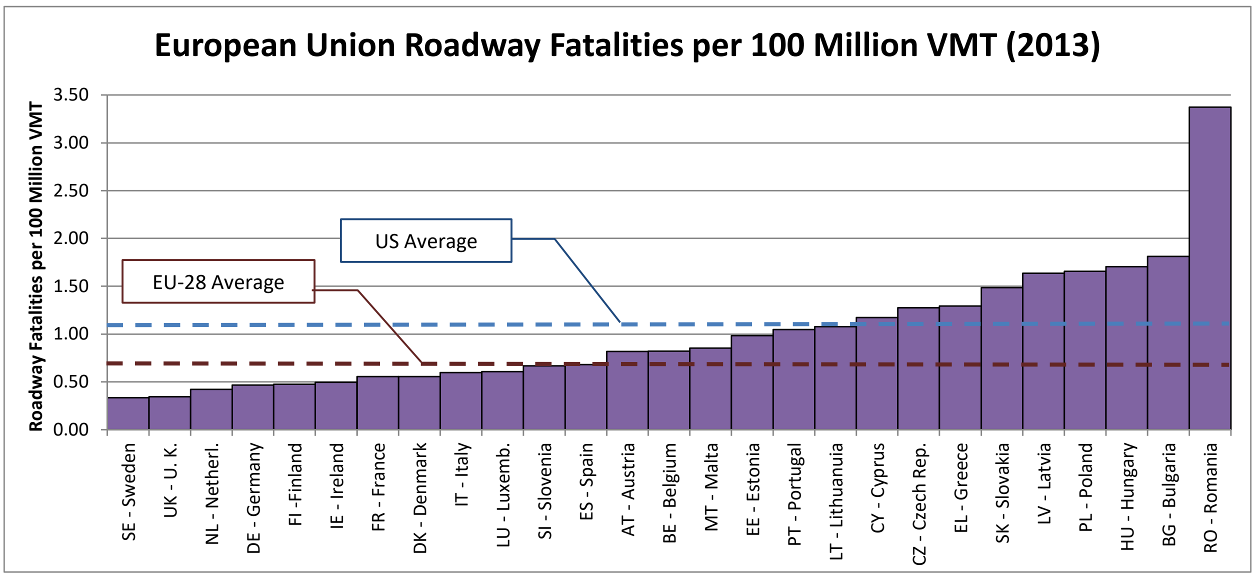


Figure 1-11

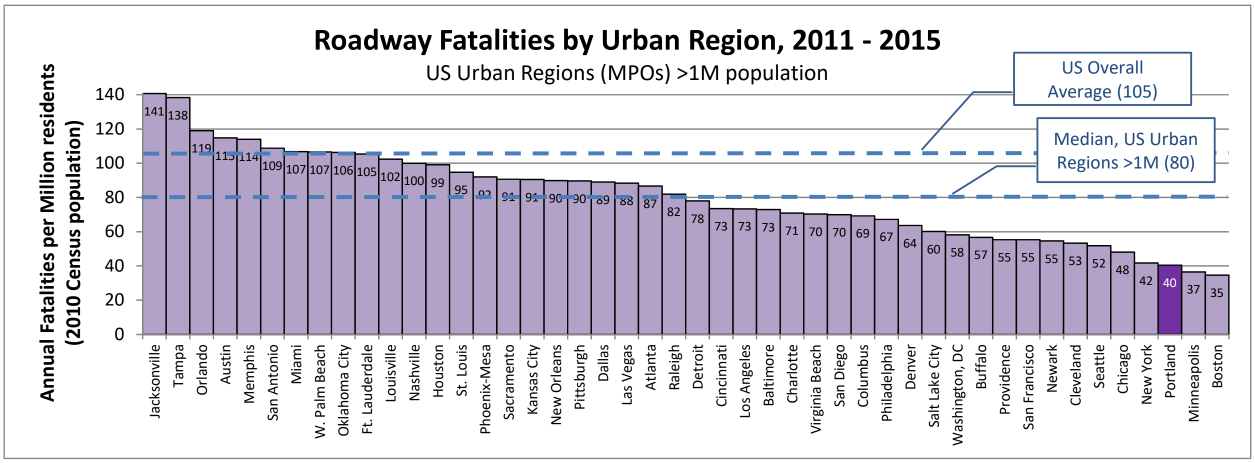


European countries appear to be limiting roadway fatalities both by managing safer roadways and developing transportation systems and development patterns which require less driving.

Urban Region Fatality Trends

Crash and population data was reviewed for the urban regions in the US (using Metropolitan Planning Organization boundaries), using FHWA's Roadway Safety Data Dashboards. A comparison was made of the large urban regions – those with populations of over 1 million people as of the 2010 Census. Figure 1-12 shows the per capita fatality rate by urbanized region. Note that the rate is slightly overstated since it is based on fatal crashes between 2011 and 2015 compared to a 2010 population due to the limited availability of regional population data. Roadway fatalities per capita in the Portland Metro region are less than 40% of the US average and less than half the State of Oregon's average.

Figure 1-12



Fatality rates

The worst regions in the nation for overall fatality rates are concentrated in Florida and the Sun Belt, where driving is the completely dominant mode of travel. The safest regions in the nation for overall fatality rates are Boston, Minneapolis-St. Paul, Portland, New York, and Chicago. In general, the safest urban regions are those that exhibit dense urban environments and higher usage of non-auto travel modes.

US City Data

NHTSA data include counts of all fatalities and pedestrian fatalities in US cities. This information is of special interest for this report given that the the Portland Metro region is highly urbanized and that the adopted growth concepts call for accomodating growth by increasing urbanization.

The figures below summarize overall fatality rates and pedestrian fatality rates for the best and worst 15 cities with population above 300,000. The figures are five-year averages (2011 – 2015). Asterisks (*) indicate that the city was also in the best or worst 15 for the 2012 State of Safety report, which looked at 2005 – 2009 data. There is a high degree of consistency between the best and worst cities between the two reports despite the differing analysis periods, indicating an established long-term relationship.

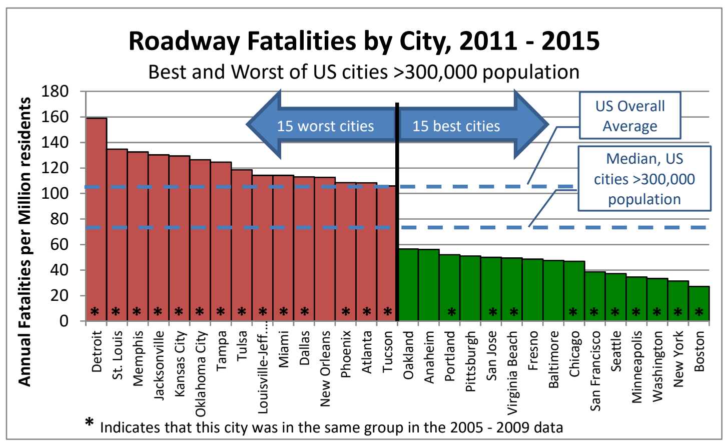
Overall fatality rates

The worst cities in the nation for overall fatality rates are Detroit, St. Louis, Memphis, Jacksonville, and Kansas City MO. In general, the worst cities are in states which have higher levels of VMT per capita, such as Michigan, Missouri, Florida, Texas, Oklahoma, and Arizona.

The safest cities in the nation in terms of roadway fatalities per capita are Boston, New York, Washington DC, Minneapolis, and Seattle. In general, the safest cities are those that exhibit dense urban environments and higher usage of non-auto travel modes.

As of 2014, the city of Portland ranks well in this list, at 13th best out of the 65 cities of population 300,000 or more. In the prior State of Safety report, Portland ranked 8th best.

Figure 1-17

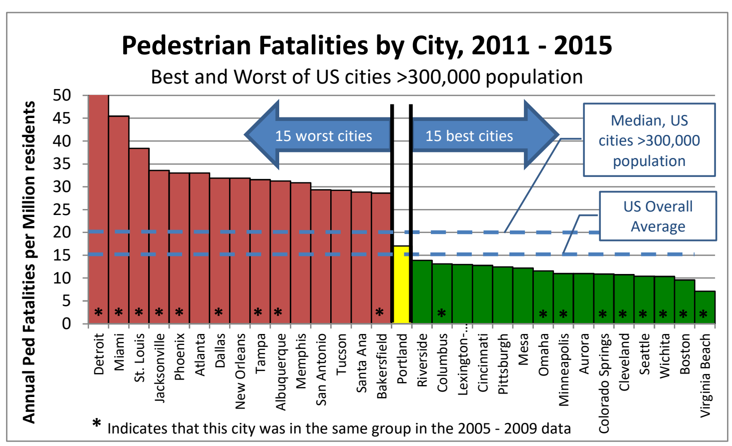


Pedestrian fatality rates

The worst cities in the nation for pedestrian crash fatality rates are Detroit, Miami, St. Louis, Jacksonville, and Phoenix. Many of the most dangerous cities for pedestrians are in states which have higher levels of VMT per capita.

The safest cities in the nation for pedestrians per capita in terms of crash fatalities are Virginia Beach, Boston, Wichita, Seattle, and Cleveland. The city of Portland ranks in the middle of the pack, at 43rd of the 65 cities of population 300,000 or more.

Figure 1-18



Discussion

In general, overall fatality rates per capita in cities are less than the national average for all areas. For example, the city of Portland's average annual fatality rate of 52 fatalities per million residents is much less than the national average of 105 and the Oregon statewide average of 90. Fifteen of the 65 cities exhibited crash fatality rates above the overall national average, with 50 exhibiting crash fatality rates below the national average.

This is likely due to a number of factors including fewer miles driven per capita due to the proximity of services, and the lower speeds of urban streets compared to rural highways, resulting in lower crash severity.

In general, cities which are more urban and which have lower levels of VMT per capita show substantially lower overall crash fatality rates. Those which have invested disproportionately in auto infrastructure, and therefore have higher VMT per capita, exhibit higher crash fatality rates.

Regarding pedestrian fatality rates, the relationships are complex, as cities with better pedestrian infrastructure encourage use by people walking, thereby increasing exposure. So while it may be safer to walk a given distance, the increased walking that results may increase pedestrian exposure and thus pedestrian crashes. Increasing walking may lead to more pedestrian fatalities because of the increased exposure but fewer overall fatalities because of the reduced VMT.

Cities which have managed to consistently demonstrate both low overall fatality rates and low pedestrian fatality rates include Boston, Seattle, Virginia Beach, and Minneapolis.

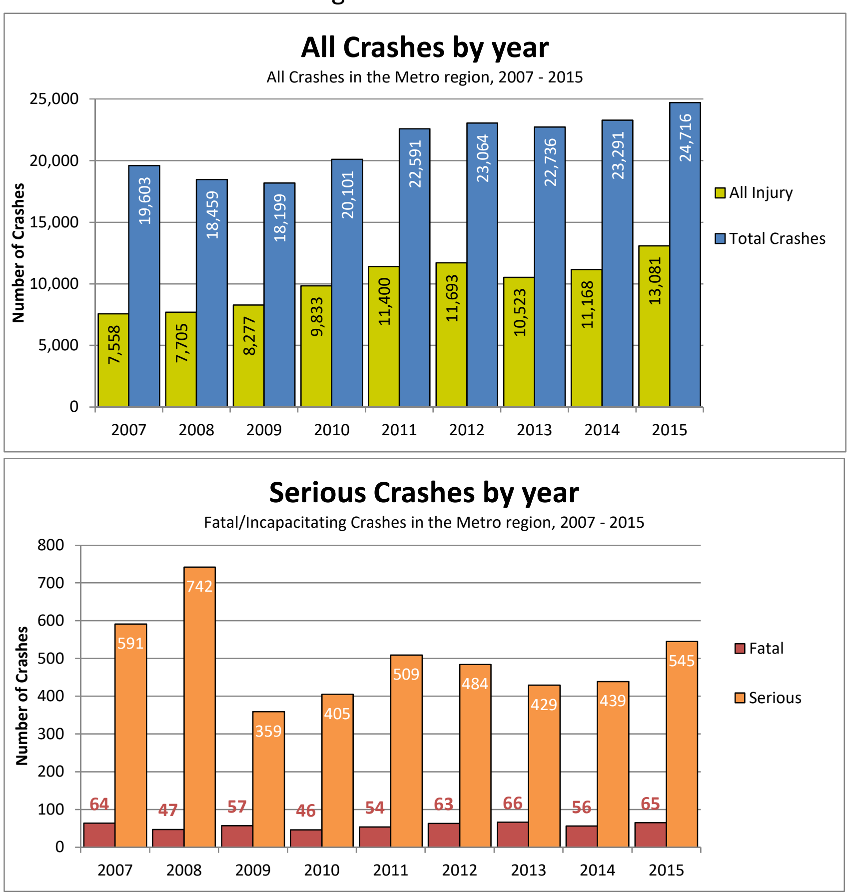
Section 2 – All Crashes

This section summarizes all crashes occurring in the Portland Metro region. The term "Serious crashes" refers to all Fatal or incapacitating injury (Injury A) crashes.

Crashes By Year

Year	Total Crashes	Fatal Crashes (Fatalities)	Injury A Crashes	Injury B Crashes	Injury C Crashes	All Injury Crashes (Injuries)	Serious Crashes
2011	22,591	54 (54)	455	2,487	8,404	11,400	509
2012	23,064	63 (66)	421	2,654	8,555	11,693	484
2013	22,736	66 (68)	363	2,428	7,666	10,523	429
2014	23,291	56 (57)	383	2,512	8,217	11,168	439
2015	24,716	65 (66)	480	2,655	9,881	13,081	545
METRO	**116,398**	**304 (311)**	**2,102**	**12,736**	**42,723**	**57,865 (81,718)**	**2,406**

Figures 2-1 and 2-2



Total reported crashes and injury crashes have increased since 2007 (Figure 2-1). Fatal and Serious crashes have fluctuated since 2007, but have more recently been increasing (Figure 2-2). Data prior to 2011 is included where available.

Metro crash rates compared to other places

2011-2015	Population (2015)	Annual VMT (2015)	Annual Injury crashes		Annual Serious crashes	
			per 1M residents	per 100M VMT	per 1M residents	per 100M VMT
Metro	1,603,229	10,437,000,000	7,219	111	300	4.6

2011 - 2015	Average Annual Fatalities	Population (2015)	Annual VMT (2015)	Annual Fatality rate per 1M residents	Fatality rate per 100M VMT
Metro	62.2	1,603,229	10,437,000,000	39	0.60
Median, regions >1M pop.*				*78*	n/a
City of Portland	31.8	620,540	4,303,000,000	51	0.74
*Median, cities >300,000 pop.**				*72*	n/a
Oregon	356	4,028,977	36,000,000,000	88	0.99
Oregon excl. Metro region	294	2,425,748	25,562,000,000	121	1.15
US	*35,092*	*321,418,820*	*3,095,373,000,000*	*109*	*1.13*
UK**	2,123	64,128,226	520,600,000,000	33	0.41
EU – 28**	32,463	506,592,457	4,322,500,000,000	64	0.75

* All data for other regions and cities is 2010 - 2014

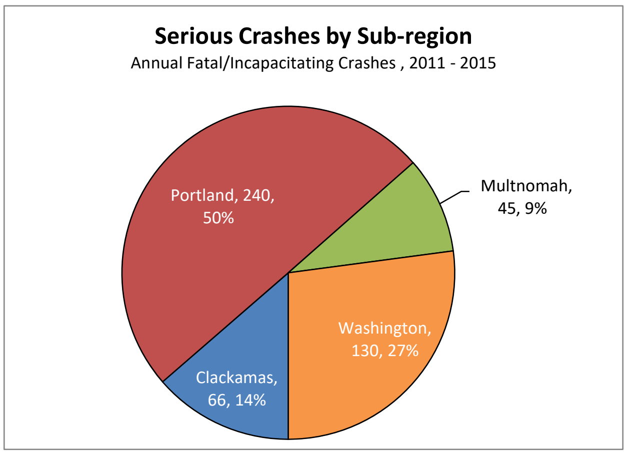
** All data for UK and EU is for year 2013

The City of Portland, the Portland Metro region, and the State of Oregon all have fatality rates below the national average. The fatality rates in the State of Oregon when the Metro region is excluded from consideration are higher than the national average. The United Kingdom and European Union data are included for reference as international best practice.

By Sub-Region

Sub-Region	2011-2015 Annual Crashes						
	All	Fatal (Fatalities)	Injury A	Injury B	Injury C	All Injury	Serious
Clackamas	3,482	10.2 (10.4)	55	395	1,362	1,822	66
Portland	11,475	31.2 (31.8)	209	1,216	4,078	5,534	240
Multnomah (excl. Portland)	1,870	6.2 (6.2)	39	245	727	1,017	45
Washington	6,452	13.2 (13.6)	117	692	2,378	3,200	130
METRO	**23,280**	**60.8 (62.2)**	**420**	**2,547**	**8,545**	**11,573**	**481**

Figures 2-3 and 2-4



Map of Metro Sub-regions

Sub-Region	Population (2015)	Annual VMT (2015)	Annual Injury crashes		Annual Serious crashes	
			per 1M residents	per 100M VMT	per 1M residents	per 100M VMT
Clackamas	290,630	2,102,000,000	6,269	87	226	3.1
Portland	620,540	4,303,000,000	8,918	129	387	5.6
Multnomah (excl. Portland)	152,611	744,000,000	6,664	137	296	6.1
Washington	539,448	3,287,000,000	5,932	97	242	4.0
METRO	**1,603,229**	**10,437,000,000**	**7,219**	**111**	**300**	**4.6**

With the highest population and VMT, Portland has the largest share of the region's Serious crashes (Figure 2-3). Portland has the highest rate of Serious crashes per capita, while Multnomah (excludes Portland) has the highest rate of Serious crashes per VMT. Clackamas County has the lowest rate of Serious crashes per capita and per VMT.

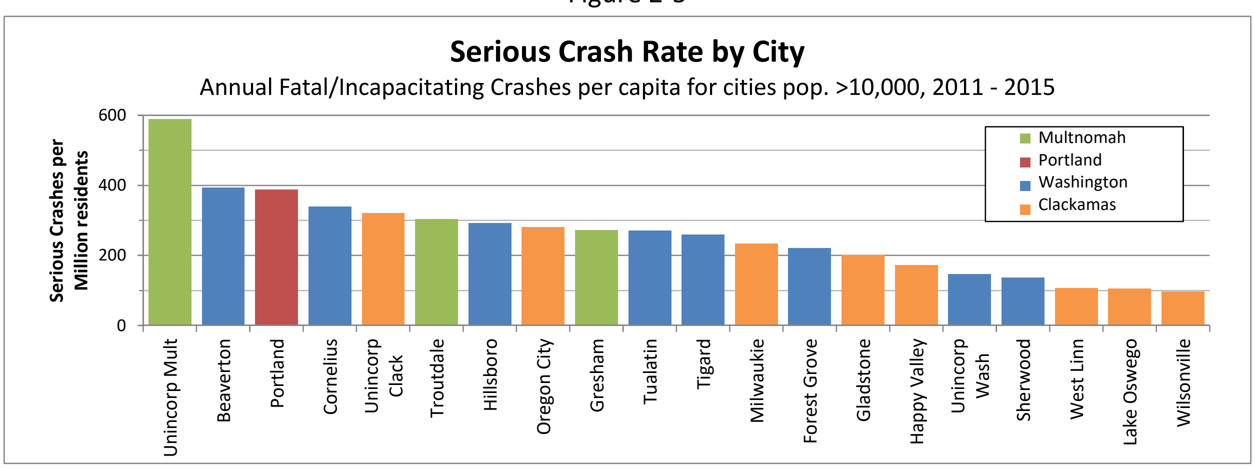
By City

City	2011-2015 Annual Crashes						
	All	Fatal	Injury A	Injury B	Injury C	All Injury	Serious
Beaverton	1,987	3.0	35	179	729	946	38
Cornelius	101	0.0	4	11	37	52	4
Durham	13	0.0	0	1	6	7	0
Fairview	88	0.2	1	13	35	49	1
Forest Grove	137	0.6	5	19	45	69	5
Gladstone	136	0.4	2	16	51	70	2
Gresham	1,356	3.4	27	170	546	747	30
Happy Valley	221	1.0	3	28	91	123	4
Hillsboro	1,413	3.6	26	177	545	751	29
Johnson City	0	0.0	0	0	0	0	0
King City	9	0.0	0	1	1	2	0
Lake Oswego	282	0.0	4	29	96	130	4
Maywood Park	27	0.0	1	2	12	15	1
Milwaukie	210	0.4	5	28	77	109	5
Oregon City	588	1.8	8	62	232	304	10
Portland	11,479	31.2	209	1,216	4,079	5,536	240
Rivergrove	1	0.0	0	0	0	0	0
Sherwood	160	0.2	2	18	58	79	3
Tigard	935	1.6	12	91	353	457	13
Troutdale	167	0.8	4	22	63	89	5
Tualatin	486	0.4	7	50	199	256	7
West Linn	213	0.6	2	23	78	104	3
Wilsonville	218	0.0	2	23	76	102	2
Wood Village	67	0.2	1	7	24	32	1
Unincorp Clack	1,651	6.0	30	187	670	893	36
Unincorp Mult	155	1.6	4	29	45	81	6
Unincorp Wash	1,180	3.8	26	144	397	571	30
METRO	**23,280**	**60.8**	**420**	**2,547**	**8,545**	**11,573**	**481**

These two tables and the accompanying Figure 2-5 summarize crash data within the region by City and for the unincorporated sections of each of the three counties. Crash rates were determined per capita but not per VMT, as the VMT estimates for the smaller cities are not considered reliable enough for such an analysis.

City	Population (2015)	2011-2015 Annual crashes	
		All Injury per 1M residents	Serious per 1M residents
Beaverton	96,704	9,782	393
Cornelius	12,389	4,230	339
Durham	1,430	4,895	0
Fairview	9,357	5,194	150
Forest Grove	23,630	2,903	220
Gladstone	11,990	5,805	200
Gresham	111,716	6,683	272
Happy Valley	20,835	5,894	173
Hillsboro	100,109	7,506	292
Johnson City	588	0	0
King City	3,817	576	52
Lake Oswego	38,156	3,397	105
Maywood Park	809	19,036	1,236
Milwaukie	21,365	5,121	234
Oregon City	35,004	8,673	280
Portland	620,540	8,921	387
Rivergrove	321	623	0
Sherwood	19,012	4,134	137
Tigard	51,642	8,849	259
Troutdale	16,486	5,411	303
Tualatin	26,617	9,625	271
West Linn	26,267	3,967	107
Wilsonville	22,932	4,448	96
Wood Village	4,056	7,988	247
Unincorp Clack	113,172	7,889	320
Unincorp Mult	10,187	7,932	589
Unincorp Wash	204,098	2,796	147
METRO	**1,603,229**	**7,219**	**300**

Figure 2-5



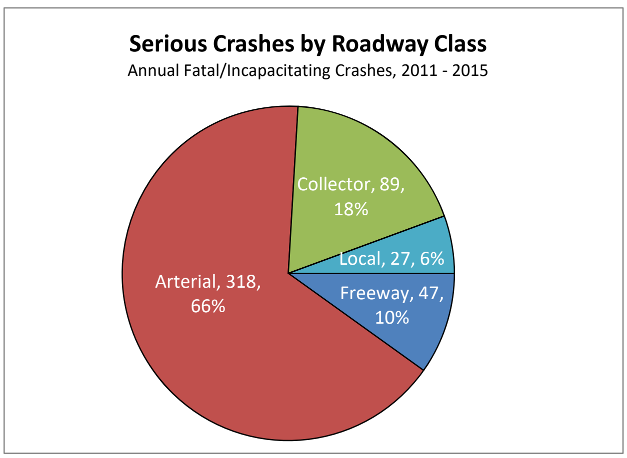
By Roadway Classification

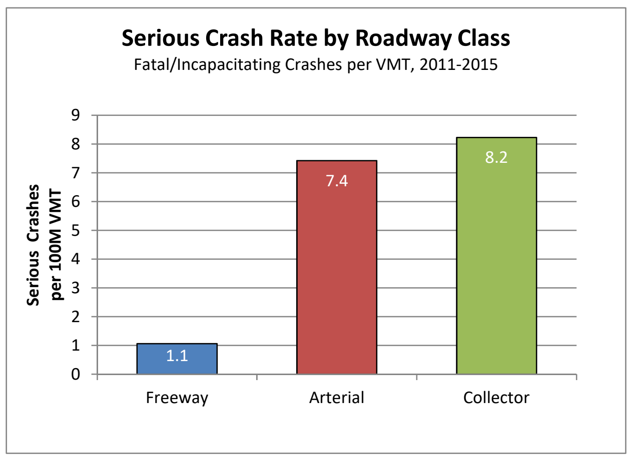
Roadway Classification	2011-2015 Annual Crashes							Percent Serious
	All	Fatal	Injury A	Injury B	Injury C	All Injury	Serious	
Freeway	3,688	4.4	43	301	1,454	1,802	47	1.3%
Arterial	14,463	41.8	276	1,606	5,605	7,529	318	2.2%
Collector	3,609	12.6	76	476	1,140	1,705	89	2.5%
Local	1,519	2.0	25	164	345	536	27	1.8%
METRO	**23,280**	**60.8**	**420**	**2,547**	**8,545**	**11,573**	**481**	**2.1%**

Roadway Classification	Total Road-Miles	Annual VMT (2015)	Annual Crashes per Road-Mile		Annual Crashes per 100M VMT	
			All Injury	Serious	All Injury	Serious
Freeway	304	4,455,000,000	5.9	0.16	40	1.1
Arterial	772	4,281,000,000	9.8	0.41	176	7.4
Collector	994	1,081,000,000	1.7	0.09	158	8.2
Local	4,565	620,000,000*	0.1	0.01	87	4.3
METRO	**6,635**	**10,437,000,000**	**1.7**	**0.07**	**111**	**4.6**

* VMT for local streets is a low-confidence estimate

Figures 2-8 and 2-9

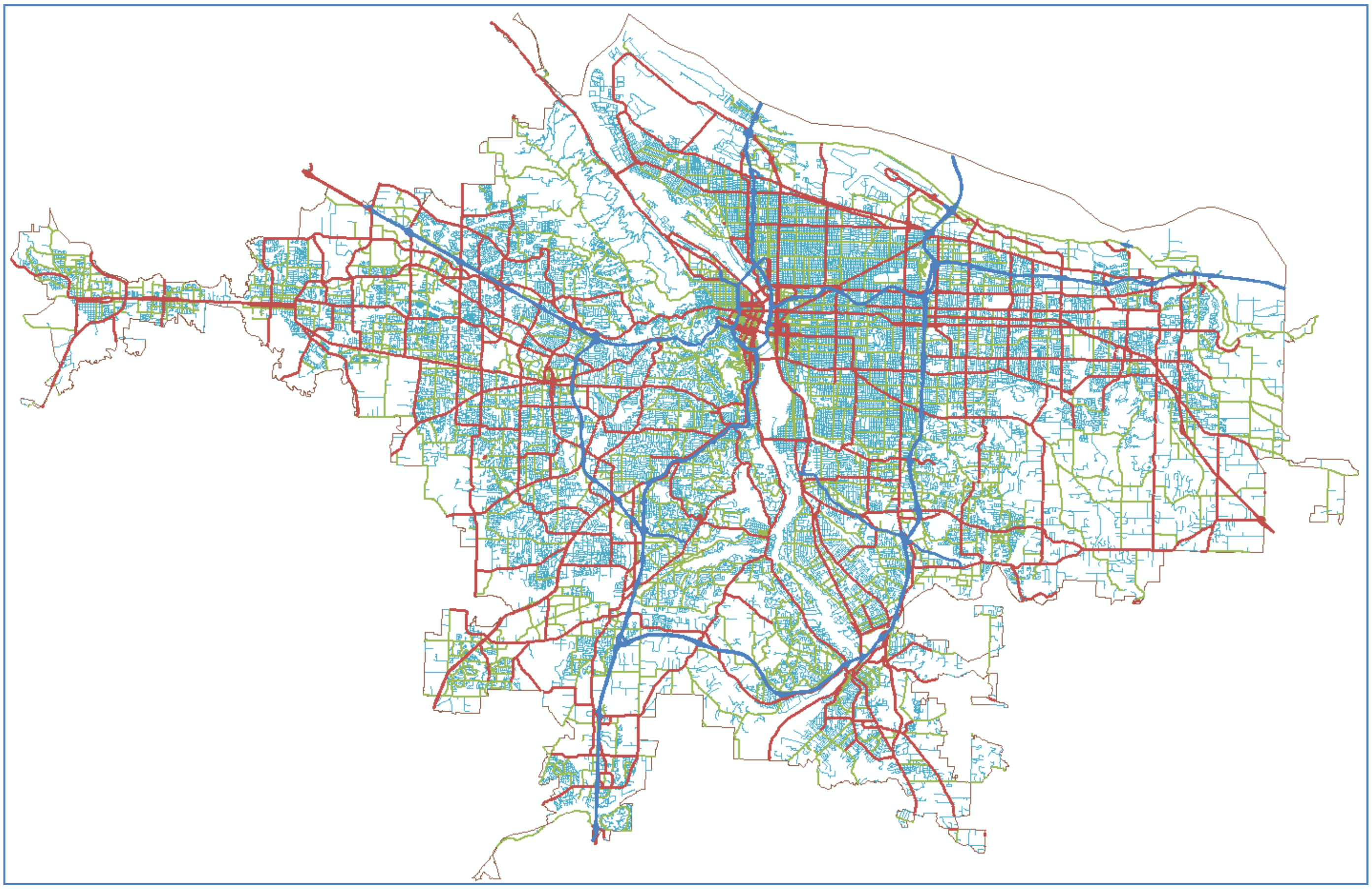




A review of the distribution of the region's Serious crashes by roadway classification reveals one of the most conclusive relationships in this study. Arterial roadways are the location of the majority of the Serious crashes in the region (Figure 2-8). A similar relationship is evident for pedestrians and cyclists, as detailed in Sections 5 and 6. Freeways and their ramps are relatively safe, per mile travelled, compared to arterial and collector roadways (Figure 2-9).

Figure 2-10 presents the functional classification of the region's roadways. Blue are freeways, red are arterial roadways, green are collectors roadwyas, and light blue are local.

Figure 2-10

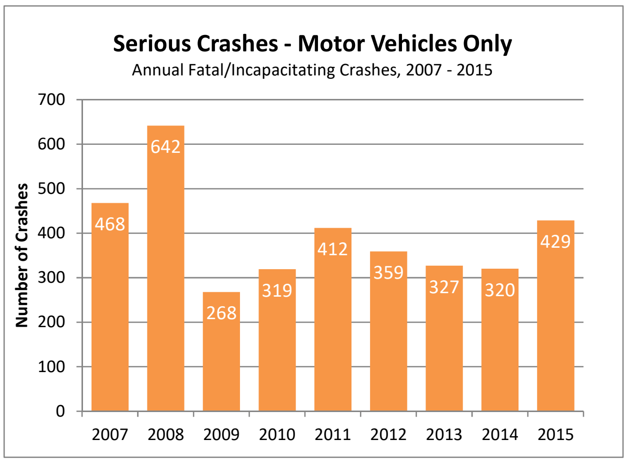


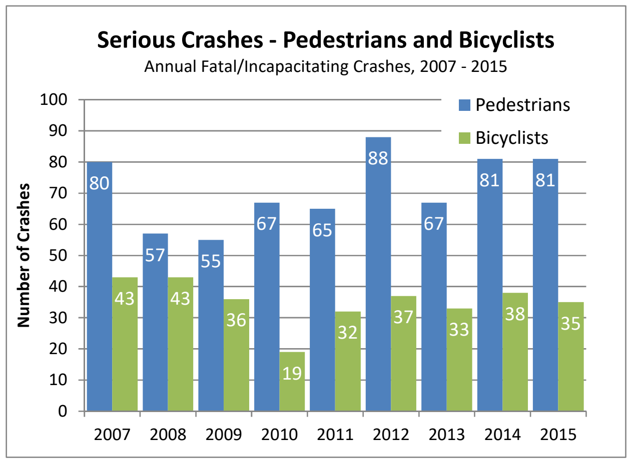
Map of Roadway Functional Classifications

By Mode

Year	Pedestrians		Bicyclists		Autos Only		Motorcycle		Truck Involved	
	All Injury	Serious	All Injury	Serious	All Injury	Serious	All Injury	Serious	All Injury	Serious
2011	418	65	481	32	10,502	412	312	72	250	20
2012	511	88	560	37	10,622	359	353	63	277	16
2013	428	67	485	33	9,607	327	356	76	238	11
2014	480	81	509	38	10,179	320	302	55	281	22
2015	474	81	477	35	12,129	429	339	86	320	19
METRO	**2,311**	**382**	**2,512**	**175**	**53,039**	**1,847**	**1,662**	**352**	**1,366**	**88**

Figures 2-11 and 2-12





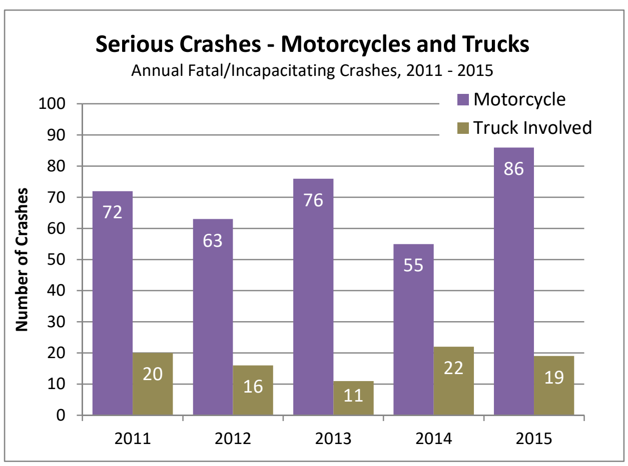


Figure 2-13

Figure 2-11 presents the annual number of Serious crashes involving only motor vehicles (no pedestrians or cyclists). Figure 2-12 presents the annual number of Serious crashes involving pedestrians and cyclists. Figure 2-13 presents the annual number of Serious crashes involving motorcycles and large trucks. Data prior to 2011 is included where available.

By Month

Month	2011-2015 Annual Crashes	
	All	**Serious**
January	1,787	39
February	1,679	36
March	1,788	36
April	1,859	33
May	1,881	38
June	1,922	43
July	1,922	44
August	1,971	47
September	1,995	45
October	2,200	39
November	2,102	41
December	2,173	41
12 MONTHS	**23,280**	**481**

Figure 2-14

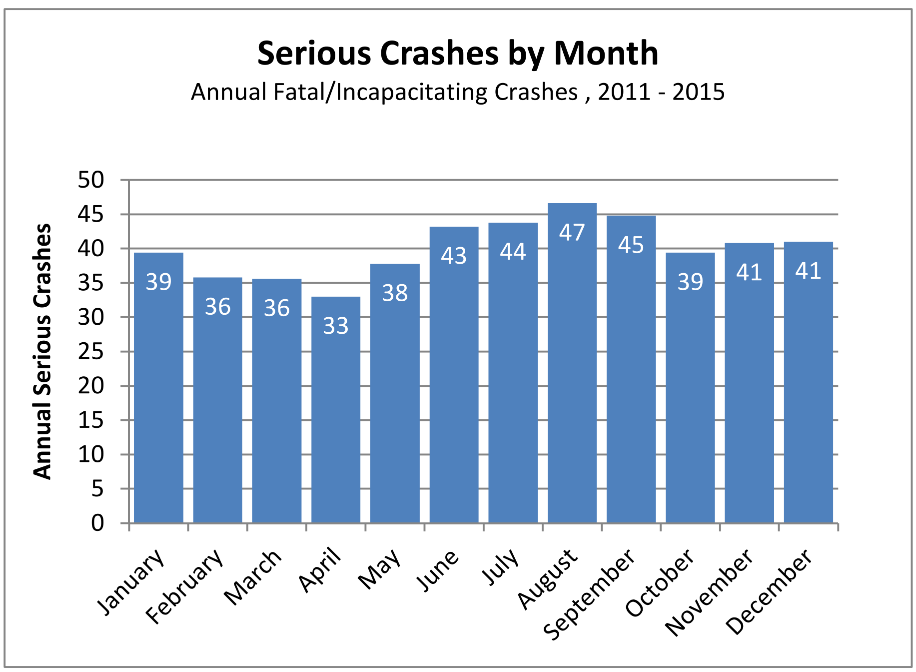


Figure 2-14 presents the annual average number of Serious crashes by month. No clear trend is evident.

By Time of Day

Figure 2-15

Serious Crashes by Day of Week and Hour

Annual Fatal/Incapacitating Crashes, 2011 - 2015

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat
12 AM	2.2	1.8	0.8	0.6	1.8	1.8	3.0
1 AM	2.6	2.0	0.8	1.6	0.6	1.6	2.0
2 AM	4.8	0.6	1.0	1.8	1.2	2.8	3.6
3 AM	1.2	0.6	0.4	0.8	0.6	1.2	2.0
4 AM	1.4	0.2	1.2	0.6	0.2	0.2	0.6
5 AM	0.6	1.2	1.2	1.0	1.4	1.8	0.8
6 AM	0.8	1.8	1.4	3.0	1.8	2.8	0.6
7 AM	2.8	2.6	3.0	4.2	2.8	2.6	1.8
8 AM	0.6	3.2	2.4	4.2	3.4	3.0	1.0
9 AM	1.6	1.6	2.8	2.2	2.8	2.4	1.2
10 AM	2.0	2.0	2.6	2.4	3.2	2.0	3.4
11 AM	2.2	2.6	2.6	3.0	3.0	5.0	3.0
12 PM	3.0	2.0	1.8	3.4	4.8	4.8	3.6
1 PM	3.0	3.2	4.2	3.4	3.0	4.2	4.2
2 PM	3.6	5.6	4.6	3.0	4.2	3.0	2.8
3 PM	4.2	4.8	5.6	4.6	4.4	5.4	5.4
4 PM	2.8	6.2	5.8	6.6	5.8	5.2	2.8
5 PM	4.6	5.0	7.8	7.4	6.4	6.6	5.0
6 PM	3.4	4.8	5.0	5.0	5.2	5.8	5.2
7 PM	3.0	3.2	4.2	3.8	5.0	4.6	4.8
8 PM	3.4	1.4	2.8	2.0	2.2	2.2	2.6
9 PM	2.6	3.2	2.4	3.6	3.8	3.6	1.8
10 PM	1.8	2.0	1.8	2.8	2.6	3.0	3.4
11 PM	1.4	1.2	1.4	2.0	1.6	2.8	1.8

Hour	Avg Wkday	Avg Wkend
12 AM	1.4	2.6
1 AM	1.3	2.3
2 AM	1.5	4.2
3 AM	0.7	1.6
4 AM	0.5	1.0
5 AM	1.3	0.7
6 AM	2.2	0.7
7 AM	3.0	2.3
8 AM	3.2	0.8
9 AM	2.4	1.4
10 AM	2.4	2.7
11 AM	3.2	2.6
12 PM	3.4	3.3
1 PM	3.6	3.6
2 PM	4.1	3.2
3 PM	5.0	4.8
4 PM	5.9	2.8
5 PM	6.6	4.8
6 PM	5.2	4.3
7 PM	4.2	3.9
8 PM	2.1	3.0
9 PM	3.3	2.2
10 PM	2.4	2.6
11 PM	1.8	1.6

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
All Day	59.6	62.8	67.6	73.0	71.8	78.4	66.4

	Avg Wkday	Avg Wkend
All Day	70.7	63.0

Figure 2-15 presents the rate of Serious crashes by day of the week and hour of the day using a "heat map" format. Dark cells indicate the highest relative crash time periods; light cells indicate the lowest relative crash time periods. The average weekday and weekend day are summarized on the right side of the figure, while each day is summarized and compared at the bottom of the figure.

The weekday evening peak hours produce the highest number of Serious crashes, with the 5:00 – 5:59 pm hour as the worst. Late Friday night/early Saturday morning and late Saturday night/early Sunday morning also stand out with high rates of Serious crashes.

By Weather

Weather	2011-2015 Annual Crashes	
	All	Serious
Cloudy/Clear	17,658	384
Rain/Fog	4,462	84
Sleet/Snow	189	3
Unknown	970	10
METRO	**20,947**	**481**

The majority (80%) of Serious crashes occurred in clear or cloudy conditions (Figure 2-16).

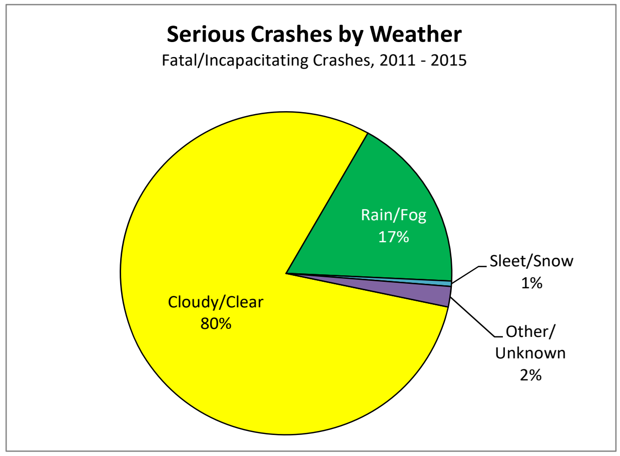


Figure 2-16

By Road Surface Condition

Road Condition	2011-2015 Annual Crashes	
	All	Serious
Dry	16,378	349
Ice/Snow	342	6
Wet	5,715	120
Unknown	844	6
METRO	**20,947**	**481**

The majority (73%) of Serious crashes occurred in dry conditions (Figure 2-17).

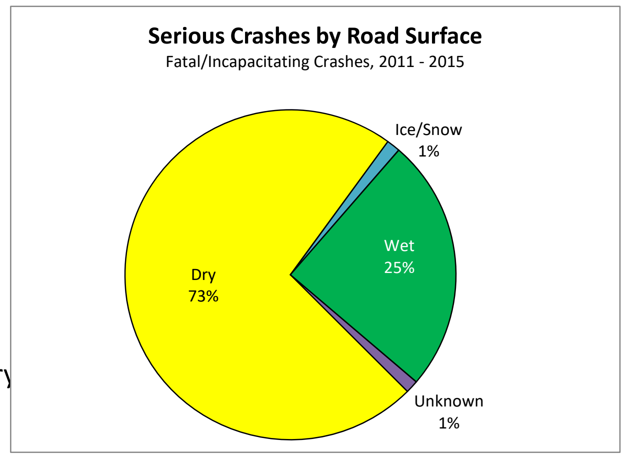


Figure 2-17

By Lighting

Lighting	2011-2015 Annual Crashes	
	All	Serious
Daylight	16,508	282
Dawn/Dusk	1,657	33
Night - Dark	892	40
Night - Lit	4,153	125
Unknown	70	1
METRO	**20,947**	**481**

The majority (59%) of Serious crashes occurred in daylight (Figure 2-18).

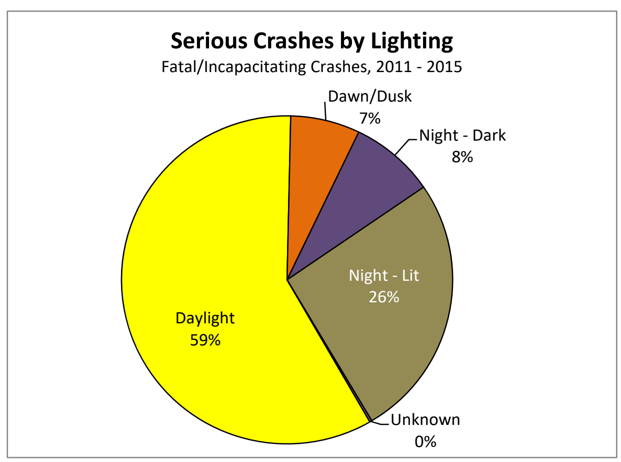
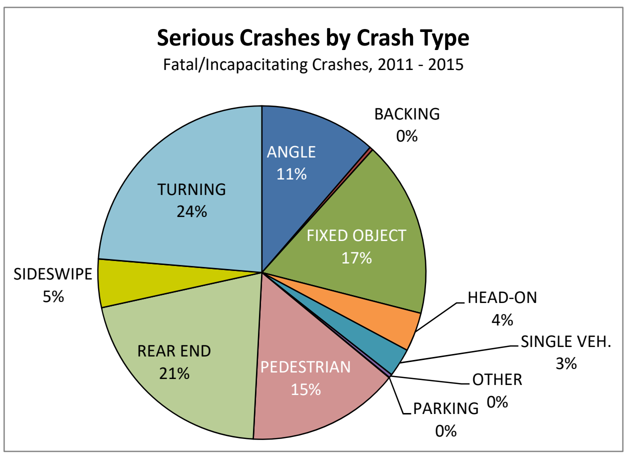


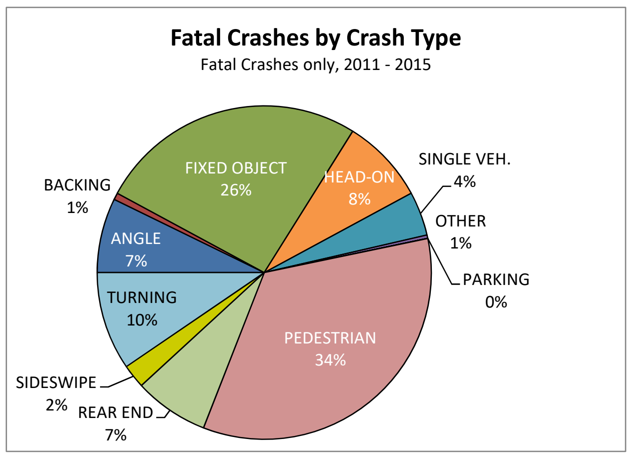
Figure 2-18

By Crash Type

Collision Type	2011-2015 Annual Crashes						
	All	Fatal	Injury A	Injury B	Injury C	All Injury	Serious
Angle	2,304	4	51	388	803	1,246	55
Backing	336	0	1	6	71	79	2
Fixed Object	1,734	16	67	289	341	712	82
Head-on	151	5	13	34	44	96	18
Single Vehicle	101	3	11	43	23	79	13
Other	78	0	1	10	10	21	2
Parking	201	0	0	8	30	38	0
Pedestrian	450	21	51	214	160	447	72
Rear End	10,573	4	96	661	4,948	5,710	100
Sideswipe	2,198	1	21	136	476	635	23
Turning	5,154	6	108	758	1,638	2,510	114
METRO	**23,280**	**61**	**420**	**2,547**	**8,545**	**11,573**	**481**

Figures 2-19 and 2-20





Figures 2-19 and 2-20 present Serious crash types and Fatal crash types. Fatal crashes are specifically broken out here because the distribution is substantially different. For the purpose of establishing crash type, bicycles are considered vehicles, and so there is no separate bicycle crash type.

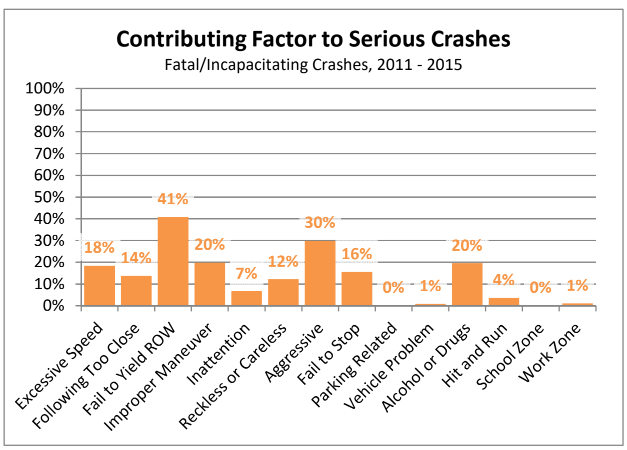
The most common Serious crash types were Turning and Rear End.

The most common Fatal crash types were Pedestrian and Fixed Object.

By Contributing Factor

Collision Type	2011-2015 Annual Crashes (All Crashes)						
	All	Fatal	Injury A	Injury B	Injury C	All Injury	Serious
Excessive Speed	2,897	20.6	68	372	1,019	1,480	89
Following Too Close	7,806	1.4	65	486	3,660	4,212	66
Fail to Yield ROW	7,081	19.2	177	1,227	2,369	3,793	196
Improper Maneuver	4,636	16.4	79	400	1,137	1,633	96
Inattention	1,279	3.0	29	166	533	731	32
Reckless or Careless	1,086	6.8	52	234	375	668	59
Aggressive	9,663	21.2	123	771	4,198	5,114	144
Fail to Stop	8,979	1.6	73	514	4,228	4,817	75
Parking Related	136	0.0	0	4	18	22	0
Vehicle Problem	124	0.8	4	18	35	57	4
Alcohol or Drugs	1,056	34.4	60	215	265	575	94
Hit and Run	1,382	5.0	12	104	452	572	17
School Zone	66	0.2	1	13	26	39	1
Work Zone	177	0.2	5	25	69	99	5
METRO	**23,280**	**60.8**	**420**	**2,547**	**8,545**	**11,573**	**481**

Figures 2-21 and 2-22



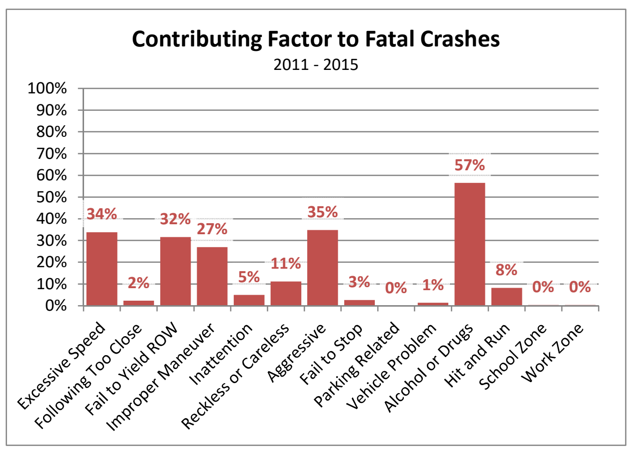


Figure 2-21 presents the the percentage of crashes of Serious severity (Fatal or Injury A) with each contributing factor. Figure 2-22 presents the the percentage of Fatal crashes with each contributing factor. Each crash may have several contributing factors. The determination of contributing factors is described in more detail in Section 7.

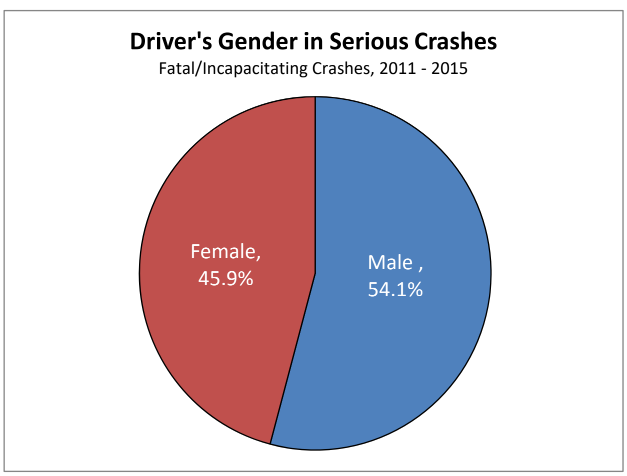
Alcohol and Drugs, Excessive Speed, Fail to Yield ROW, and Aggressive Driving are particularly common factors. Crashes involving Alcohol and Drugs have a much higher likelihood of being Fatal than other crashes.

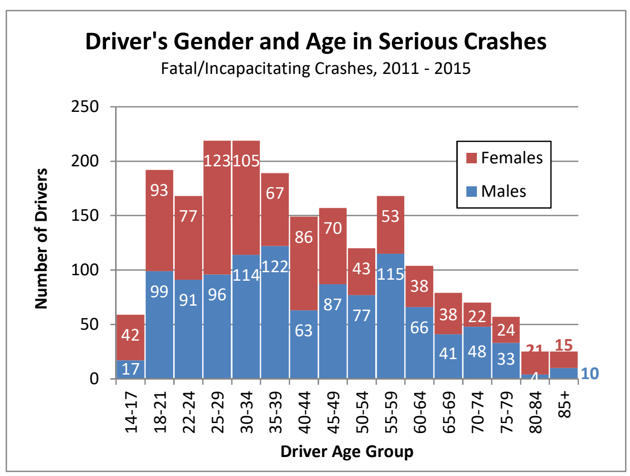
By Driver's Age and Gender

The age and gender of drivers involved in crashes, regardless of fault, are presented in the following table and Figures 2-23 and 2-24.

Age Group	Total Male Drivers (2011 – 2015)			Total Female Drivers (2011 – 2015)		
	All Crashes	Serious	Percent Serious	All Crashes	Serious	Percent Serious
14-17	3,076	17	0.6%	3,579	42	1.2%
18-21	9,572	99	1.0%	9,413	93	1.0%
22-24	7,518	91	1.2%	7,466	77	1.0%
25-29	12,431	96	0.8%	11,968	123	1.0%
30-34	11,897	114	1.0%	10,804	105	1.0%
35-39	10,343	122	1.2%	9,247	67	0.7%
40-44	10,421	63	0.6%	8,898	86	1.0%
45-49	9,218	87	0.9%	8,053	70	0.9%
50-54	9,114	77	0.8%	7,500	43	0.6%
55-59	8,248	115	1.4%	6,810	53	0.8%
60-64	6,734	66	1.0%	5,529	38	0.7%
65-69	4,589	41	0.9%	3,823	38	1.0%
70-74	2,408	48	2.0%	2,180	22	1.0%
75-79	1,428	33	2.3%	1,306	24	1.8%
80-84	820	4	0.5%	813	21	2.6%
85+	747	10	1.3%	777	15	1.9%
Unknown	15,669	16	0.1%	11,098	14	0.1%
METRO	**124,233**	**1,099**	**0.9%**	**109,264**	**931**	**0.9%**

Figures 2-23 and 2-24





Seat Belt Use

The reported use of seat belts is shown in the following tables, for all crashes, for Serious crashes only, and for non-serious crashes.

Seat Belt Use (All crashes, 2011-2015)					
Gender	**Seat Belt Use**	**No Seat Belt**	**Unknown**	**% Seat Belt Use**	**% No Seat Belt**
Males	81,267	769	47,229	99.1%	0.9%
Females	80,854	445	34,213	99.5%	0.5%
Unknown	245	2	6,261	99.2%	0.8%
METRO	**162,366**	**1,216**	**87,703**	**99.3%**	**0.7%**

Seat Belt Use (Serious crashes, 2011-2015)					
Gender	**Seat Belt Use**	**No Seat Belt**	**Unknown**	**% Seat Belt Use**	**% No Seat Belt**
Males	622	79	164	88.7%	11.3%
Females	768	51	100	93.8%	6.2%
Unknown	0	0	0	-	-
METRO	**1,390**	**130**	**264**	**91.4%**	**8.6%**

Seat Belt Use (Injury B, C, and PDO crashes, 2011-2015)					
Gender	**Seat Belt Use**	**No Seat Belt**	**Unknown**	**% Seat Belt Use**	**% No Seat Belt**
Males	80,645	690	47,065	99.2%	0.8%
Females	80,086	394	34,113	99.5%	0.5%
Unknown	245	2	6,261	99.2%	0.8%
METRO	**160,976**	**1,086**	**87,439**	**99.3%**	**0.7%**

Seat belt use in the region as reported exceeds 99%.

Males were 71% more likely than females to be reported without a seat belt.

Occupants without seat belts were 12 times as likely to be seriously injured or killed as occupants wearing seat belts.

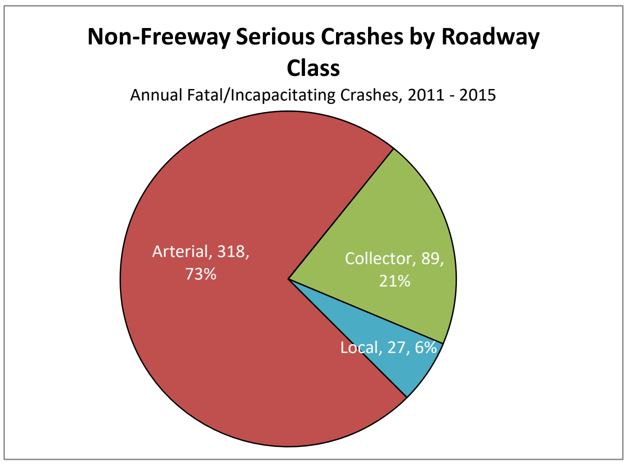
Section 3 – Roadway Characteristics of Non-Freeway Crashes

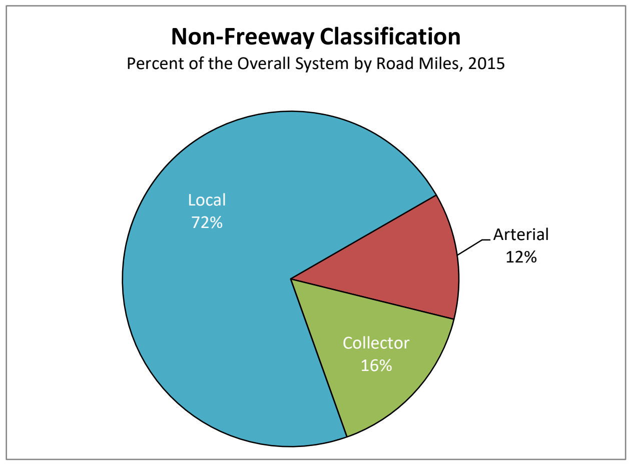
By Roadway Classification

Roadway Classification	Total Road-Miles	Annual VMT (2015)	2011-2015 Annual Crashes		
			All	All Injury	Serious
Arterial	772	4,281,000,000	14,463	7,529	318
Collector	994	1,081,000,000	3,609	1,705	89
Local	4,565	620,000,000*	1,519	536	27
METRO	**6,331**	**5,982,000,000**	**19,591**	**9,771**	**434**

* VMT for local streets is a low-confidence estimate

Figures 3-1 and 3-2





Roadway Classification	% crashes resulting in		Annual Crashes per Road-Mile		Annual Crashes per 100M VMT	
	All Injury	Serious	All Injury	Serious	All Injury	Serious
Arterial	52%	2.2%	9.8	0.41	176	7.4
Collector	47%	2.5%	1.7	0.09	158	8.2
Local	35%	1.8%	0.1	0.01	--	--
METRO	**50%**	**2.2%**	**--**	**--**	**--**	**--**

A review of the distribution of non-freeway Serious crashes by roadway classification reveals one of the most conclusive relationships in this report. Arterial roadways are the location of the majority of the Serious crashes in the region. Despite making up only 12% of the region's non-freeway road miles, they constitute 73% of the Serious crashes (Figures 3-1 and 3-2). A similar relationship is evident for pedestrians and cyclists, as detailed in Sections 5 and 6. In general, these roads have high traffic volumes, high travel speeds, and are challenging to pedestrians crossing.

As shown in Figure 3-3, collector streets have the highest crash rate per traffic volume, followed closely by arterial streets. Figure 3-4 presents the functional classification of the region's roadways. Red are arterial roadways and green are collector roadways.

Figure 3-3

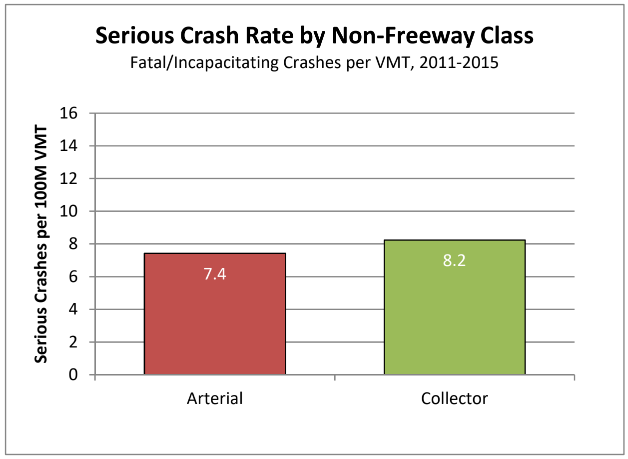
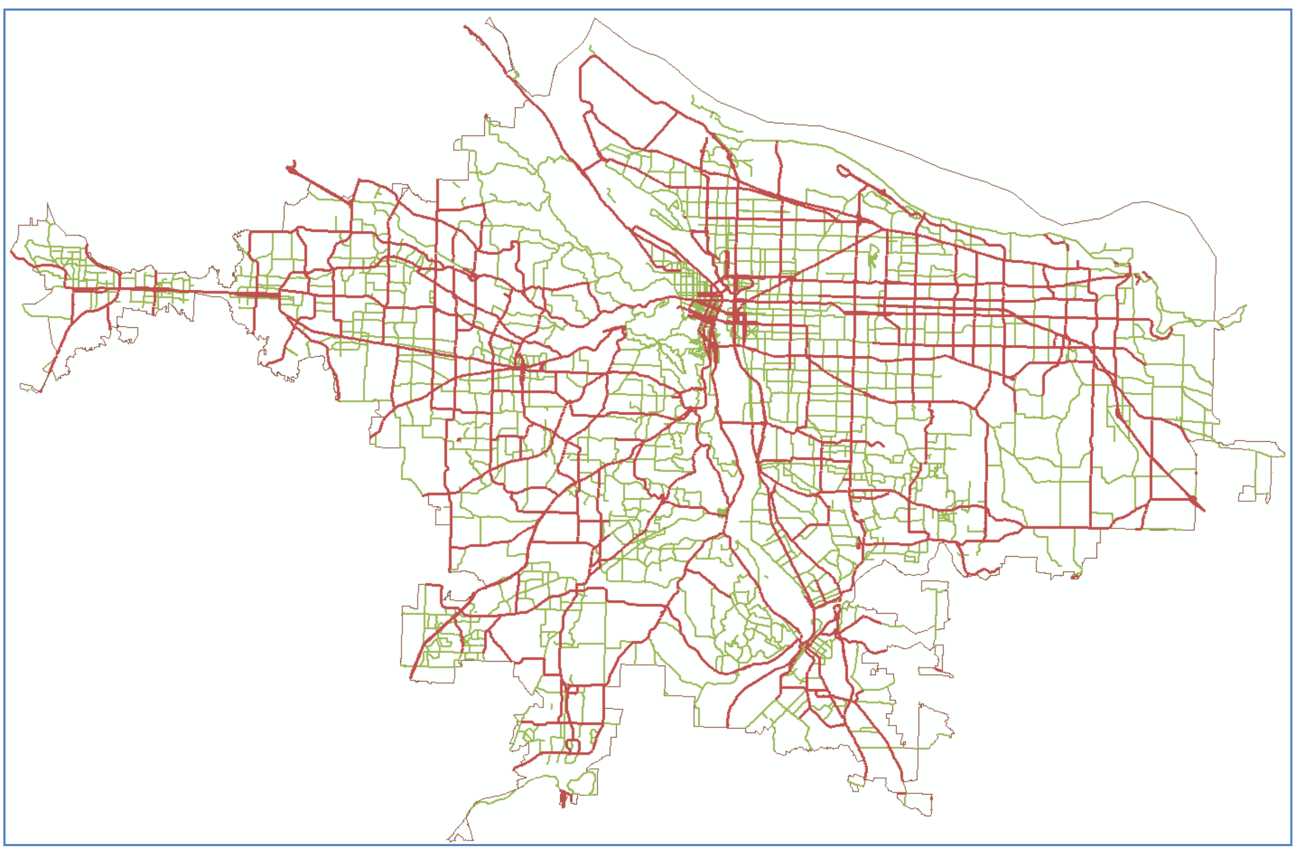


Figure 3-4



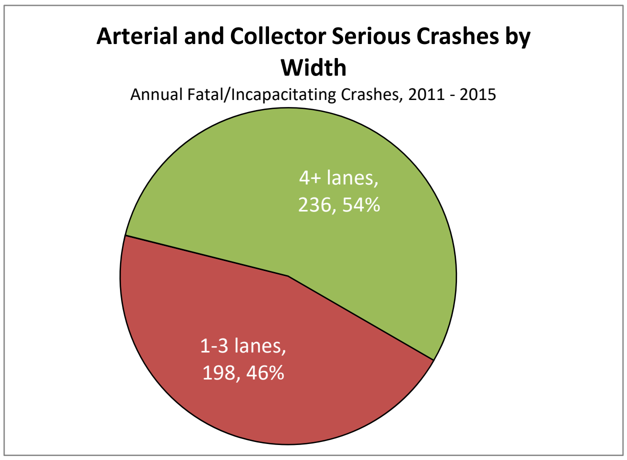
Map of Roadway Functional Classifications

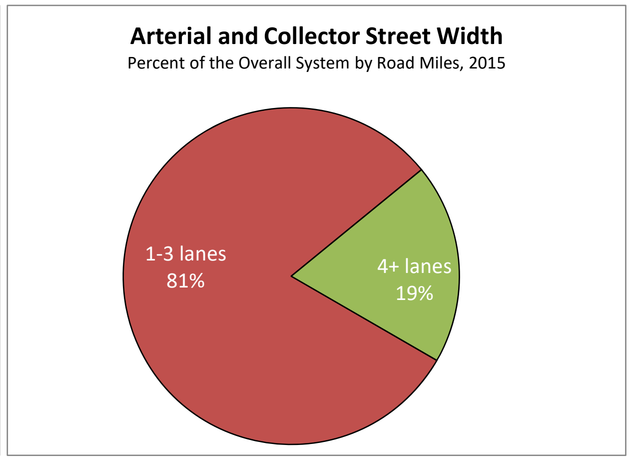
By Number of Lanes

The following tables and Figures 3-5 and 3-6 summarize crashes by number of lanes for arterial and collector roadways.

Number of Arterial/Collector Lanes	Total Road-Miles	Annual VMT (2015)	2011-2015 Annual Crashes		
			All	All Injury	Serious
1 – 3 Lanes	1,427	2,972,000,000	8,932	4,217	198
4+ Lanes	340	2,738,000,000	10,597	5,532	236

Figures 3-5 and 3-6





Number of Arterial/Collector lanes	% crashes resulting in		Annual Crashes per Road-Mile		Annual Crashes per 100M VMT	
	All Injury	Serious	All Injury	Serious	All Injury	Serious
1-3 lanes	47%	2.2%	3.0	0.14	142	6.6
4+ lanes	52%	2.2%	16.3	0.69	202	8.6
ALL ARTERIALS AND COLLECTORS	**50%**	**2.2%**	**5.5**	**0.25**	**171**	**7.6**

Figure 3-7 presents the crash rate per traffic volume, and Figure 3-8 presents the number of lanes for arterials and collectors in the region. The influence of street width is consistent with the influence of roadway classification. Wider roadways are the location of a disproportionate number of Serious crashes in relation to both their share of the overall system (Figures 3-5 and 3-6) and the vehicle-miles travelled they serve (Figure 3-7). Similar patterns are documented in AASHTO's Highway Safety Manual (2010), Chapter 12.

Figure 3-7

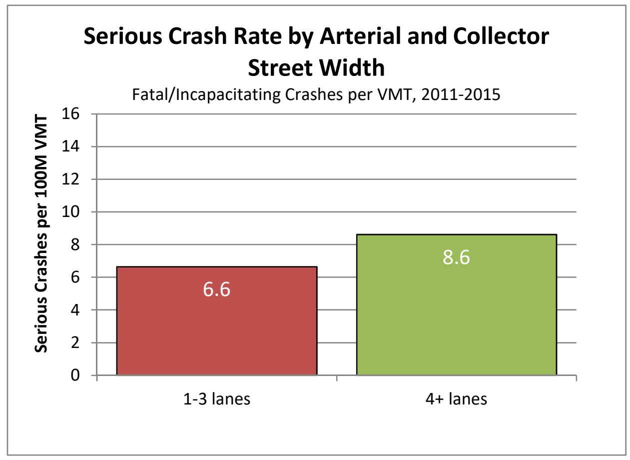
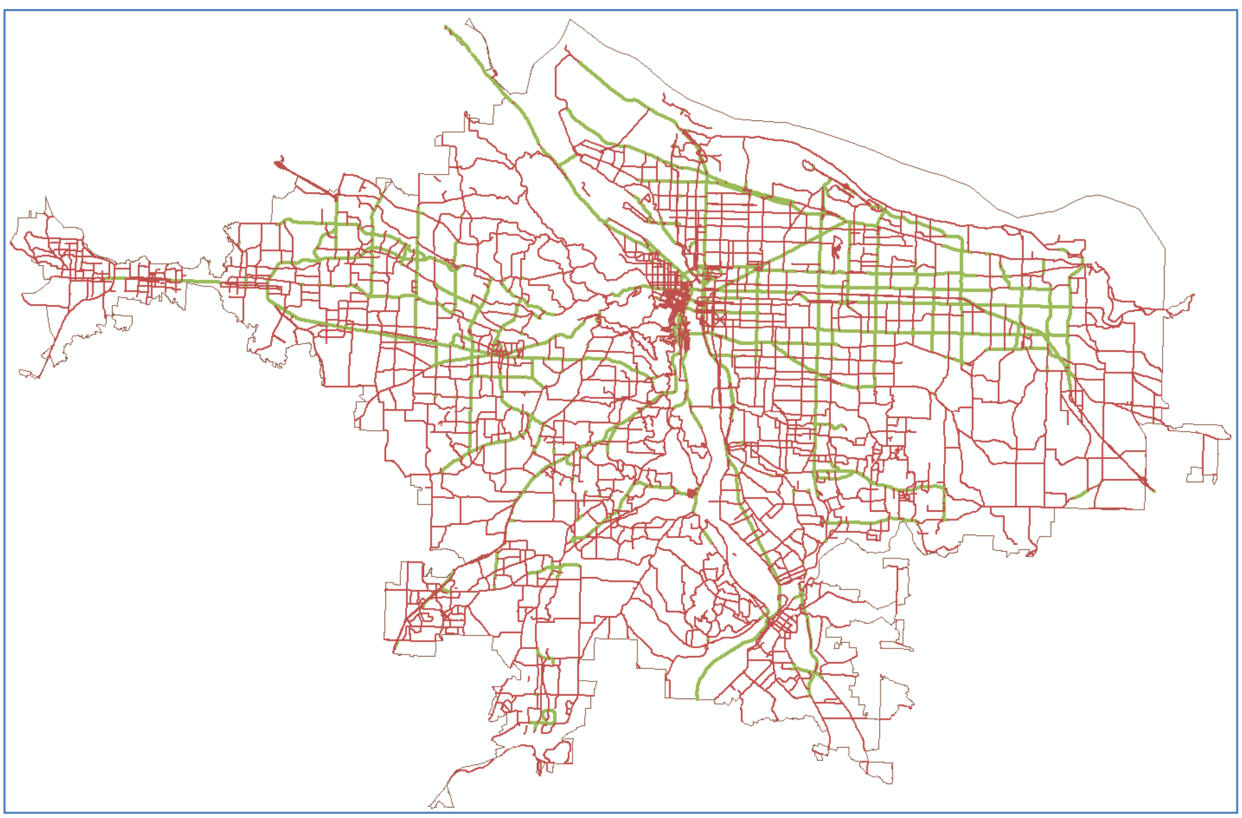


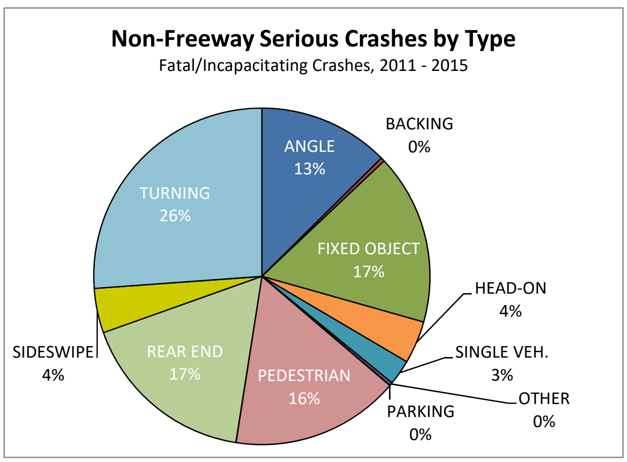
Figure 3-8 Map of Number of Lanes for Arterials and Collectors

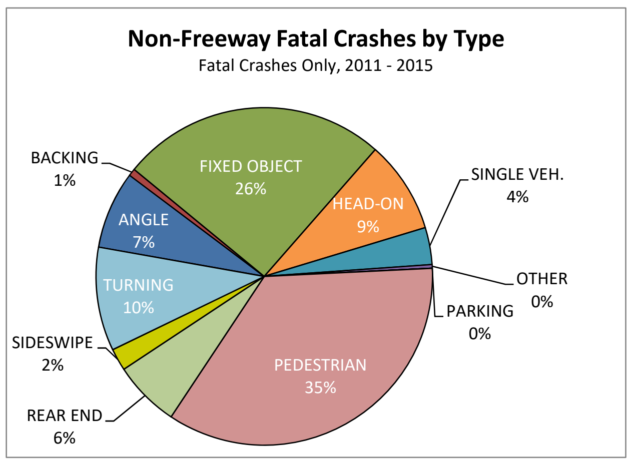


By Crash Type

Collision Type	2011-2015 Annual Crashes						
	All	**Fatal**	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Angle	2,296	4.2	50	386	801	1,241	55
Backing	329	0.4	1	6	70	78	2
Fixed Object	1,416	14.4	57	241	263	575	71
Head-on	145	5.0	13	33	41	93	18
Single Vehicle	79	2.0	9	35	18	64	11
Other	51	0.2	1	7	7	15	1
Parking	200	0.0	0	8	30	38	0
Pedestrian	446	19.8	51	212	160	442	70
Rear End	7,912	3.6	71	467	3,753	4,294	74
Sideswipe	1,608	1.2	17	100	324	442	19
Turning	5,108	5.6	108	754	1,623	2,490	113
METRO	**19,591**	**56.4**	**377**	**2,247**	**7,090**	**9,771**	**434**

Figure 3-9 and 3-10





Figures 3-9 and 3-10 present non-freeway Serious crash types and non-freeway Fatal crash types. Fatal crashes are specifically broken out here because the distribution is substantially different. For the purpose of establishing crash type, bicycles are considered vehicles, and so there is no separate bicycle crash type.

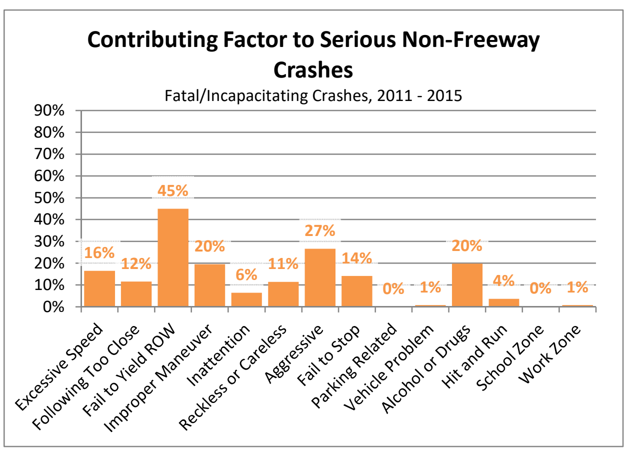
The most common Serious crash types were Turning and Rear End.

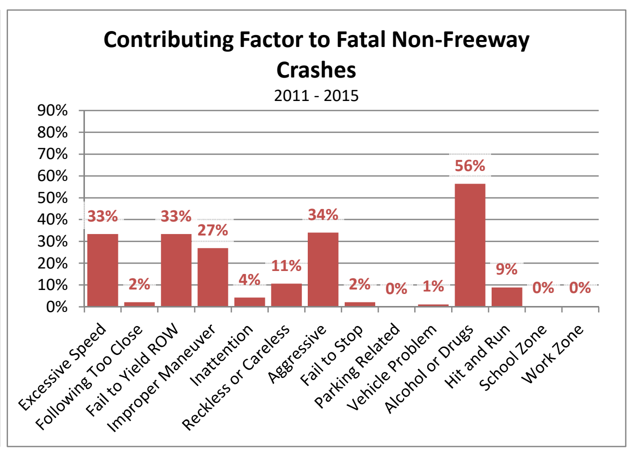
The most common Fatal crash types were Pedestrian and Fixed Object.

By Contributing Factor

Collision Type	2011-2015 Annual Crashes (Non-Freeway)						
	All	**Fatal**	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Excessive Speed	1,982	18.8	53	276	644	991	71
Following Too Close	5,815	1.2	49	338	2,771	3,159	50
Fail to Yield ROW	7,000	18.8	176	1,219	2,344	3,758	195
Improper Maneuver	3,902	15.2	69	341	937	1,363	85
Inattention	1,071	2.4	25	144	445	617	28
Reckless or Careless	922	6.0	43	204	305	559	49
Aggressive	7,208	19.2	96	566	3,141	3,823	115
Fail to Stop	7,046	1.2	60	384	3,354	3,799	61
Parking Related	133	0.0	0	4	17	22	0
Vehicle Problem	90	0.6	3	15	28	46	3
Alcohol or Drugs	958	31.8	54	195	235	516	86
Hit and Run	1,161	5.0	11	92	374	482	16
School Zone	66	0.2	1	13	25	39	1
Work Zone	129	0.2	3	17	50	70	3
METRO	**19,591**	**56.4**	**377**	**2,247**	**7,090**	**9,771**	**434**

Figures 3-11 and 3-12





Figures 3-11 and 3-12 present the proportion of non-freeway crashes by contributing factor for Serious and Fatal crashes, respectively. Alcohol or Drugs, Fail to Yield ROW, Aggressive Driving, and Excessive Speed are the most common factors.

The determination of contributing factors is described in more detail in Section 7.

By Volume-to-Capacity Ratio

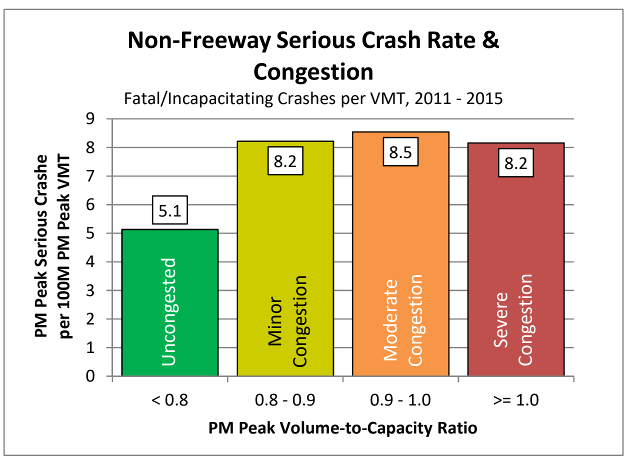
The combination of traffic data available from the region's travel demand model and crash data allowed for a comparison of traffic congestion with safety.

An analysis of Serious crash rates compared to congestion levels for non-freeway roadways was performed. The analysis included all roadways in the regional travel demand model, including all arterials and collectors, as well as certain local streets serving a collector function. The intent was to establish the relationship between congestion and safety.

PM peak 3-hour Volume-to-Capacity ratios as determined by the travel demand model were compared to the same 3-hours of weekday crash data. The results are shown in the table and Figures 3-13. Figure 3-14 presents the Volume-to-Capacity ratios for the region's non-freeway roadways.

PM Peak V/C Range	Total Road-Miles	Annual PM Peak VMT (2015)	2011-2015 Annual PM Peak Crashes (Non-Freeway)					
			Number of Crashes		Per Road-Mile		Per 100M VMT	
			All Injury	Serious	All Injury	Serious	All Injury	Serious
< 0.80	1,496	1,057,000,000	1,720	54	1.1	0.04	163	5.1
0.80 - 0.89	84	110,00,000	278	9	3.3	0.11	254	8.2
0.90 – 0.99	30	40,000,000	124	3	4.1	0.11	311	8.5
≥ 1.00	25	29,000,000	99	2	3.9	0.09	336	8.2

Figures 3-13 and 3-14



Map of V/C Ratios for Non-Freeway Roadways

The Serious crash rate per vehicle-mile travelled on arterials and collectors was highest with congestion.

The relationship is quite different from the analysis of 2007 – 2009 data, perhaps because of differences in travel demand model assignment procedures used and resulting Volume-to-Capacity ratio estimates. In order to provide a more conclusive analysis of this relationship, use of a more accurate tool for measuring real-world congestion, such as probe data, would be recommended.

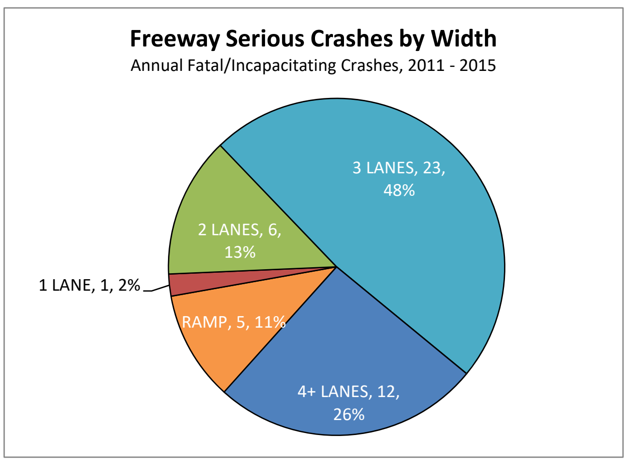
Section 4 – Roadway Characteristics of Freeway Crashes

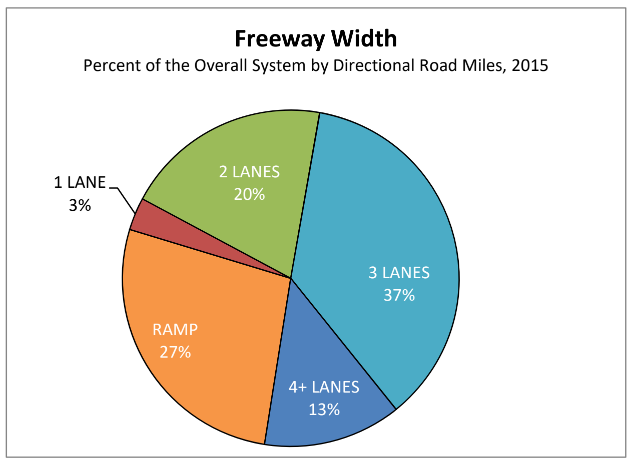
By Number of Lanes

Number of Freeway lanes (in one direction)	Total Road-Miles	Annual VMT (2015)	2011-2015 Annual Crashes		
			All	All Injury	Serious
Freeway ramp	83	275,000,000	300	151	5
1 Lanes	10	48,000,000	68	33	1
2 Lanes	61	758,000,000	493	234	6
3 Lanes	111	2,386,000,000	1,906	923	23
4+ Lanes	40	979,000,000	909	456	12
ALL FREEWAYS	**304**	**4,455,000,000**	**3,688**	**1,802**	**47**

Figures 4-1 and 4-2 present the distribution of freeway crashes by number of lanes. They also present the proportion of freeway crashes that occur on ramps.

Figure 4-1 and 4-2





Number of Freeway lanes (in one direction)	% crashes resulting in		Per Road-Mile		Per 100M VMT	
	All Injury	Serious	All Injury	Serious	All Injury	Serious
Freeway ramp	50%	1.7%	1.8	0.06	55	1.8
1 Lanes	49%	1.5%	3.5	0.10	70	2.1
2 Lanes	48%	1.3%	3.9	0.11	31	0.8
3 Lanes	48%	1.2%	8.3	0.21	39	1.0
4+ Lanes	50%	1.3%	11.3	0.30	47	1.2
ALL FREEWAYS	**49%**	**1.3%**	**5.9**	**0.16**	**41**	**1.1**

The influence of freeway width is not as pronounced as for non-freeway roadways. Freeways with two directional lanes (including auxiliary lanes) exhibit the lowest crash rates, while the rate increases for freeways with more or fewer lanes (Figure 4-3). Figure 4-4 presents the number of lanes for the region's freeways. Ramps (off-ramps and on-ramps) exhibit a higher Serious crash rate per mile travelled, while still representing a relatively small proportion (11%) of all Serious freeway crashes (Figure 4-1). Single-lane segments are uninterrupted ramps connecting freeways.

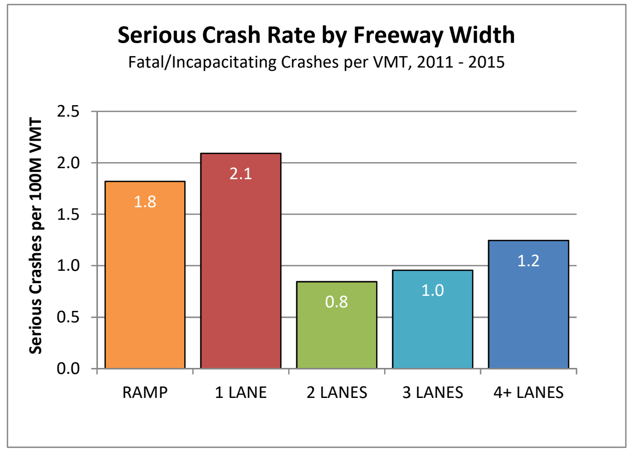
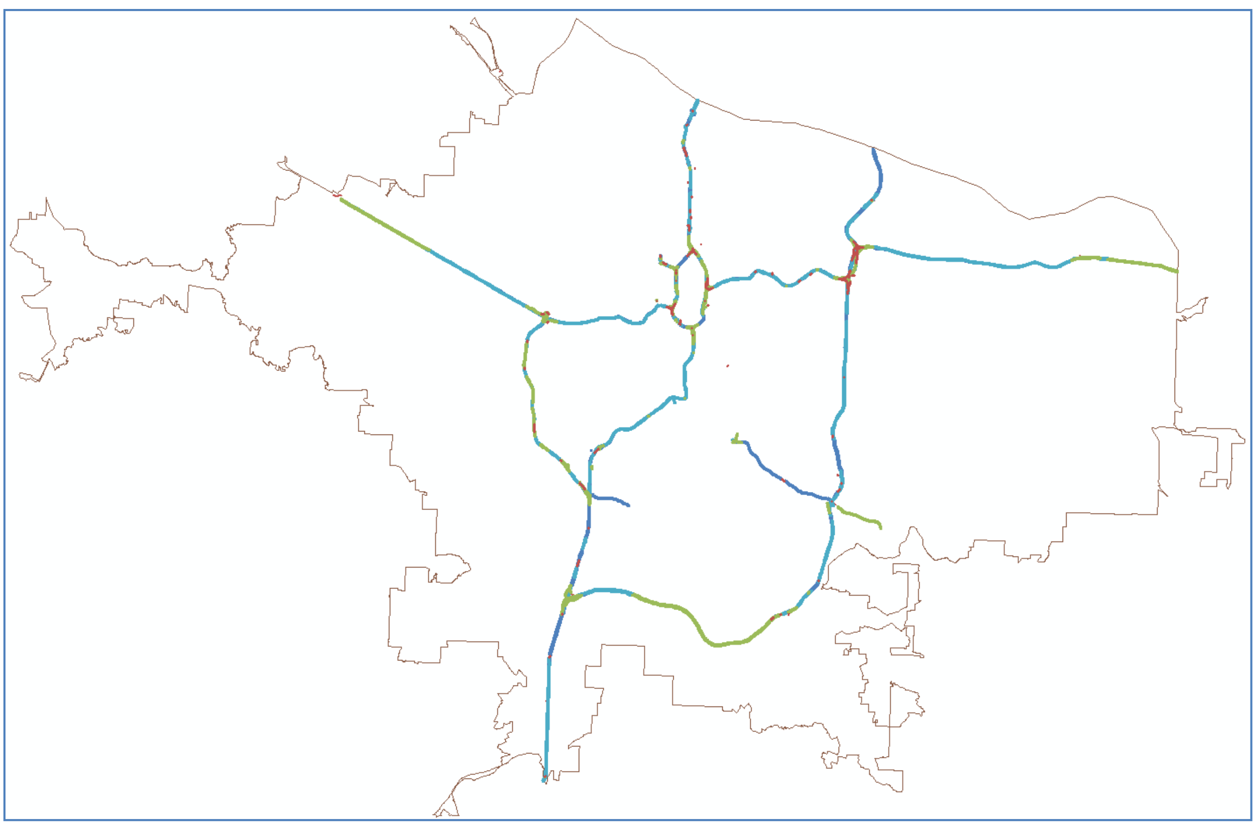


Figure 4-3

Figure 4-4

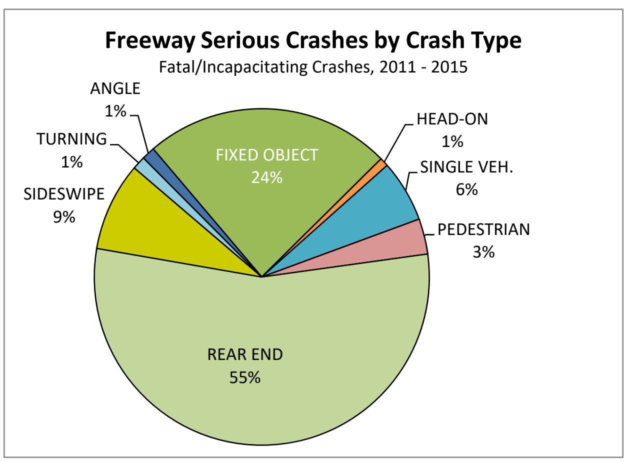


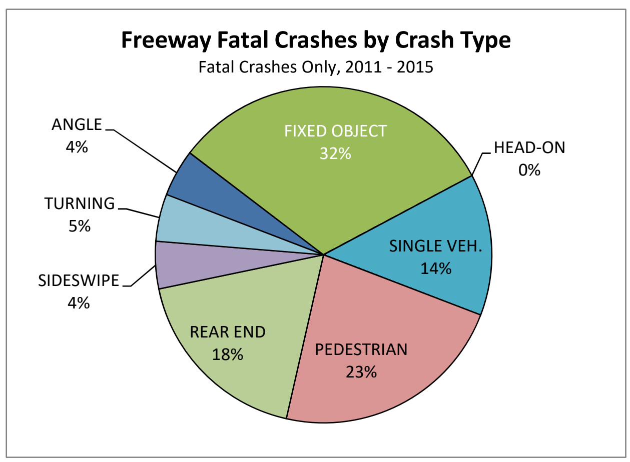
Map of Freeways by Number of Lanes

By Crash Type

Collision Type	2011-2015 Annual Crashes						
	All	**Fatal**	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Angle	8	0.2	0	2	3	6	1
Backing	7	0.0	0	0	1	1	0
Fixed Object	318	1.4	10	48	77	136	11
Head-on	6	0.0	0	1	3	4	0
Single Vehicle	21	0.6	2	8	4	15	3
Parking	1	0.0	0	0	0	0	0
Pedestrian	4	1.0	1	2	0	4	2
Rear End	2,661	0.8	25	195	1,195	1,416	26
Sideswipe	589	0.2	4	36	152	192	4
Turning	46	0.2	0	5	15	21	1
Other	27	0	0	3	3	7	0
METRO	**3,688**	**4.4**	**43**	**301**	**1,454**	**1,802**	**47**
Total – Fwy Mainline	**3,117**	**3.8**	**37**	**252**	**1,230**	**1,522**	**41**
Total – Fwy Ramps	**572**	**0.6**	**6**	**48**	**225**	**280**	**7**

Figure 4-5 and 4-6





Figures 4-5 and 4-6 present freeway Serious crash types and freeway Fatal crash types. Fatal crashes are specifically broken out here because the distribution is substantially different.

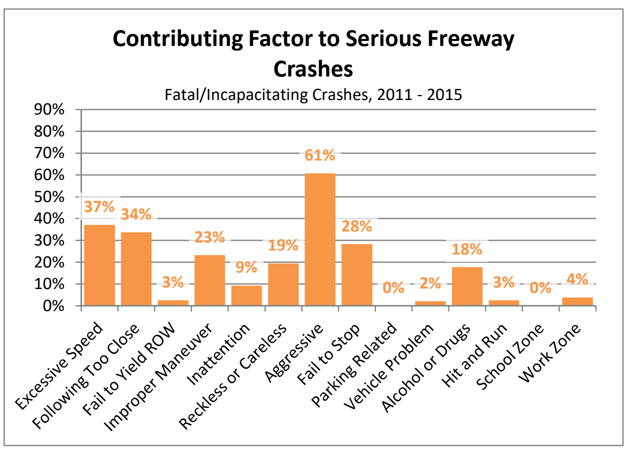
The most common Serious crash type was Rear End crashes.

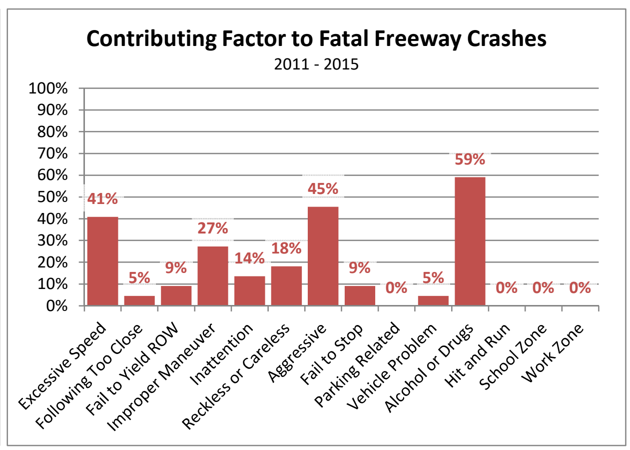
The most common Fatal crash type was Fixed Object crashes.

By Contributing Factor

Collision Type	2011-2015 Annual Crashes (Freeway)						
	All	Fatal	Injury A	Injury B	Injury C	All Injury	Serious
Excessive Speed	915	1.8	16	96	375	488	18
Following Too Close	1,991	0.2	16	148	889	1,053	16
Fail to Yield ROW	81	0.4	1	9	25	35	1
Improper Maneuver	734	1.2	10	58	200	269	11
Inattention	208	0.6	4	21	88	114	4
Reckless or Careless	164	0.8	8	30	70	109	9
Aggressive	2,456	2.0	27	205	1,057	1,291	29
Fail to Stop	1,932	0.4	13	131	874	1,018	13
Parking Related	2	0.0	0	0	0	1	0
Vehicle Problem	34	0.2	1	3	7	11	1
Alcohol or Drugs	98	2.6	6	20	31	59	8
Hit and Run	221	0.0	1	12	78	91	1
School Zone	0	0.0	0	0	0	0	0
Work Zone	48	0	2	8	19	29	2
METRO	**3,688**	**4.4**	**43**	**301**	**1,454**	**1,802**	**47**

Figures 4-7 and 4-8





Figures 4-7 and 4-8 present the proportion of freeway crashes by contributing factor for Serious and Fatal crashes, respectively. Alcohol and Drugs, Aggressive Driving and Excessive Speed are the most common factors.

The determination of contributing factors is described in more detail in Section 7.

By Volume-to-Capacity Ratio

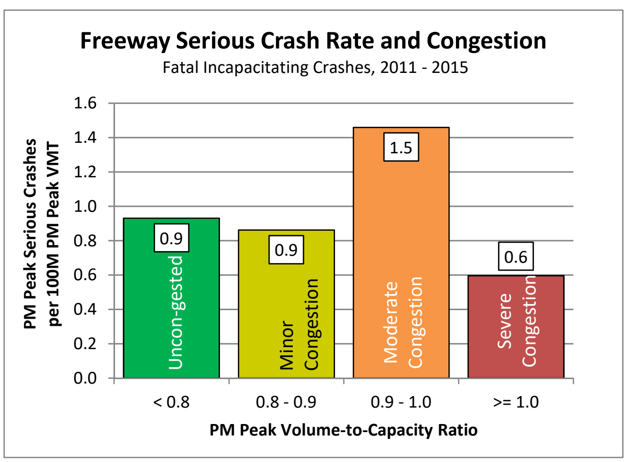
The combination of traffic data available from the region's travel demand model and crash data allowed for a comparison of traffic congestion with safety.

An analysis of Serious crash rates compared to congestion levels for freeways was performed. The intent was to establish the relationship between congestion and safety.

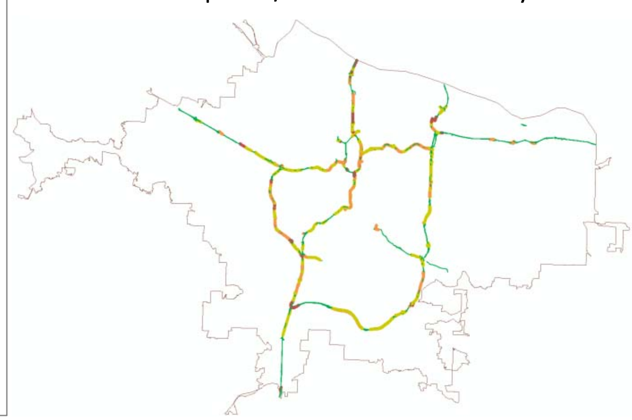
PM peak 3-hour Volume-to-Capacity ratios as determined by the travel demand model were compared to the same 3-hours of weekday crash data. The results are shown in the table and Figures 4-9. Figure 4-10 presents the Volume-to-Capacity ratios for the region's freeways, including ramps.

PM Peak V/C Range	Total Road-Miles	Annual PM Peak VMT (2015)	2011-2015 Annual PM Peak Crashes (Freeway)					
			Number of Crashes		Per Road-Mile		Per 100M VMT	
			All Injury	Serious	All Injury	Serious	All Injury	Serious
< 0.80	212	537,000,000	198	5.0	0.9	0.02	37	0.9
0.80 - 0.89	53	232,000,000	134	2.0	2.5	0.04	58	0.9
0.90 – 0.99	28	110,000,000	90	1.6	3.2	0.06	82	1.5
≥ 1.00	10	36,000,000	26	0.2	2.7	0.02	79	0.6

Figures 4-9 and 4-10



Map of V/C Ratios for Freeways



The Serious crash rate per vehicle-mile travelled on freeways increased with moderate congestion, but dropped and was lowest with severe congestion.

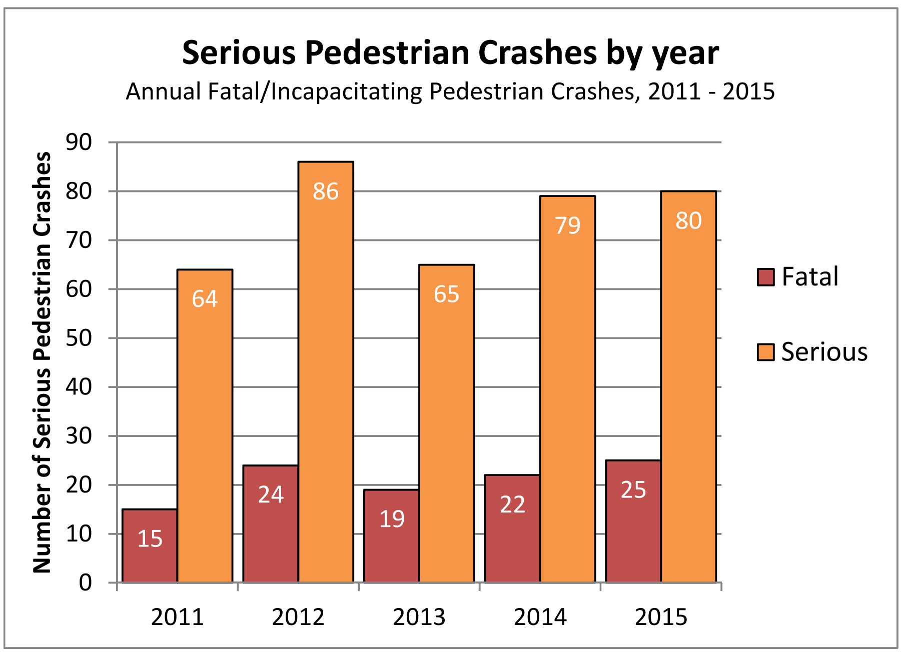
The relationship is consistent with the analysis of 2007 – 2009 data, and may result from traffic at free-flow speed encountering traffic stopped or slowed for congestion. In order to provide a more conclusive analysis of this relationship, use of a more accurate tool for measuring real-world congestion, such as probe data, would be recommended.

Section 5 – Pedestrians (Non-Freeway Crashes)

By Year

Year	Fatal Crashes (Fatalities)	Injury A Crashes	Injury B Crashes	Injury C Crashes	All Injury Crashes	Serious
2011	15 (15)	49	191	161	416	64
2012	24 (24)	62	238	184	508	86
2013	19 (20)	46	227	132	424	65
2014	22 (22)	57	238	154	471	79
2015	25 (25)	55	196	190	466	80
METRO	**105 (106)**	**269**	**1,090**	**821**	**2,285**	**374**

Figure 5-1



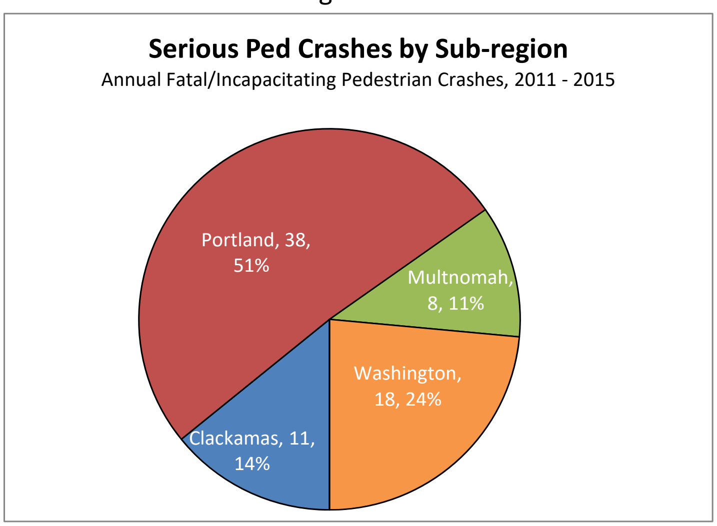
As presented in Figure 5-1, Serious and Fatal Pedestrian crashes increased somewhat over the 5-year period. Pedestrian fatalities have steadily increased to 2015.

By Sub-Region

Sub-Region	2011-2015 Annual Pedestrian Crashes					
	Fatal	Injury A	Injury B	Injury C	All Injury	Serious
Clackamas	3.0	8	25	19	54	11
Portland	10.4	28	119	86	243	38
Multnomah (excl. Portland)	1.8	7	27	18	54	8
Washington	5.8	12	47	42	106	18
METRO	**21.0**	**54**	**218**	**164**	**457**	**75**

Sub-Region	Population (2015)	Annual VMT (2015)	Annual Pedestrian Injury Crashes		Annual Serious Pedestrian Crashes	
			per 1M residents	per 100M VMT	per 1M residents	per 100M VMT
Clackamas	290,630	1,048,000,000	186	5.2	36	1.0
Portland	620,540	2,096,000,000	391	11.6	62	1.8
Multnomah (excl. Portland)	152,611	548,000,000	351	9.8	55	1.5
Washington	539,448	2,031,000,000	197	5.2	33	0.9
METRO	**1,603,229**	**5,723,000,000**	**285**	**8.0**	**47**	**1.3**

Figure 5-2



With the highest population, transit usage, VMT, and likely the largest number of pedestrians, Portland has 51% of the region's Serious Pedestrian crashes (Figure 5-2). Portland also has the highest rate of Serious Pedestrian crashes per capita and per VMT. Multnomah (excludes Portland) also has high rates of Serious Pedestrian crashes per capita and per VMT. Clackamas County and Washington County have relatively low rates of Serious Pedestrian crashes, which is likely largely due to fewer people walking.

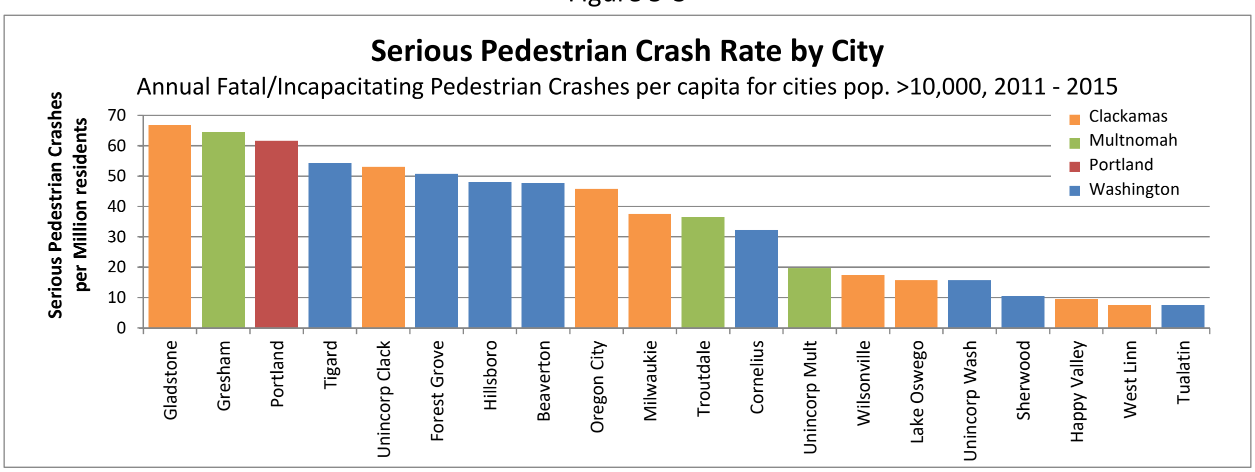
By City

City	2011-2015 Annual Pedestrian Crashes					
	Fatal	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Beaverton	1.0	3.6	9.2	7.4	21.2	4.6
Cornelius	0.0	0.4	0.6	0.8	1.8	0.4
Durham	0.0	0.0	0.0	0.0	0.0	0.0
Fairview	0.0	0.0	1.4	0.4	1.8	0.0
Forest Grove	0.6	0.6	2.0	1.4	4.6	1.2
Gladstone	0.2	0.6	1.0	0.0	1.8	0.8
Gresham	1.6	5.6	22.6	14.4	44.2	7.2
Happy Valley	0.0	0.2	1.0	1.0	2.2	0.2
Hillsboro	2.0	2.8	13.0	13.0	30.8	4.8
Johnson City	0.0	0.0	0.0	0.0	0.0	0.0
King City	0.0	0.2	0.4	0.0	0.6	0.2
Lake Oswego	0.0	0.6	2.4	1.6	4.6	0.6
Maywood Park	0.0	0.2	0.0	0.0	0.2	0.2
Milwaukie	0.0	0.8	3.0	1.8	5.6	0.8
Oregon City	0.8	0.8	3.8	4.2	9.6	1.6
Portland	10.4	27.8	119.0	85.6	242.8	38.2
Rivergrove	0.0	0.0	0.0	0.0	0.0	0.0
Sherwood	0.2	0.0	2.0	0.8	3.0	0.2
Tigard	0.8	2.0	4.6	4.6	12.0	2.8
Troutdale	0.0	0.6	2.4	1.8	4.8	0.6
Tualatin	0.0	0.2	3.6	5.2	9.0	0.2
West Linn	0.0	0.2	1.4	0.4	2.0	0.2
Wilsonville	0.0	0.4	1.4	1.6	3.4	0.4
Wood Village	0.2	0.0	0.6	1.0	1.8	0.2
Uninc. Clackamas	2.0	4.0	11.0	8.2	25.2	6.0
Uninc. Multnomah	0.0	0.2	0.2	0.0	0.4	0.2
Uninc. Washington	1.2	2.0	11.4	9.0	23.6	3.2
METRO	**21.0**	**53.8**	**218.0**	**164.2**	**457.0**	**74.8**

While Portland has the largest number and rate of Serious Pedestrian crashes, it is apparent from Figure 5-3 that there are a number of other cities and areas with a high rate of Serious Pedestrian crashes per capita. Gladstone, Gresham, Tigard, unincorporated Clackamas County, Forest Grove, Hillsboro, Beaverton, and Oregon City all experience relatively high rates of Serious Pedestrian crashes.

City	Population (2015)	2011-2015 Annual Pedestrian Crashes All Injury Per 1M residents	2011-2015 Annual Pedestrian Crashes Serious per 1M residents
Beaverton	96,704	219	47.6
Cornelius	12,389	145	32.3
Durham	1,430	0	0.0
Fairview	9,357	192	0.0
Forest Grove	23,630	195	50.8
Gladstone	11,990	150	66.7
Gresham	111,716	396	64.4
Happy Valley	20,835	106	9.6
Hillsboro	100,109	308	47.9
Johnson City	588	0	0.0
King City	3,817	157	52.4
Lake Oswego	38,156	121	15.7
Maywood Park	809	247	247.2
Milwaukie	21,365	262	37.4
Oregon City	35,004	274	45.7
Portland	620,540	391	61.6
Rivergrove	321	0	0.0
Sherwood	19,012	158	10.5
Tigard	51,642	232	54.2
Troutdale	16,486	291	36.4
Tualatin	26,617	338	7.5
West Linn	26,267	76	7.6
Wilsonville	22,932	148	17.4
Wood Village	4,056	444	49.3
Uninc. Clackamas	113,172	223	53.0
Uninc. Multnomah	10,187	39	19.6
Uninc. Washington	204,098	116	15.7
METRO	**1,603,229**	**285**	**46.7**

Figure 5-3



By Month

Month	2011-2015 Annual Pedestrian Crashes	
	All Injury	**Serious**
January	53	11.0
February	41	7.2
March	35	5.4
April	29	4.2
May	30	4.0
June	27	4.6
July	30	3.8
August	30	6.0
September	33	5.8
October	46	6.6
November	50	8.0
December	53	8.2
12 MONTHS	**457**	**74.8**

Figure 5-4

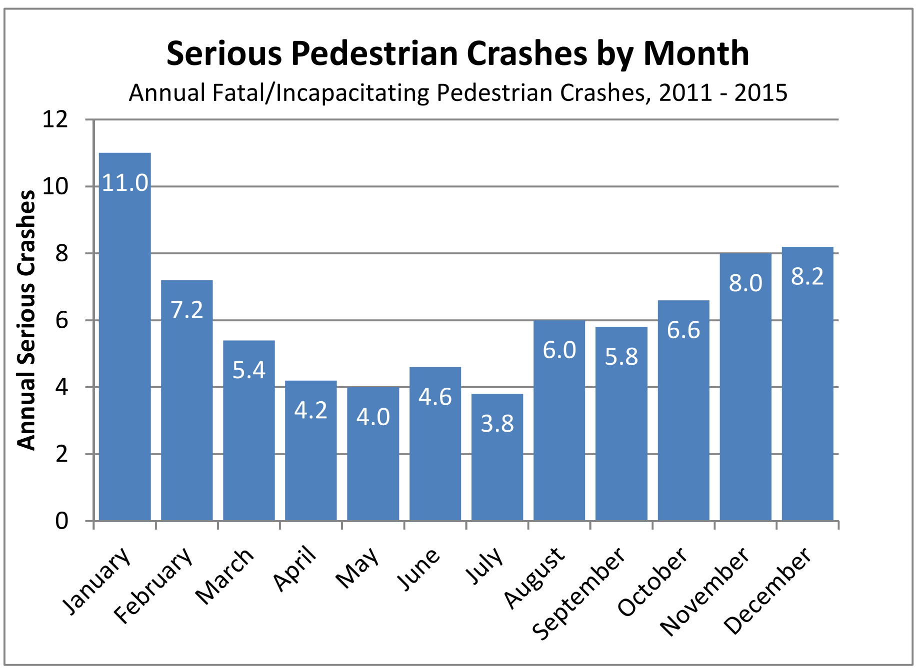


Figure 5-4 presents the annual average number of Serious crashes by month. Fall and winter months generally have more Serious Pedestrian crashes, coinciding with the darkest months.

By Time of Day

Figure 5-5

Serious Crashes by Day of Week and Hour

Annual Fatal/Incapacitating Pedestrian Crashes, 2011 - 2015

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat
12 AM	0.2	0.0	0.0	0.0	0.2	0.4	0.8
1 AM	0.6	0.0	0.2	0.0	0.0	0.0	0.0
2 AM	1.0	0.0	0.0	0.2	0.2	0.4	0.4
3 AM	0.2	0.2	0.2	0.0	0.0	0.2	0.2
4 AM	0.2	0.0	0.0	0.0	0.0	0.0	0.0
5 AM	0.0	0.4	0.0	0.6	0.4	0.0	0.2
6 AM	0.0	0.2	0.8	0.6	0.2	0.6	0.2
7 AM	0.2	0.0	0.2	0.4	0.2	0.2	0.0
8 AM	0.0	1.0	0.2	0.2	0.0	0.8	0.0
9 AM	0.6	0.0	0.2	0.2	0.4	0.2	0.2
10 AM	0.0	0.0	0.0	0.2	0.0	0.0	0.4
11 AM	0.2	0.4	0.2	0.4	0.6	0.8	0.4
12 PM	0.0	0.4	0.0	0.2	0.2	0.0	0.2
1 PM	0.0	0.2	0.4	0.4	0.2	0.4	0.4
2 PM	0.4	0.8	0.4	0.2	0.8	0.4	0.4
3 PM	0.4	1.2	1.2	0.6	1.2	1.2	0.8
4 PM	0.2	0.6	0.6	1.2	0.6	0.8	0.6
5 PM	0.6	1.0	1.6	1.0	1.0	0.6	0.0
6 PM	0.6	0.8	1.2	1.2	1.4	1.8	1.6
7 PM	0.8	0.2	0.8	0.8	1.8	1.2	2.2
8 PM	0.8	0.2	1.4	0.4	0.6	0.6	0.8
9 PM	0.8	1.0	0.4	0.4	0.8	0.6	0.6
10 PM	0.6	0.6	0.2	0.2	1.0	0.8	0.6
11 PM	0.2	0.0	0.4	0.2	0.6	0.6	0.4

Hour	Average Wkday	Average Wkend
12 AM	0.1	0.5
1 AM	0.0	0.3
2 AM	0.2	0.7
3 AM	0.1	0.2
4 AM	0.0	0.1
5 AM	0.3	0.1
6 AM	0.5	0.1
7 AM	0.2	0.1
8 AM	0.4	0.0
9 AM	0.2	0.4
10 AM	0.0	0.2
11 AM	0.5	0.3
12 PM	0.2	0.1
1 PM	0.3	0.2
2 PM	0.5	0.4
3 PM	1.1	0.6
4 PM	0.8	0.4
5 PM	1.0	0.3
6 PM	1.3	1.1
7 PM	1.0	1.5
8 PM	0.6	0.8
9 PM	0.6	0.7
10 PM	0.6	0.6
11 PM	0.4	0.3

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
All Day	8.6	9.2	10.6	9.6	12.4	12.6	11.4

	Average Wkday	Average Wkend
All Day	10.9	10.0

Figure 5-5 presents the rate of Serious Pedestrian crashes by day of the week and hour of the day using a "heat map" format. Dark cells indicate the highest relative crash time periods; light cells indicate the lowest relative crash time periods. The average weekday and weekend day are summarized on the right side of the figure, while each day is summarized and compared at the bottom of the figure.

The weekday late afternoon and evening peak hours produce the highest number of Serious Pedestrian crashes. A larger proportion of evening crashes are evident as compared to all crashes. Late Friday night/early Saturday morning and late Saturday night show somewhat high rates of Serious Pedestrian crashes. Thursday, Friday, and Saturday have the highest rates of Serious Pedestrian crashes, predominantly evening crashes.

By Weather

2011-2015 Annual Pedestrian Crashes	
Weather	**Serious Crashes**
Cloudy/Clear	53.6
Rain/Fog	19.6
Sleet/Snow	0.2
Unknown	1.4
METRO	**74.8**

The majority (72%) of Serious Pedestrian crashes occurred in clear or cloudy conditions (Figure 5-6), as compared to 80% for all crashes (Figure 2-16).

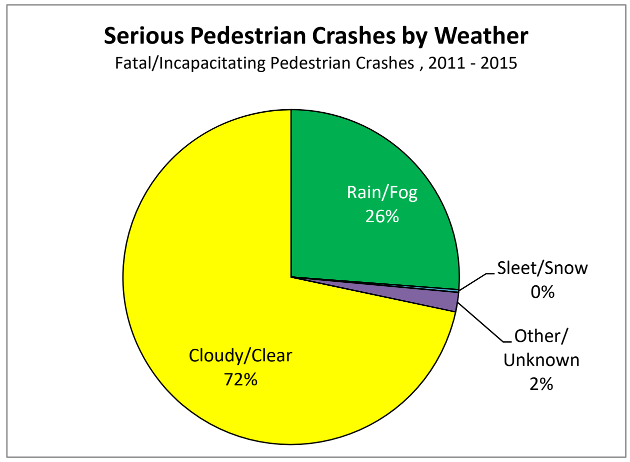


Figure 5-6

By Road Surface Condition

2011-2015 Annual Pedestrian Crashes	
Road Condition	**Serious Crashes**
Dry	48.4
Ice/Snow	0.4
Wet	25.0
Unknown	1.0
METRO	**74.8**

The majority (65%) of Serious Pedestrian crashes occurred in dry conditions (Figure 5-7), as compared to 73% for all crashes (Figure 2-17).

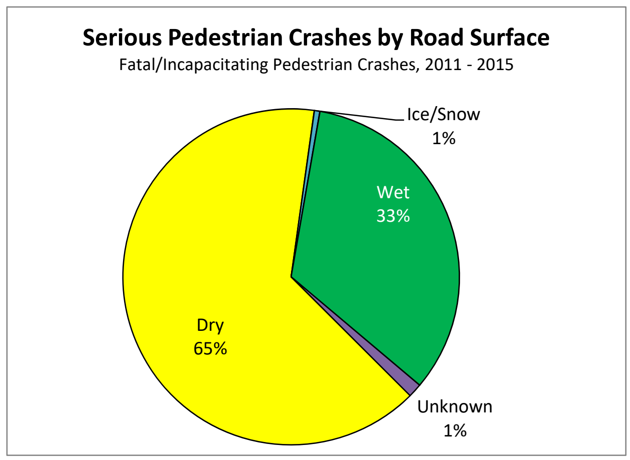


Figure 5-7

By Lighting

2011-2015 Annual Pedestrian Crashes	
Lighting	**Serious Crashes**
Daylight	27.2
Dawn/Dusk	8.4
Night - Dark	9.6
Night - Lit	29.6
Unknown	0.0
METRO	**74.8**

Only 36% of Serious Pedestrian crashes occurred in daylight (Figure 5-8), as compared to 59% for all crashes (Figure 2-18). **Serious Pedestrian crashes are significantly more likely after dark as compared to other modes.**

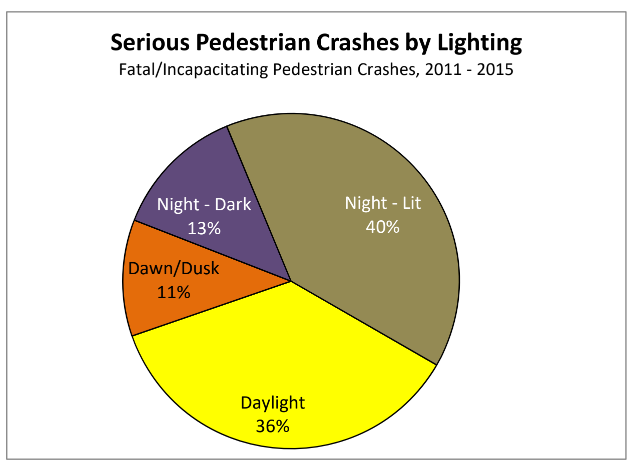


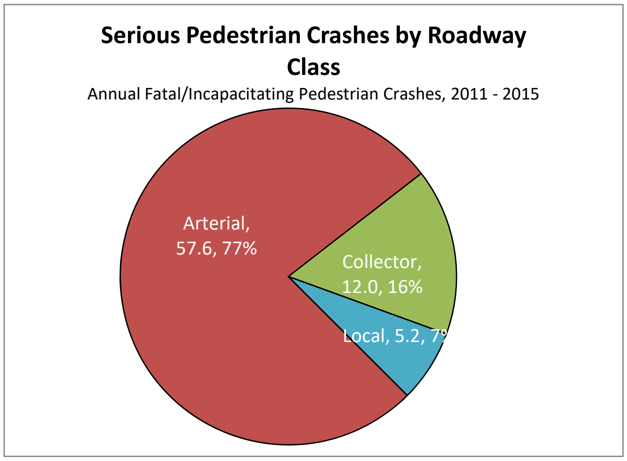
Figure 5-8

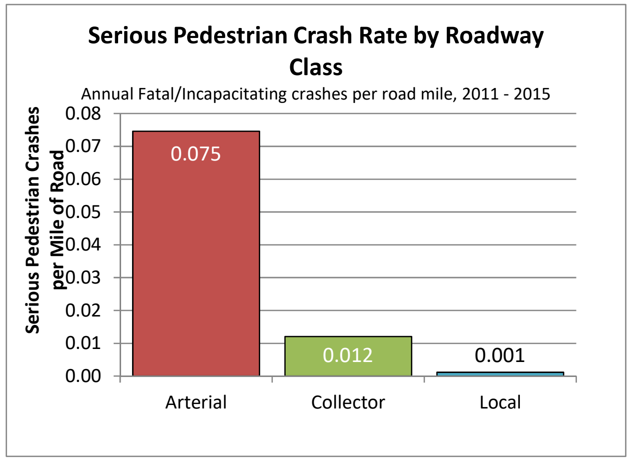
By Roadway Classification

Roadway Classification	Total Road-Miles	Annual VMT (2015)	2011-2015 Annual Pedestrian Crashes		
			Serious	Serious per Road-Mile	Serious per 100M VMT
Arterial	772	4,281,000,000	57.6	0.075	1.35
Collector	994	1,081,000,000	12.0	0.012	1.11
Local	4,565	620,000,000*	5.2	0.001	0.84
METRO	**6,331**	**5,982,000,000**	**74.8**	**0.012**	**--**

* VMT for local streets is a low-confidence estimate

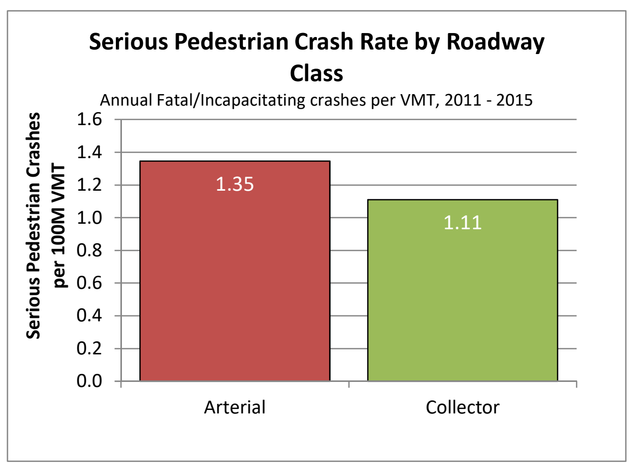
Figures 5-9 and 5-10





As with overall crashes, the region's Serious Pedestrian crashes occur primarily on the arterials, accounting for 77% of these crashes. Figure 5-9 presents the distribution of Serious Pedestrian crashes by roadway classification. As can be seen in Figure 5-10, which presents the rate of Serious Pedestrian crashes per mile of roadway, arterial roadways are about 6 times as likely as collectors per mile to be the location of a Serious Pedestrian crash, and more than 65 times as likely as local streets per mile to be the location of a Serious Pedestrian crash.

Figure 5-11



As can be seen in Figure 5-11, when normalized by motor vehicle traffic volume, the Serious Pedestrian crash rate on arterials is still higher than on collectors. A reliable estimate of vehicle miles travelled was not available for local streets.

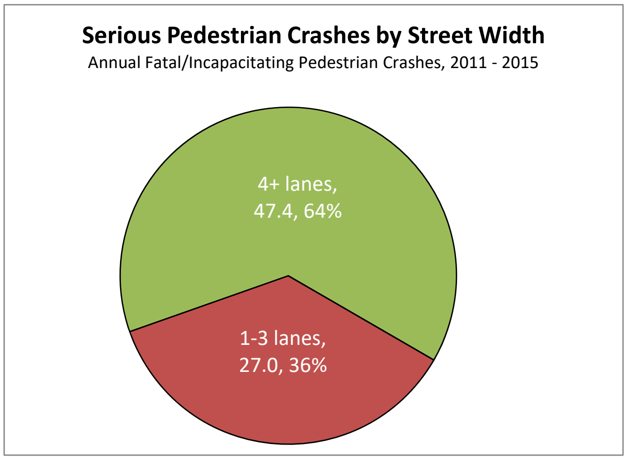
Many transit routes follow arterial roadways, increasing the need for people to cross these roadways safely.

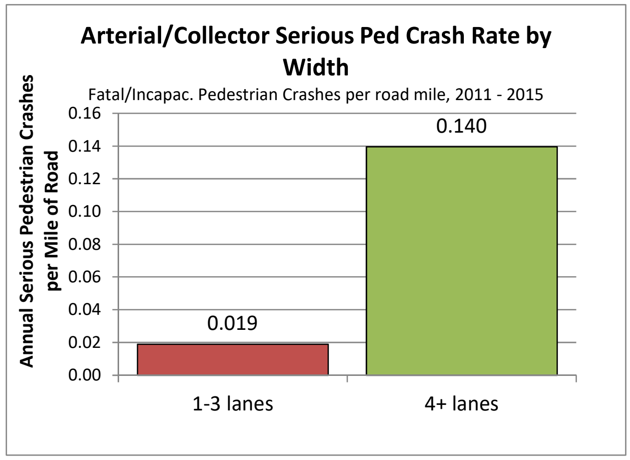
By Number of Lanes

Number of Lanes*	Total Road-Miles	2011-2015 Annual Pedestrian Crashes		
		Serious	Serious per Road-Mile	Serious per 100M VMT
1 – 3 Lanes	1,427	27.0	0.019	0.91
4+ Lanes	340	47.4	0.140	1.73
METRO	**1,766**	**74.4**	**0.042**	**1.31**

* Arterial and Collector roadways only

Figures 5-12 and 5-13



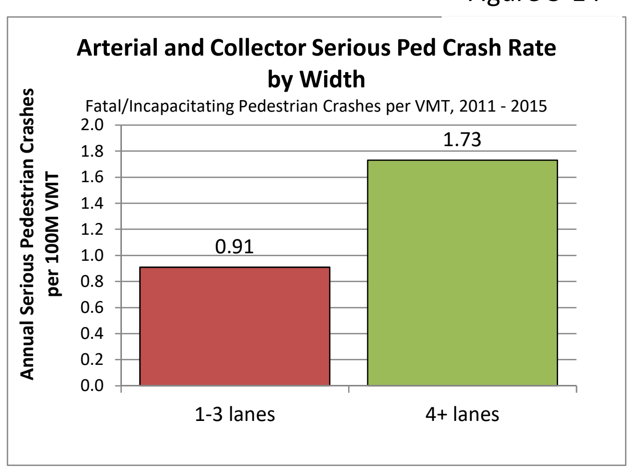


The influence of street width is consistent with the influence of roadway classification (Figure 5-12). Wider roadways are the location of a disproportionate number of Serious Pedestrian crashes in relation to both their share of the overall system (Figure 5-13) and the vehicle-miles travelled they serve (Figure 5-14). The Serious Pedestrian crash rate increases dramatically for roadways with 4 or more lanes. This effect is in spite of the fact that such arterials often discourage pedestrian travel in the first place, thereby reducing potential pedestrian exposure.

As can be seen in Figure 5-14, even when normalized by motor vehicle traffic volume, the Serious Pedestrian crash rate on wider roadways is still substantially higher than on narrower roads. Wider roadways are particularly hazardous to pedestrians.

Many transit routes follow wider roadways, increasing the need for people to cross these roadways safely.

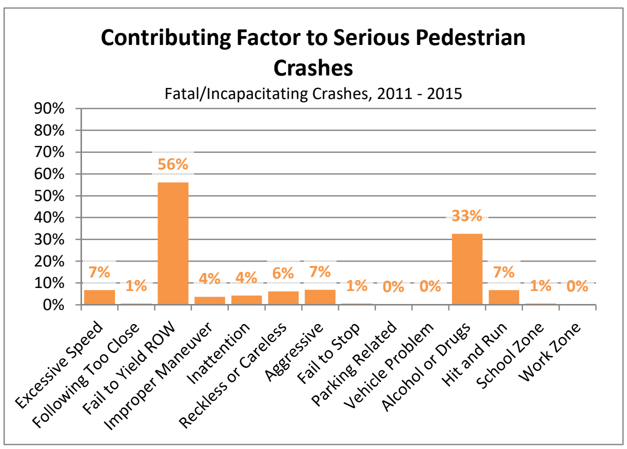
Figure 5-14

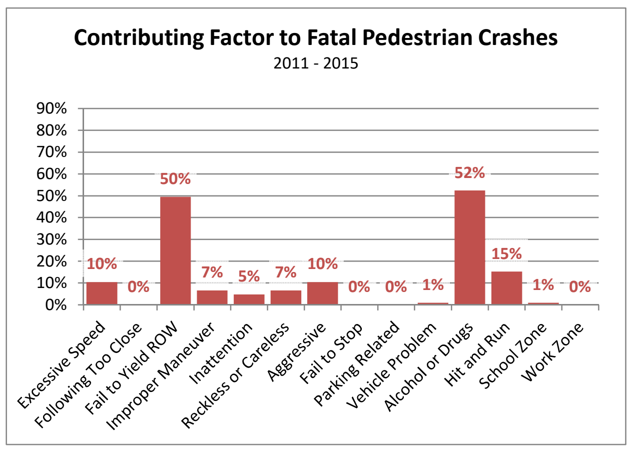


By Contributing Factor

Factor	2011-2015 Annual Crashes (Pedestrian)						
	All	Fatal	Injury A	Injury B	Injury C	All Injury	Serious
Excessive Speed	10	2.2	3	3	2	10	5
Following Too Close	1	0.0	0	1	0	1	0
Fail to Yield ROW	334	10.4	32	162	127	331	42
Improper Maneuver	18	1.4	1	8	6	17	3
Inattention	16	1.0	2	7	5	16	3
Reckless or Careless	16	1.4	3	8	3	16	5
Aggressive	11	2.2	3	4	2	11	5
Fail to Stop	3	0.0	0	1	2	3	0
Parking Related	1	0.0	0	0	1	1	0
Vehicle Problem	1	0.2	0	0	1	1	0
Alcohol or Drugs	53	11.0	13	20	9	53	24
Hit and Run	18	3.2	2	6	6	17	5
School Zone	6	0.2	0	3	3	6	0
Work Zone	4	0	0	2	2	4	0
METRO	**461**	**21.0**	**54**	**218**	**164**	**457**	**75**

Figures 5-15 and 5-16





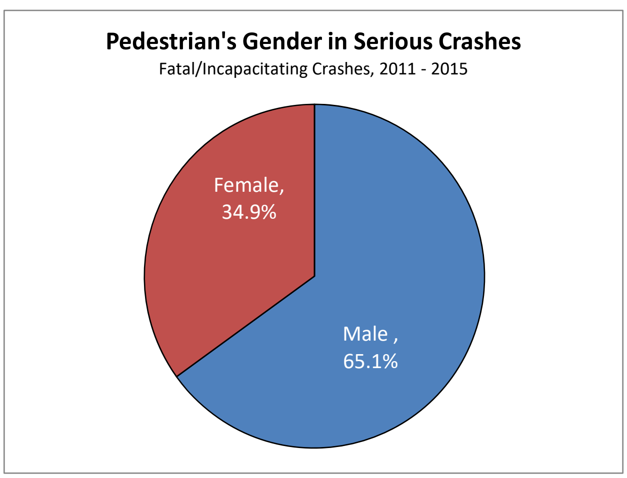
Figures 5-15 and 5-16 present the proportion of Pedestrian crashes by contributing factor for Serious and Fatal crashes, respectively. Alcohol or Drugs and Fail to Yield ROW are the most common factors. The determination of contributing factors is described in more detail in Section 7.

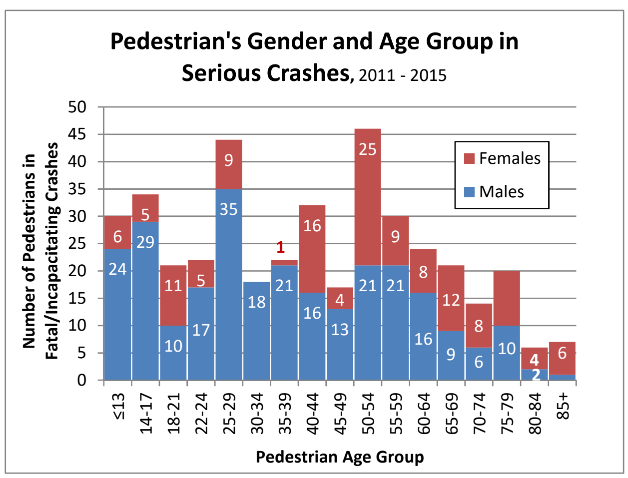
These data do not specify whether the driver, the pedestrian, or both were at fault, but fault in Pedestrian crashes is explored in more detail in Section 7.

By Pedestrian's Age and Gender

The age and gender of pedestrians involved in crashes are presented in the following table and Figures 5-17 and 5-18.

	Total Male Pedestrians (2011 – 2015)			Total Female Pedestrians (2011 – 2015)		
Age	All	Serious	Percent Serious	All	Serious	Percent Serious
≤13	117	24	20.5%	70	6	8.6%
14-17	126	29	23.0%	90	5	5.6%
18-21	113	10	8.8%	96	11	11.5%
22-24	101	17	16.8%	103	5	4.9%
25-29	154	35	22.7%	112	9	8.0%
30-34	105	18	17.1%	65	0	0.0%
35-39	59	21	35.6%	71	1	1.4%
40-44	97	16	16.5%	98	16	16.3%
45-49	110	13	11.8%	55	4	7.3%
50-54	113	21	18.6%	127	25	19.7%
55-59	73	21	28.8%	61	9	14.8%
60-64	61	16	26.2%	62	8	12.9%
65-69	33	9	27.3%	43	12	27.9%
70-74	26	6	23.1%	32	8	25.0%
75-79	23	10	43.5%	15	10	66.7%
80-84	11	2	18.2%	18	4	22.2%
85+	10	1	10.0%	22	6	27.3%
Unknown	66	1	1.5%	61	6	9.8%
METRO	**1,398**	**270**	**19.3%**	**1,201**	**145**	**12.1%**





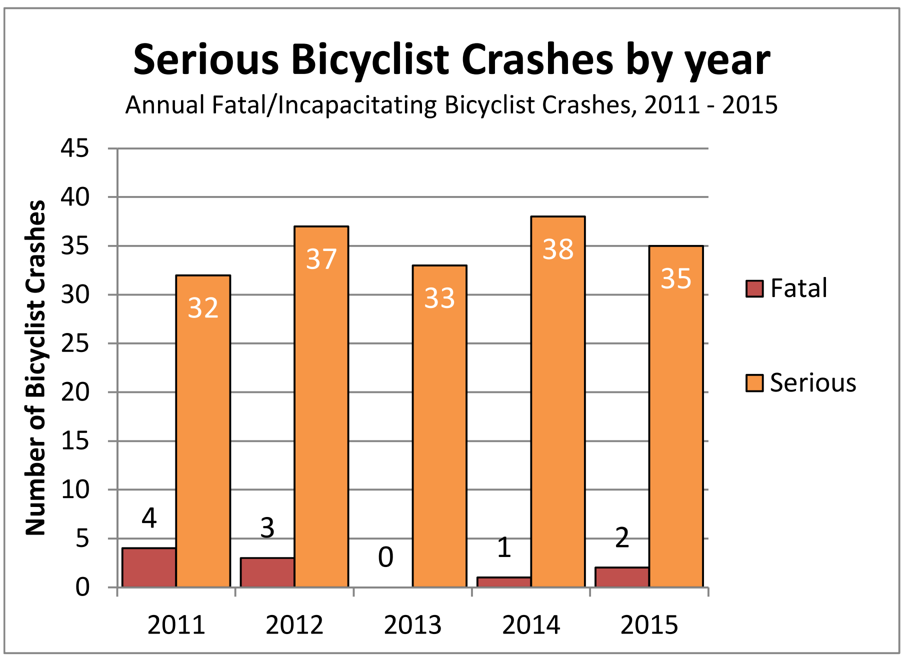
Figures 5-17 and 5-18

Section 6 – Bicyclists (Non-Freeway Crashes)

By Year

Year	Fatal Crashes (Fatalities)	Injury A Crashes	Injury B Crashes	Injury C Crashes	All Injury Crashes	Serious Crashes
2011	4 (4)	28	283	166	481	32
2012	3 (3)	34	357	167	561	37
2013	0 (0)	33	320	132	485	33
2014	1 (1)	37	311	160	509	38
2015	2 (2)	33	262	181	478	35
METRO	**10 (10)**	**165**	**1,533**	**806**	**2,514**	**175**

Figure 6-1



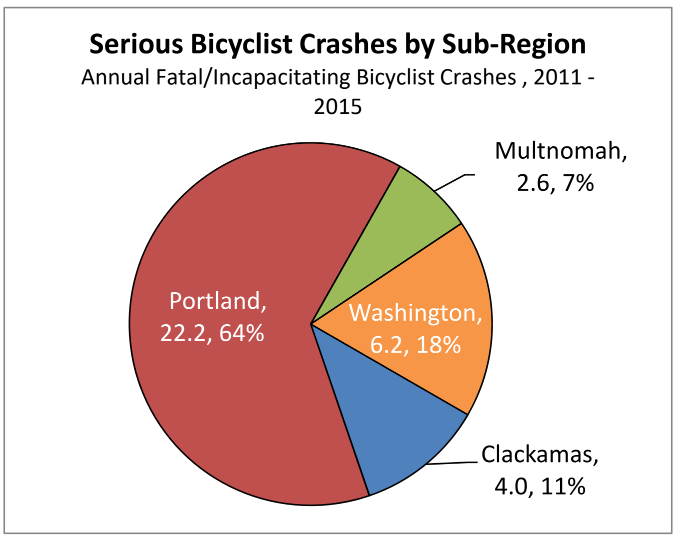
As presented in Figure 6-1, Serious Bicyclist crashes fluctuated over the 5-year period, while Fatal Bicyclist crashes declined. No clear trend is evident.

By Sub-Region

Sub-region	2011-2015 Annual Bicyclist Crashes					
	Fatal	Injury A	Injury B	Injury C	All Injury	Serious
Clackamas	0.2	3.8	26	13	43	4.0
Portland	1.2	21.0	193	98	314	22.2
Multnomah (excl. Portland)	0.0	2.6	24	15	42	2.6
Washington	0.6	5.6	63	35	104	6.2
METRO	**2.0**	**33.0**	**306**	**161**	**502**	**35.0**

Sub-region	Population (2015)	Annual VMT (2015)	Annual Bicyclist Injury Crashes		Annual Serious Bicyclist Crashes	
			per 1M residents	per 100M VMT	per 1M residents	per 100M VMT
Clackamas	290,630	1,048,000,000	149	4.1	14	0.4
Portland	620,540	2,096,000,000	505	15.0	36	1.1
Multnomah (excl. Portland)	152,611	548,000,000	273	7.6	17	0.5
Washington	539,448	2,031,000,000	192	5.1	11	0.3
METRO	**1,603,229**	**5,723,000,000**	**313**	**8.8**	**22**	**0.6**

Figure 6-2



With the highest population, transit usage, VMT, and number of bicyclists, Portland has 64% of the region's Serious Bicyclist crashes (Figure 6-2). Portland also has the highest rate of Serious Bicyclist crashes per capita and per VMT. Multnomah (excludes Portland), Clackamas County and Washington County have lower rates of Serious Bicyclist crashes, which is likely partially due to fewer people cycling.

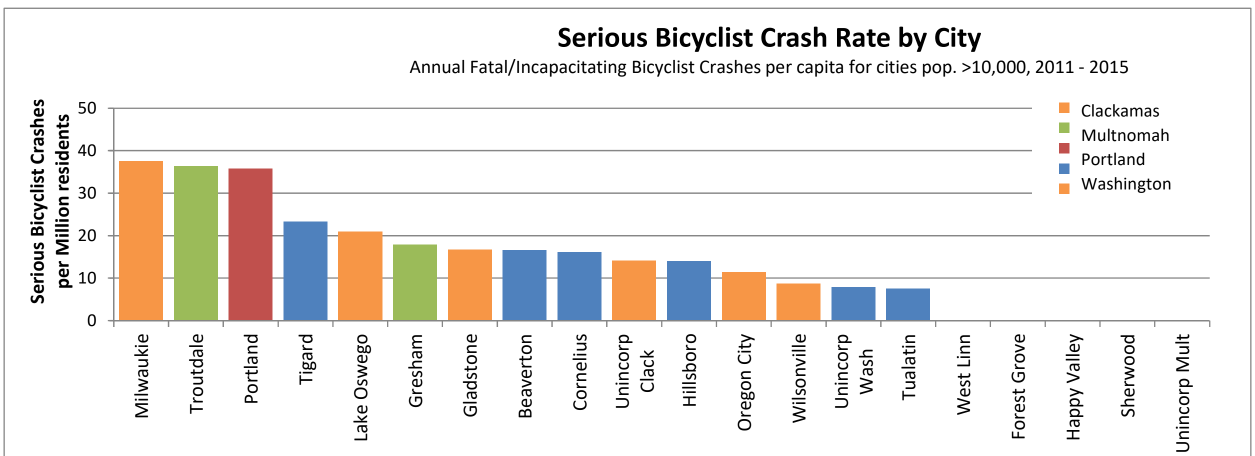
By City

City	2011-2015 Annual Bicyclist Crashes					
	Fatal	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Beaverton	0.2	1.4	14	7	22	1.6
Cornelius	0.0	0.2	2	1	2	0.2
Durham	0.0	0.0	0	0	1	0.0
Fairview	0.0	0.0	1	0	1	0.0
Forest Grove	0.0	0.0	4	2	6	0.0
Gladstone	0.0	0.2	2	1	3	0.2
Gresham	0.0	2.0	18	12	32	2.0
Happy Valley	0.0	0.0	2	0	2	0.0
Hillsboro	0.2	1.2	15	11	28	1.4
Johnson City	0.0	0.0	0	0	0	0.0
King City	0.0	0.0	0	0	0	0.0
Lake Oswego	0.0	0.8	2	1	4	0.8
Maywood Park	0.0	0.0	0	0	0	0.0
Milwaukie	0.0	0.8	4	2	7	0.8
Oregon City	0.0	0.4	4	1	6	0.4
Portland	1.2	21.0	193	98	314	22.2
Rivergrove	0.0	0.0	0	0	0	0.0
Sherwood	0.0	0.0	1	1	2	0.0
Tigard	0.0	1.2	9	5	15	1.2
Troutdale	0.0	0.6	2	2	4	0.6
Tualatin	0.0	0.2	5	3	8	0.2
West Linn	0.0	0.0	1	0	2	0.0
Wilsonville	0.0	0.2	1	1	2	0.2
Wood Village	0.0	0.0	1	1	2	0.0
Uninc. Clackamas	0.2	1.4	9	6	16	1.6
Uninc. Multnomah	0.0	0.0	2	0	2	0.0
Uninc. Washington	0.2	1.4	13	6	20	1.6
METRO	**2.0**	**33.0**	**306**	**161**	**502**	**35.0**

While Portland has the largest number of Serious Bicyclist crashes, it is apparent from Figure 6-3 that there are a several cities with a relatively high rate of Serious Bicyclist crashes per capita. Troutdale, Milwaukie, and Portland all experienced relatively high rates of Serious Bicyclist crashes between 2011 and 2015.

City	Population (2015)	2011-2015 Annual Bicyclist Crashes: All Injury per 1M residents	2011-2015 Annual Bicyclist Crashes: Serious per 1M residents
Beaverton	96,704	230	16.5
Cornelius	12,389	194	16.1
Durham	1,430	420	0.0
Fairview	9,357	150	0.0
Forest Grove	23,630	254	0.0
Gladstone	11,990	250	16.7
Gresham	111,716	285	17.9
Happy Valley	20,835	115	0.0
Hillsboro	100,109	278	14.0
Johnson City	588	0	0.0
King City	3,817	0	0.0
Lake Oswego	38,156	115	21.0
Maywood Park	809	494	0.0
Milwaukie	21,365	328	37.4
Oregon City	35,004	166	11.4
Portland	620,540	506	35.8
Rivergrove	321	0	0.0
Sherwood	19,012	116	0.0
Tigard	51,642	287	23.2
Troutdale	16,486	267	36.4
Tualatin	26,617	301	7.5
West Linn	26,267	69	0.0
Wilsonville	22,932	96	8.7
Wood Village	4,056	444	0.0
Uninc. Clackamas	113,172	145	14.1
Uninc. Multnomah	10,187	177	0.0
Uninc. Washington	204,098	98	7.8
METRO	**1,603,229**	**313**	**21.8**

Figure 6-3



By Month

Month	2011-2015 Annual Bicyclist Crashes	
	All Injury	Serious
January	21	1.4
February	28	2.2
March	33	1.6
April	38	1.0
May	46	2.6
June	48	3.4
July	61	5.0
August	57	4.0
September	60	4.8
October	49	2.6
November	34	3.0
December	28	3.4
12 MONTHS	**502**	**35.0**

Figure 6-4

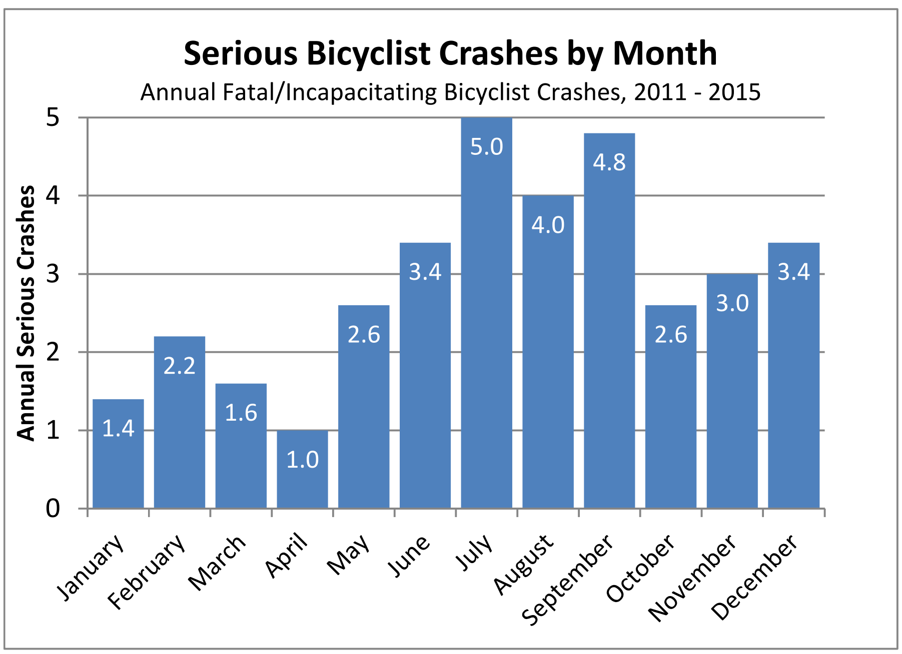


Figure 6-4 presents the annual average number of Serious Bicyclist crashes by month. May through December generally have more Serious Bicyclist crashes, with the peak corresponding to the summer months, likely related to the higher number of people cycling in the warm and dry months.

By Time of Day

Figure 6-5

Serious Crashes by Day of Week and Hour

Annual Fatal/Incapacitating Bicyclist Crashes, 2011 - 2015

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Hour	Average Wkday	Average Wkend
12 AM	0.2	0.0	0.0	0.0	0.0	0.0	0.2	12 AM	0.0	0.2
1 AM	0.2	0.0	0.0	0.0	0.0	0.2	0.4	1 AM	0.0	0.3
2 AM	0.2	0.0	0.0	0.0	0.0	0.0	0.0	2 AM	0.0	0.1
3 AM	0.0	0.0	0.0	0.0	0.2	0.0	0.0	3 AM	0.0	0.0
4 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4 AM	0.0	0.0
5 AM	0.0	0.2	0.0	0.0	0.0	0.0	0.0	5 AM	0.0	0.0
6 AM	0.0	0.0	0.0	0.8	0.2	0.4	0.0	6 AM	0.3	0.0
7 AM	0.0	0.4	0.0	0.8	0.6	0.2	0.0	7 AM	0.4	0.0
8 AM	0.0	0.0	0.0	0.8	0.8	0.4	0.2	8 AM	0.4	0.1
9 AM	0.2	0.2	0.2	0.0	0.4	0.2	0.0	9 AM	0.2	0.1
10 AM	0.0	0.0	0.0	0.6	0.4	0.2	0.4	10 AM	0.2	0.2
11 AM	0.2	0.0	0.0	0.2	0.2	0.4	0.4	11 AM	0.2	0.3
12 PM	0.0	0.2	0.4	0.6	0.8	0.0	0.0	12 PM	0.4	0.0
1 PM	0.0	0.0	0.2	0.4	0.0	0.6	0.2	1 PM	0.2	0.1
2 PM	0.4	0.4	0.2	0.2	0.0	0.8	0.0	2 PM	0.3	0.2
3 PM	0.0	0.4	0.0	0.6	0.4	0.2	0.8	3 PM	0.3	0.4
4 PM	0.4	1.2	0.6	0.8	0.6	0.4	0.0	4 PM	0.7	0.2
5 PM	0.6	0.2	1.0	0.8	1.0	0.4	0.4	5 PM	0.7	0.5
6 PM	0.2	0.4	0.4	0.2	0.6	0.0	0.4	6 PM	0.3	0.3
7 PM	0.0	0.8	0.4	0.0	0.6	0.0	0.0	7 PM	0.4	0.0
8 PM	0.0	0.0	0.0	0.4	0.2	0.0	0.2	8 PM	0.1	0.1
9 PM	0.2	0.2	0.0	0.4	0.4	0.0	0.0	9 PM	0.2	0.1
10 PM	0.0	0.0	0.2	0.2	0.0	0.2	0.4	10 PM	0.1	0.2
11 PM	0.0	0.2	0.0	0.0	0.0	0.0	0.0	11 PM	0.0	0.0

	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Average Wkday	Average Wkend
All Day	2.8	4.8	3.6	7.8	7.4	4.6	4.0	All Day	5.6	3.4

Figure 6-5 presents the rate of Serious Bicyclist crashes by day of the week and hour of the day using a “heat map” format. Dark cells indicate the highest relative crash time periods; light cells indicate the lowest relative crash time periods. The average weekday and weekend day are summarized on the right side of the figure, while each day is summarized and compared at the bottom of the figure.

The weekday evening peak hours produce the highest number of Serious Bicyclist crashes, mirroring the pattern for all crashes, with the 4:00 – 5:59 pm as the worst. Wednesday and Thursday are the two days with the highest number of Bicyclist crashes, which is consistent with the prior report’s data from 2007 – 2009. No other clear trends are evident.

By Weather

2011-2015 Annual Bicyclist Crashes	
Weather	**Serious Crashes**
Cloudy/Clear	30.6
Rain/Fog	3.6
Sleet/Snow	0.0
Unknown	0.8
METRO	**35.0**

The majority (88%) of Serious Bicyclist crashes occurred in clear or cloudy conditions (Figure 6-6), as compared to 80% for all crashes (Figure 2-16).

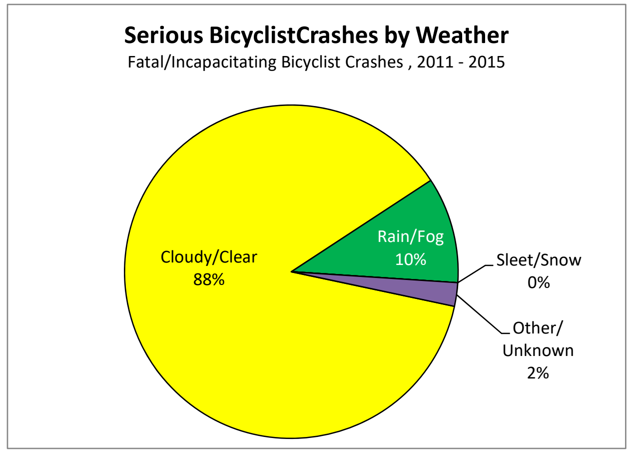


Figure 6-6

By Road Surface Condition

2011-2015 Annual Bicyclist Crashes	
Road Condition	**Serious Crashes**
Dry	29.2
Ice/Snow	0.0
Wet	5.4
Unknown	0.4
METRO	**35.0**

The majority (84%) of Serious Bicyclist crashes occurred in dry conditions (Figure 6-7), as compared to 73% for all crashes (Figure 2-17).

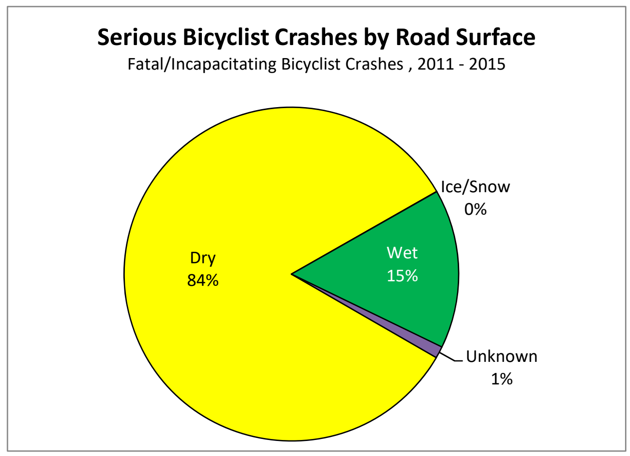


Figure 6-7

By Lighting

2011-2015 Annual Bicyclist Crashes	
Lighting	**Serious Crashes**
Daylight	24.4
Dawn/Dusk	2.8
Night - Dark	1.6
Night - Lit	6.2
Unknown	0.0
METRO	**35.0**

The majority (70%) of Serious Bicyclist crashes occurred in daylight (Figure 6-8), as compared to 59% for all crashes (Figure 2-18).

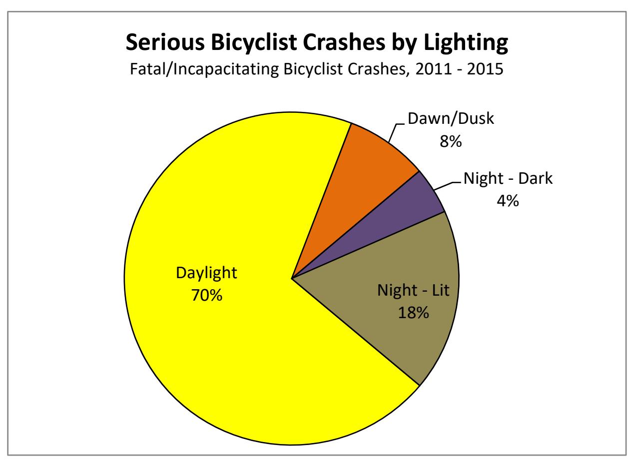


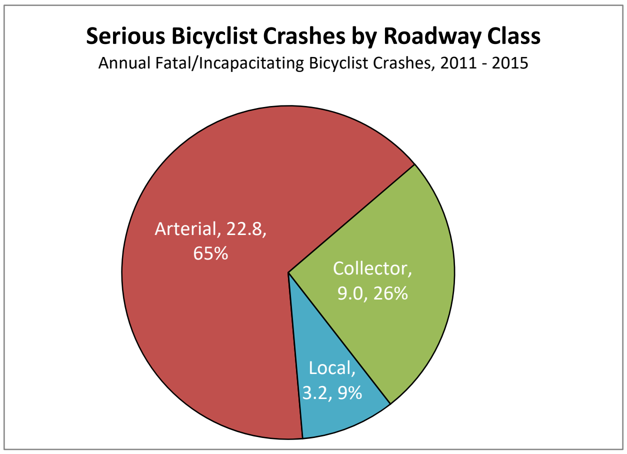
Figure 6-8

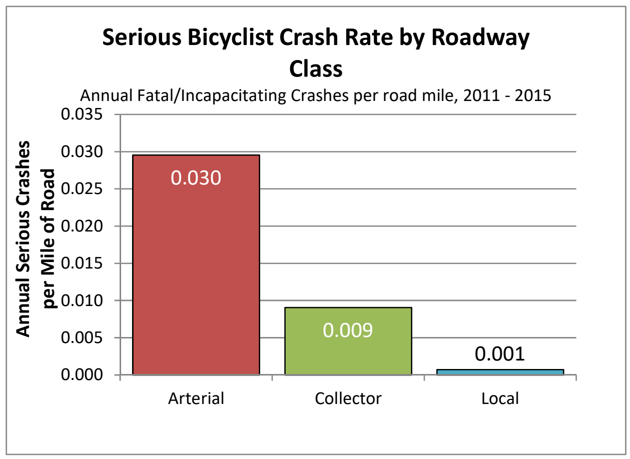
By Roadway Classification

Roadway Classification	Total Road-Miles	Annual VMT (2015)	2011-2015 Annual Bicyclist Crashes		
			Serious	Serious per Road-Mile	Serious per 100M VMT
Arterial	772	4,281,000,000	22.8	0.030	0.53
Collector	994	1,081,000,000	9.0	0.009	0.83
Local	4,565	620,000,000*	3.2	0.001	0.52
METRO	**6,331**	**5,982,000,000**	**35.0**	**0.006**	--

* VMT for local streets is a low-confidence estimate

Figures 6-9 and 6-10

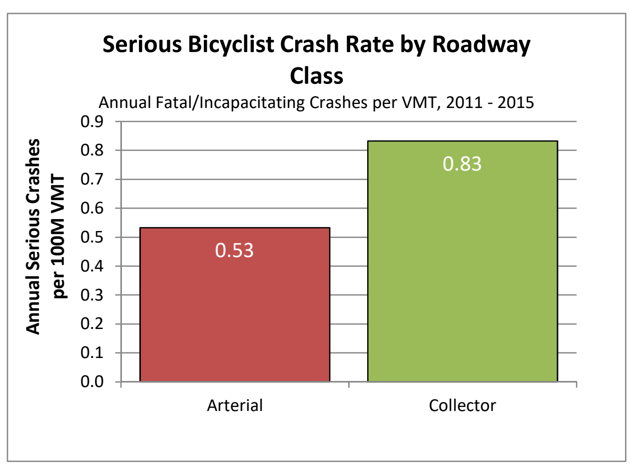




As with all crashes, the region's Serious Bicyclist crashes occur primarily on the arterials, accounting for 65% of these crashes. Figure 6-9 presents the distribution of Serious Bicyclist crashes by roadway classification. As can be seen in Figure 6-10, which presents the rate of Serious Bicyclist crashes per mile of roadway, arterial roadways are more than three times as likely than collectors per mile to be the location of a Serious Bicyclist crash, and more than 40 times as likely than local streets per mile to be the location of a Serious Bicyclist crash.

As can be seen in Figure 6-11, when normalized by motor vehicle traffic volume, the Serious Bicyclist crash rate on collectors is higher than on arterials. While the reason for this is not clear from the data, it may be related to a higher use of collector roads by cyclists relative to traffic volume as compared to arterials. Vehicle miles travelled was not available for local streets.

Figure 6-11

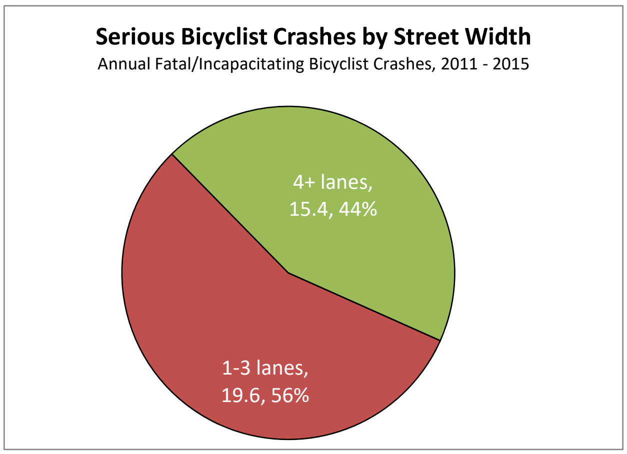


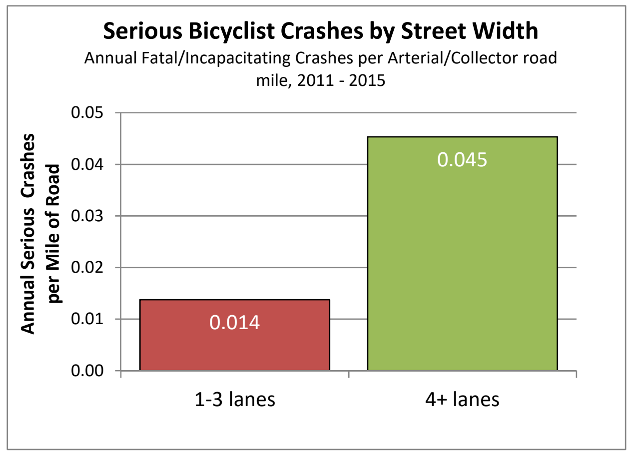
By Number of Lanes

Number of Lanes	Total Road-Miles	2011-2015 Annual Bicyclist Crashes		
		Serious	Serious per Road-Mile	Serious per 100M VMT
1 – 3 Lanes	1,427	19.6	0.014	0.66
4+ Lanes	340	15.4	0.045	0.56
METRO	**1,766**	**35.0**	**0.020**	**0.61**

* Arterial and Collector roadways only

Figure 6-12 and 6-13

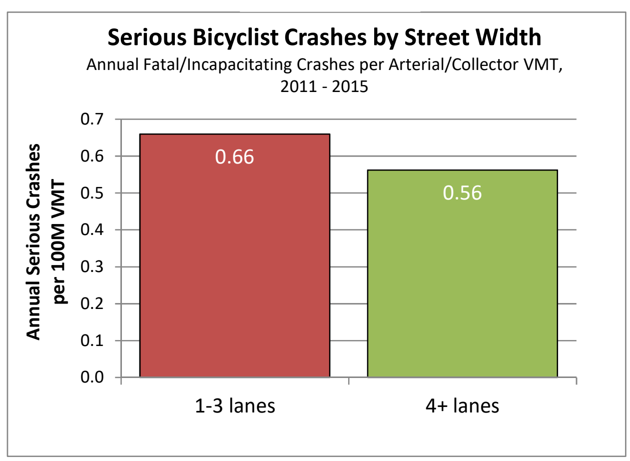




The influence of street width is consistent with the influence of roadway classification (Figure 6-12). Wider roadways are the location of a disproportionate number of Serious Bicyclist crashes in relation to their share of the overall system (Figure 6-13), although the effect is not as pronounced as it is for Serious Pedestrian crashes. The Serious Bicyclist crash rate per road mile increases dramatically for roadways with 4 or more lanes. This is a concern, given that in many parts of the region designated bicycling routes often follow arterial roadways with 4 or more lanes.

As can be seen in Figure 6-14, when normalized by motor vehicle traffic volume, the Serious Bicyclist crash rate on narrower roads is higher than on wider roads. While the reason for this is not clear from the data, it may be related to a higher use of narrower roads by cyclists relative to traffic volume as compared to multi-lane roadways.

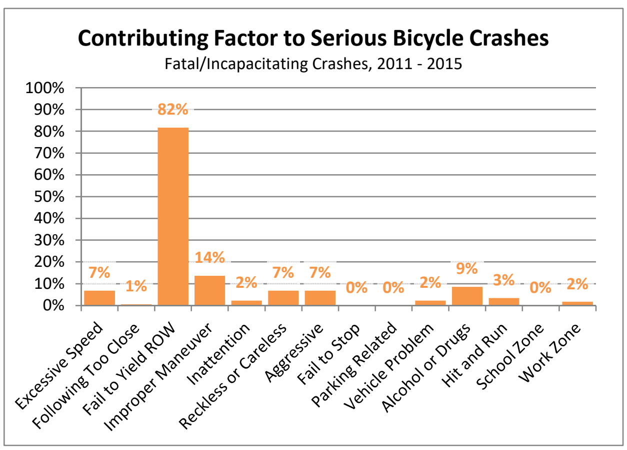
Figure 6-14



By Contributing Factor

Factor	2011-2015 Annual Crashes (Bicyclist)						
	All	**Fatal**	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Excessive Speed	25	0.4	2	16	6	24	2
Following Too Close	13	0.2	0	7	4	11	0
Fail to Yield ROW	417	1.0	28	248	129	406	29
Improper Maneuver	77	0.6	4	41	30	75	5
Inattention	7	0.0	1	4	2	7	1
Reckless or Careless	14	0.4	2	8	3	14	2
Aggressive	35	0.4	2	21	9	32	2
Fail to Stop	10	0.0	0	5	3	8	0
Parking Related	0	0.0	0	0	0	0	0
Vehicle Problem	9	0.0	1	5	3	9	1
Alcohol or Drugs	18	0.8	2	10	4	17	3
Hit and Run	14	0.6	1	8	3	13	1
School Zone	4	0.0	0	2	2	4	0
Work Zone	3	0	1	2	1	3	1
METRO	**518**	**2.0**	**33**	**306**	**161**	**502**	**35**

Figures 6-15 and 6-16



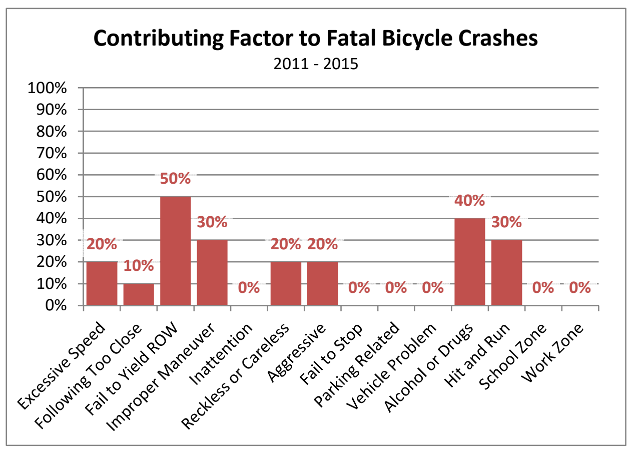


Figure 6-15 and 6-16 present the proportion of Bicyclist crashes by contributing factor for Serious and Fatal crashes, respectively. Alcohol or Drugs and Fail to Yield ROW are the most common factors. The data do not specify whether the driver, the bicyclist, or both were under the influence of alcohol. Other factors, such as Fail to Yield ROW, Excessive Speed, and Aggressive Driving, are for the driver.

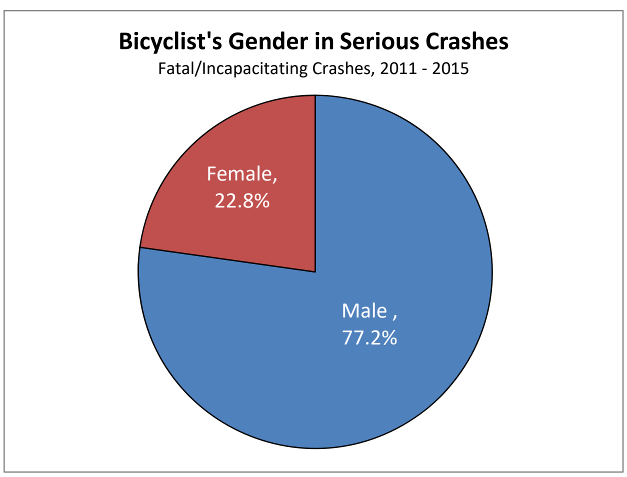
The determination of contributing factors is described in more detail in Section 7.

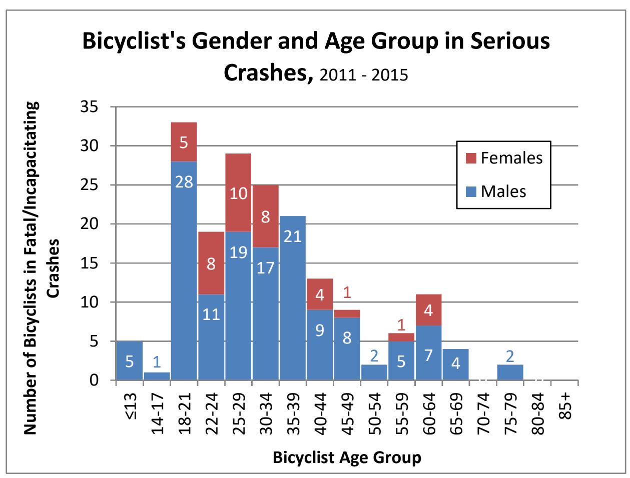
By Bicyclist's Age and Gender

The age and gender of bicyclists involved in Serious crashes are presented in the following table and Figures 6-17 and 6-18.

	Total Male Bicyclists (2011 – 2015)			Total Female Bicyclists (2011 – 2015)		
Age	**All Crashes**	**Serious**	**Percent Serious**	**All Crashes**	**Serious**	**Percent Serious**
≤13	98	5	5.1%	39	0	0.0%
14-17	131	1	0.8%	23	0	0.0%
18-21	164	28	17.1%	54	5	9.3%
22-24	236	11	4.7%	81	8	9.9%
25-29	223	19	8.5%	149	10	6.7%
30-34	262	17	6.5%	107	8	7.5%
35-39	150	21	14.0%	66	0	0.0%
40-44	154	9	5.8%	48	4	8.3%
45-49	156	8	5.1%	47	1	2.1%
50-54	116	2	1.7%	28	0	0.0%
55-59	96	5	5.2%	16	1	6.3%
60-64	71	7	9.9%	18	4	22.2%
65-69	20	4	20.0%	2	0	0.0%
70-74	17	0	0.0%	0	0	--
75-79	11	2	18.2%	0	0	--
80-84	0	0	--	0	0	--
85+	6	0	0.0%	0	0	--
Unknown	154	0	0.0%	39	0	0.0%
METRO	**2065**	**139**	**6.7%**	**717**	**41**	**5.7%**

Figures 6-17 and 6-18





Section 7 – Crash Type Detail

In this section, the four crash types identified in Section 2 as most prevalent are reviewed relative to all crashes in more detail to identify patterns. As documented in Section 2, the most common Serious crash types were Rear End and Turning, while the most common Fatal crash types were Fixed Object and Pedestrian. More detail on Rear End, Turning, Fixed Object, and Pedestrian crashes are presented here.

For each crash type, detailed crash information was summarized for all crashes of that type. The information includes crash severity and contributing factors.

Crash Severity

Every crash is assigned a crash severity based on the most critically injured victim. From worst to best, the classifications are: Fatal, Injury A, Injury B, Injury C, and PDO (property damage only).

"**Serious Crashes**" in this report refers to the total number of Fatal and Injury A crashes.

"**Injury A**" and "**Incapacitating injury**" are used interchangeably. Incapacitating injuries typically are injuries that the victim is not able to walk away from. They are synonymous with the term "**Severe injury**"

"**Injury B**" and "**Moderate injury**" are used interchangeably.

"**Injury C**" and "**Minor injury**" are used interchangeably.

"PDO" means property damage only. Crashes must result in $3,000 or more in damages to be counted.

Contributing Factors

The State Department of Motor Vehicles assigns causes and errors to participants in each crash, along with identifiers for certain risk factors, including alcohol and drugs. Several causes, errors, and/or events may apply to any single crash. Based on these causes, errors, and risk factors, crashes were evaluated for 14 contributing factors. The first cause, three errors, and one event were reviewed for up to three drivers and one non-motorist per crash, and classified for this analysis as follows:

Defined Contrib. Factor	DMV codes included in factor	Cause Codes	Error Codes	Event Codes
Excessive Speed	Speed too fast for conditions; Driving in excess of posted speed; Speed racing; Failed to decrease speed for slower moving vehicle; Driving too fast for conditions	1, 30, 31	42, 47, 50, 53	
Following Too Close	Following too closely	7	43	
Fail to Yield ROW (right-of-way)	Did not yield ROW; Passed stop sign or flashing red; Disregarded traffic signal; Disregarded other traffic control device; Disregarded officer or flagman; Disregarded emergency vehicle; Disregarded Railroad signal or sign or flagman; Failed to obey mandatory turn signal, sign or lane markings; Left turn in front of oncoming traffic; Did not have ROW over pedalcyclist; Did not have ROW; Failed to yield ROW to pedestrian; Passed vehicle stopped at crosswalk for pedestrian	2, 3, 4, 14	3, 4, 20, 21, 23, 24, 25, 27, 28, 29, 33	
Improper Maneuver	Drove left of center on two-way road; Improper overtaking; Made improper turn; Other improper driving; Improper change of lanes; Improper use of median or shoulder; Wide turn; Cut corner on turn; Left turn where prohibited; Turned from or into wrong lane; U-turned illegally; Improperly stopped in traffic; Improper signal or failure to signal; Backing improperly (not parking); Improper start from stopped position; Disregarded warning sign, flares, or flashing amber; Passing on a curve, on wrong side, on straight road under unsafe conditions, at intersection, on crest of hill, in no passing zone, or in front of oncoming traffic; Driving on wrong side of road; Driving through safety zone or island; Failed to stop for school bus; Impeding traffic; Straddling or driving on wrong lanes; Improper change of lanes; Wrong way	5, 6, 8, 10, 13, 50	1, 2, 5, 6, 7, 8, 9, 10, 11, 14, 22, 30, 31, 32, 34, 35, 36, 37, 39, 40, 41, 44, 45, 46, 49	
Inattention	Driver drowsy/fatigued/sleepy; Inattention; Distracted by passenger, animal, cell phone, texting, navigation system, or electronic device	16, 27, 28	16	2, 3, 93, 99, 102, 115, 116
Reckless or Careless	Reckless driving; Careless driving	32, 33	51, 52	
Aggressive	Excessive Speed or Following too Close, as defined above	1, 7, 30, 31	42, 43, 47, 50, 53	
Fail to Stop	Failed to avoid stopped or parked vehicle ahead other than school bus		26	
Parking Related	Improperly parked; Improper start leaving parked position; Improper parking; Opened door into adjacent traffic lane		12, 13, 18, 48	
Vehicle Problem	Improper or no lights; Driving unsafe vehicle (no other error apparent); Overloading or improper loading of vehicle with cargo or passengers		15, 17, 85	
Alcohol or Drugs	Alcohol, Drugs			
Hit and Run	Hit and Run			

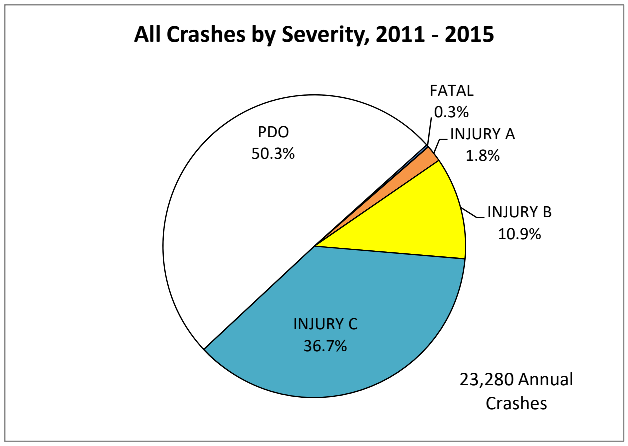
All Crash Types

The following table summarizes all crashes in the region by severity and contributing factor, as defined on the previous page.

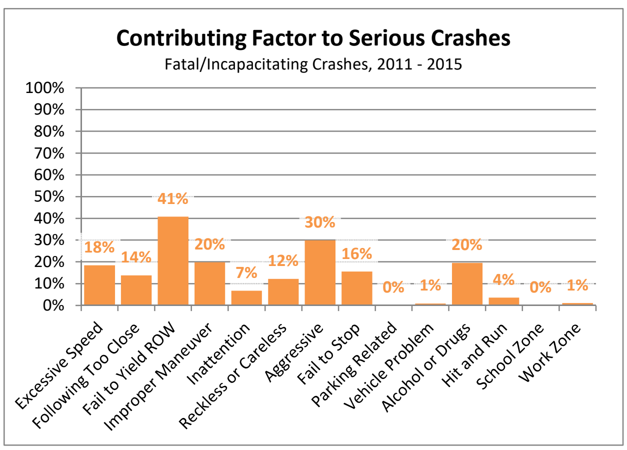
	2011-2015 Annual Crashes (All Crashes)						
Factor	**All**	**Fatal**	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Excessive Speed	2,897	20.6	68	372	1,019	1,480	89
Following Too Close	7,806	1.4	65	486	3,660	4,212	66
Fail to Yield ROW	7,081	19.2	177	1,227	2,369	3,793	196
Improper Maneuver	4,636	16.4	79	400	1,137	1,633	96
Inattention	1,279	3.0	29	166	533	731	32
Reckless or Careless	1,086	6.8	52	234	375	668	59
Aggressive	9,663	21.2	123	771	4,198	5,114	144
Fail to Stop	8,979	1.6	73	514	4,228	4,817	75
Parking Related	136	0.0	0	4	18	22	0
Vehicle Problem	124	0.8	4	18	35	57	4
Alcohol or Drugs	1,056	34.4	60	215	265	575	94
Hit and Run	1,382	5.0	12	104	452	572	17
School Zone	66	0.2	1	13	26	39	1
Work Zone	177	0.2	5	25	69	99	5
METRO	**23,280**	**60.8**	**420**	**2,547**	**8,545**	**11,573**	**481**

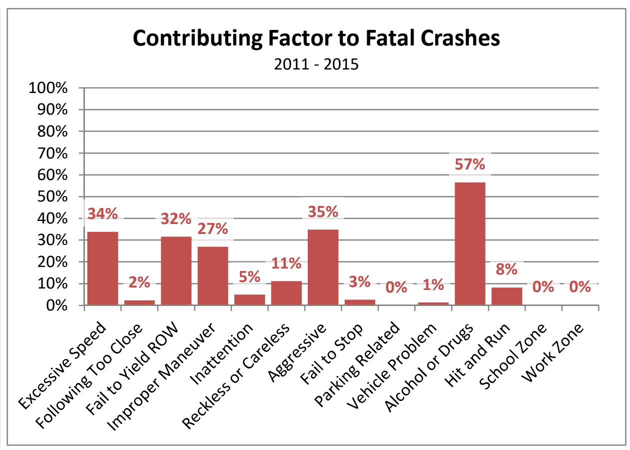
Figure 7-1 presents the crash severity distribution of all crashes. Figures 7-2 and 7-3 present the proportion of crashes by contributing factor for Serious and Fatal crashes, respectively. Each crash may have several contributing factors.

Figure 7-1



Figures 7-2 and 7-3





Alcohol and Drugs, Aggressive Driving (defined as either Excessive Speed or Following Too Close), Excessive Speed, and Fail to Yield ROW are the most common contributing factors to Serious crashes in the region.

Rear End Crashes

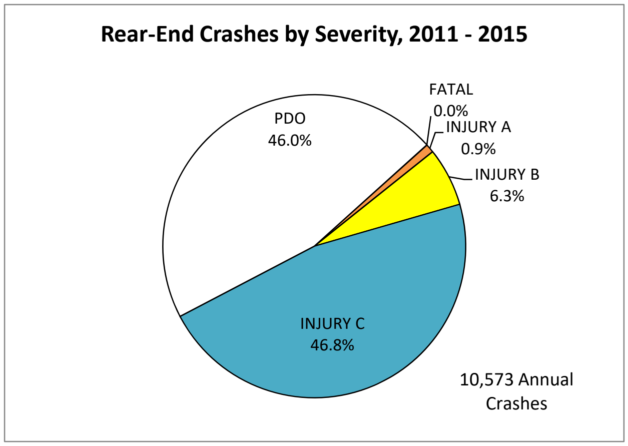
A Rear End crash results when a vehicle traveling in the same direction or parallel on the same path as another vehicle, collides with the rear end of a second vehicle. In this type, the direction of travel was parallel but continuous.

Rear End is the most common crash type in the region, and although it is rarely Fatal it is often Serious. Rear End crashes constitute 7% of Fatal crashes, 21% of Serious crashes, and 45% of all crashes in the region.

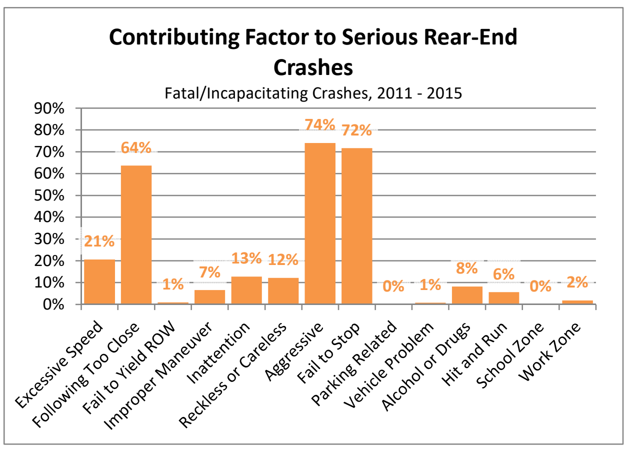
	2011-2015 Annual Crashes (Rear-End Crashes)						
Factor	**All**	**Fatal**	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Excessive Speed	1,591	2.6	18.0	131	727	878	20.6
Following Too Close	7,639	1.4	62.2	470	3,599	4,133	63.6
Fail to Yield ROW	59	0.4	0.6	7	25	33	1.0
Improper Maneuver	455	0.8	5.8	32	184	223	6.6
Inattention	834	0.8	12.0	75	417	505	12.8
Reckless or Careless	412	1.2	11.0	67	209	288	12.2
Aggressive	8,248	3.2	70.8	520	3,865	4,460	74.0
Fail to Stop	8,748	1.4	70.2	503	4,167	4,742	71.6
Parking Related	4	0.0	0.0	0	1	1	0.0
Vehicle Problem	28	0.0	0.8	2	14	18	0.8
Alcohol or Drugs	256	3.0	5.2	36	110	154	8.2
Hit and Run	553	0.8	4.8	32	264	302	5.6
School Zone	21	0.0	0.0	2	11	13	0.0
Work Zone	89	0	1.8	9	42	54	1.8
METRO	**10,573**	**4.4**	**95.6**	**661**	**4,948**	**5,710**	**100.0**

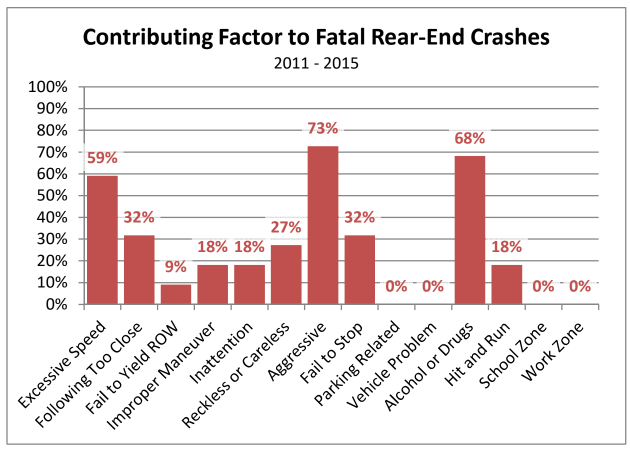
Figure 7-4 presents the crash severity distribution of Rear End crashes. Figures 7-5 and 7-6 present the proportion of crashes by contributing factor for Serious Rear End and Fatal Rear End crashes, respectively. Each crash may have several contributing factors.

Figure 7-4



Figures 7-5 and 7-6





Rear End crashes are less severe than most crashes, producing a high proportion of Injury C and PDO crashes. Aggressive Driving, Fail to Stop, Following too Closely, and Excessive Speed are factors in a substantial proportion of Serious and Fatal Rear End crashes.

Turning Crashes

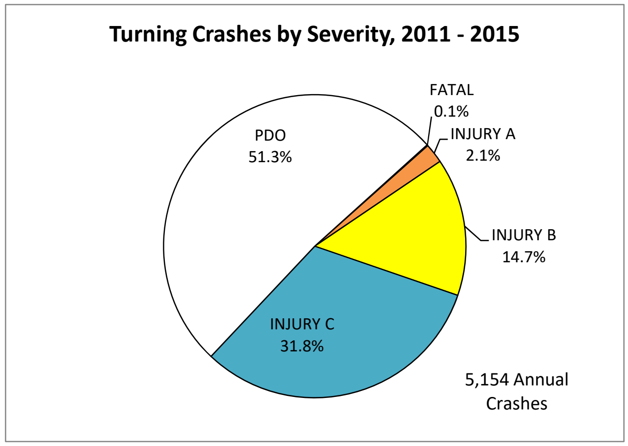
A Turning crash results when one or more vehicles in the act of a turning maneuver is involved in a collision with another vehicle. It differs from an Angle crash in that Turning crashes involve vehicles traveling on the same street, whereas Angle crashes involve vehicles traveling on intersecting streets or driveways.

Turning is the second most common crash type in the region, as well as the most common Serious crash type. Turning crashes constitute 10% of Fatal crashes, 24% of Serious crashes, and 22% of all crashes in the region.

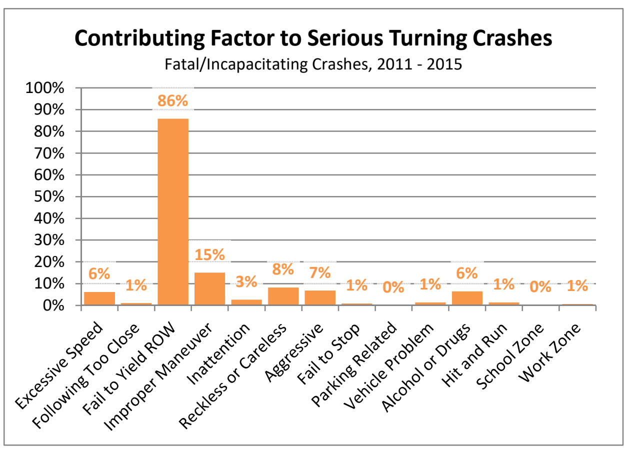
Factor	2011-2015 Annual Crashes (Turning Crashes)						
	All	**Fatal**	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Excessive Speed	173	1.4	6	31	54	92	7
Following Too Close	102	0.0	1	7	39	47	1
Fail to Yield ROW	4,017	3.8	94	668	1,340	2,106	98
Improper Maneuver	1,160	1.8	15	104	301	423	17
Inattention	56	0.2	3	11	19	33	3
Reckless or Careless	123	0.8	9	36	41	87	9
Aggressive	238	1.4	6	34	80	122	8
Fail to Stop	86	0.0	1	3	34	38	1
Parking Related	1	0.0	0	0	0	0	0
Vehicle Problem	17	0.4	1	4	6	12	2
Alcohol or Drugs	102	1.8	6	25	31	63	7
Hit and Run	241	0.0	2	20	66	88	2
School Zone	18	0.0	0	5	6	11	0
Work Zone	25	0.2	1	5	7	13	1
METRO	**5,154**	**5.8**	**108**	**758**	**1,638**	**2,510**	**114**

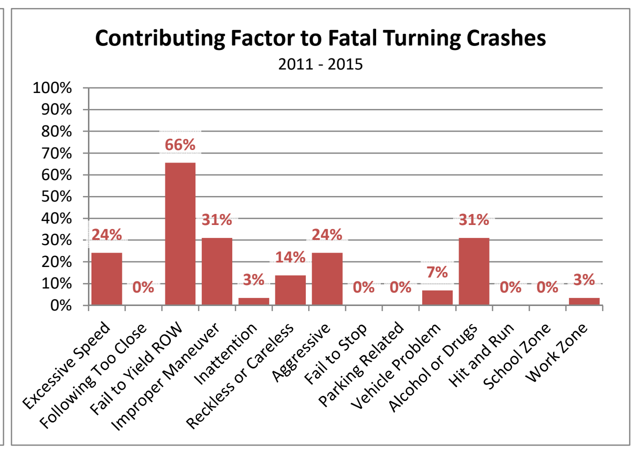
Figure 7-7 presents the crash severity distribution of Turning crashes. Figures 7-8 and 7-9 present the proportion of crashes by contributing factor for Serious Turning and Fatal Turning crashes, respectively. Each crash may have several contributing factors.

Figure 7-7



Figures 7-8 and 7-9





Turning crashes have an average rate of severity compared to other crash types. Fail to Yield ROW, Alcohol or Drugs, and Excessive Speed are often involved in Serious and Fatal Turning crashes.

Fixed Object Crashes

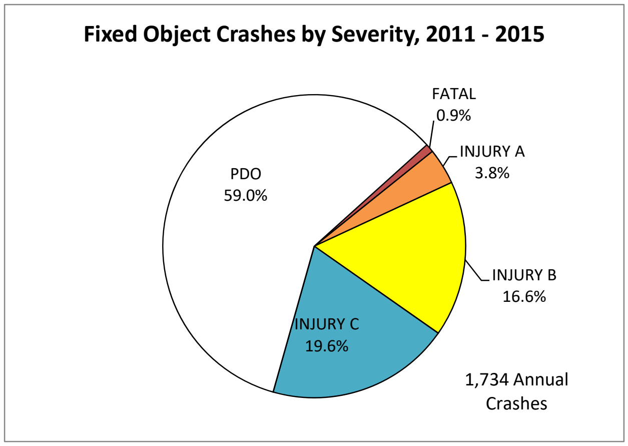
A Fixed Object crash results when one vehicle strikes a fixed or other object on or off the roadway.

Fixed Object is the second most common Fatal crash type in the region. Fixed Object crashes constitute 26% of Fatal crashes, 17% of Serious crashes, though only 7% of all crashes in the region.

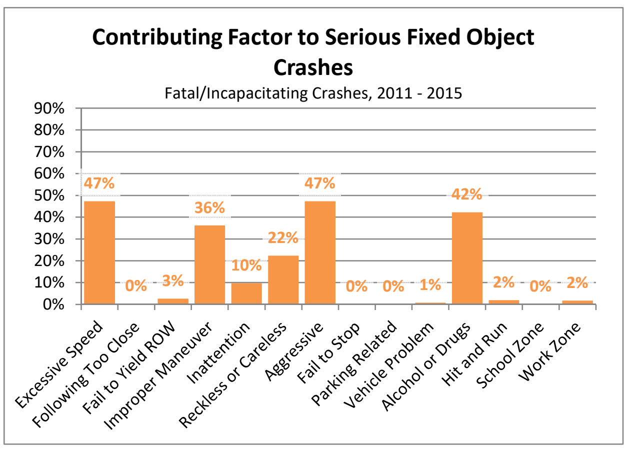
	2011-2015 Annual Crashes (Fixed Object Crashes)						
Factor	**All**	**Fatal**	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Excessive Speed	756	11.2	27.8	136	145	320	39.0
Following Too Close	9	0.0	0.2	2	3	5	0.2
Fail to Yield ROW	31	0.8	1.4	6	5	13	2.2
Improper Maneuver	642	5.0	24.8	98	117	245	29.8
Inattention	216	0.8	7.2	43	46	97	8.0
Reckless or Careless	311	1.8	16.6	71	54	144	18.4
Aggressive	761	11.2	27.8	137	147	323	39.0
Fail to Stop	6	0.0	0.0	1	2	2	0.0
Parking Related	7	0.0	0.0	0	1	1	0.0
Vehicle Problem	33	0.0	0.6	3	6	10	0.6
Alcohol or Drugs	401	11.2	23.6	89	59	183	34.8
Hit and Run	133	0.4	1.2	18	14	33	1.6
School Zone	9	0.0	0.0	2	2	3	0.0
Work Zone	22	0	1.4	4	5	11	1.4
METRO	**1,734**	**15.8**	**66.6**	**289**	**341**	**712**	**82.4**

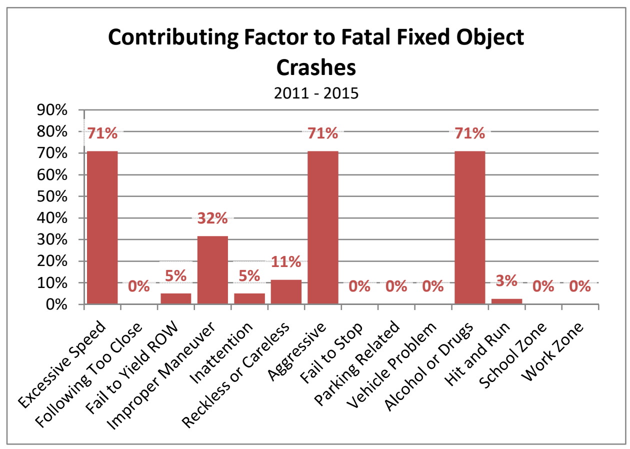
Figure 7-10 presents the crash severity distribution of Fixed Object crashes. Figures 7-11 and 7-12 present the proportion of crashes by contributing factor for Serious Fixed Object and Fatal Fixed Object crashes, respectively. Each crash may have several contributing factors.

Figure 7-10



Figures 7-11 and 7-12





Fixed Object crashes have a higher rate of severity including fatalities compared to other crash types. Excessive Speed, Aggressive Driving, and Alcohol or Drugs are often involved in Serious and Fatal Fixed Object crashes.

Pedestrian Crashes

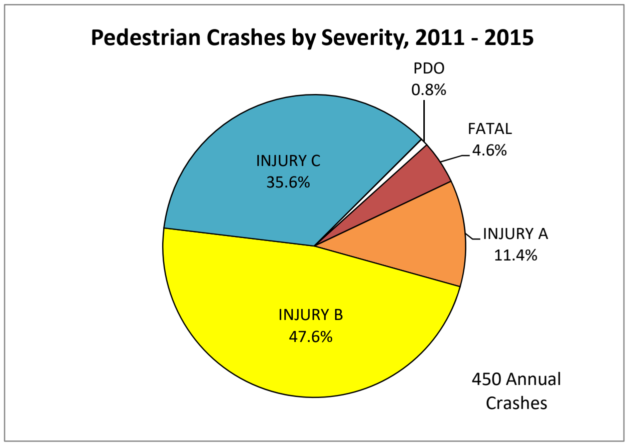
A Pedestrian crash results when the first harmful event is any impact between a motor vehicle in traffic and a pedestrian. It does not include any crash where a pedestrian is injured after the initial vehicle impact.

Pedestrian is the most common Fatal crash type in the region, and the most common crash type to be Fatal. Pedestrian crashes constitute 34% of Fatal crashes, 15% of Serious crashes, though only 2% of all crashes in the region. Pedestrian trips are 10% of all trips in the region.

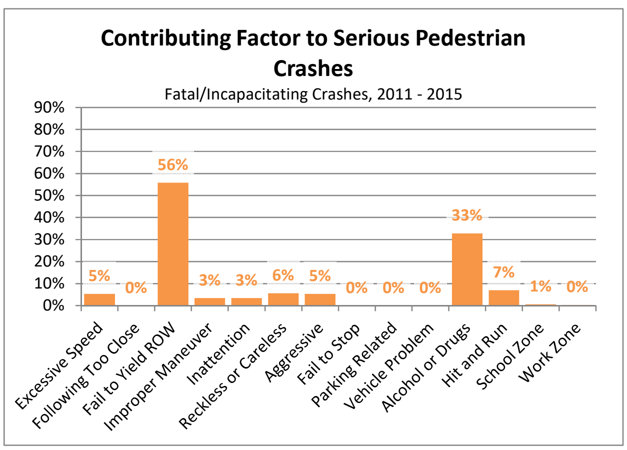
	2011-2015 Annual Crashes (Pedestrian Crashes)						
Factor	**All**	**Fatal**	**Injury A**	**Injury B**	**Injury C**	**All Injury**	**Serious**
Excessive Speed	7	1.6	2.2	3	1	7	3.8
Following Too Close	0	0.0	0.0	0	0	0	0.0
Fail to Yield ROW	331	10.0	30.2	161	127	328	40.2
Improper Maneuver	13	1.4	1.0	5	5	13	2.4
Inattention	14	0.6	1.8	7	5	14	2.4
Reckless or Careless	14	1.2	2.8	8	3	14	4.0
Aggressive	8	1.6	2.2	3	1	8	3.8
Fail to Stop	1	0.0	0.0	0	0	1	0.0
Parking Related	1	0.0	0.0	0	1	1	0.0
Vehicle Problem	1	0.0	0.0	0	1	1	0.0
Alcohol or Drugs	52	11.0	12.6	19	9	52	23.6
Hit and Run	17	3.2	1.8	6	6	17	5.0
School Zone	6	0.2	0.2	3	3	6	0.4
Work Zone	4	0	0.2	2	2	4	0.2
METRO	**450**	**20.8**	**51.2**	**214**	**160**	**447**	**72.0**

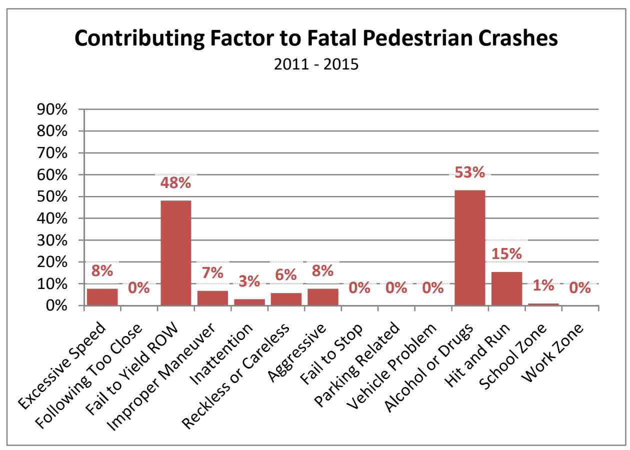
Figure 7-13 presents the crash severity distribution of Pedestrian crashes. Figures 7-14 and 7-15 present the proportion of crashes by contributing factor for Serious Pedestrian and Fatal Pedestrian crashes, respectively. Further breakdown of the reported error by user follows in Figures 7-16 through 7-19. Each crash may have several contributing factors.

Figure 7-13



Figures 7-14 and 7-15



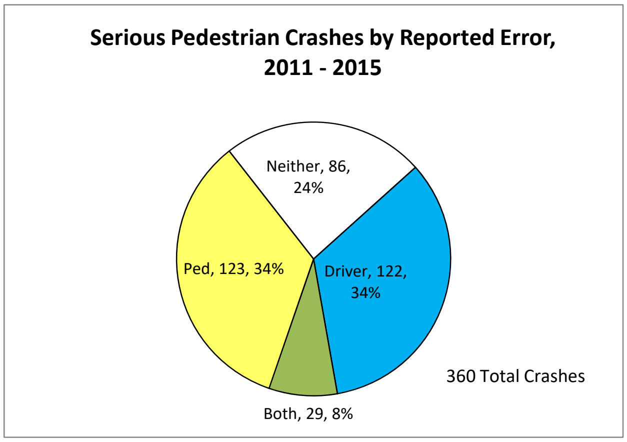


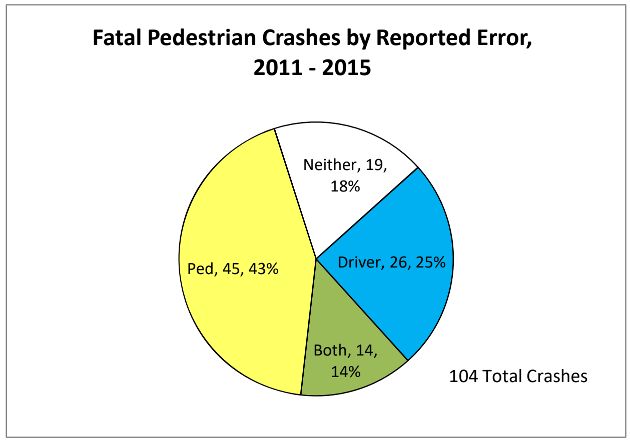
Pedestrian crashes have the highest severity of any crash type. **A Pedestrian crash is more than 26 times as likely to be fatal than a crash not involving a pedestrian, and more than 110 times as likely to be fatal as a Rear End crash, the most common crash type.** Failure to Yield ROW and Alcohol or Drugs are the most common contributing factors.

Additional analysis was done for this crash type to identify how often the driver was reported to be at fault in Pedestrian crashes and how often the pedestrian was reported to be at fault. For the purposes of this analysis, those causes, errors, and events defined at the beginning of Section 7 are considered errors.

Figures 7-16 and 7-17 present the proportion of Pedestrian crashes by reported error source for Serious Pedestrian and Fatal Pedestrian crashes, respectively.

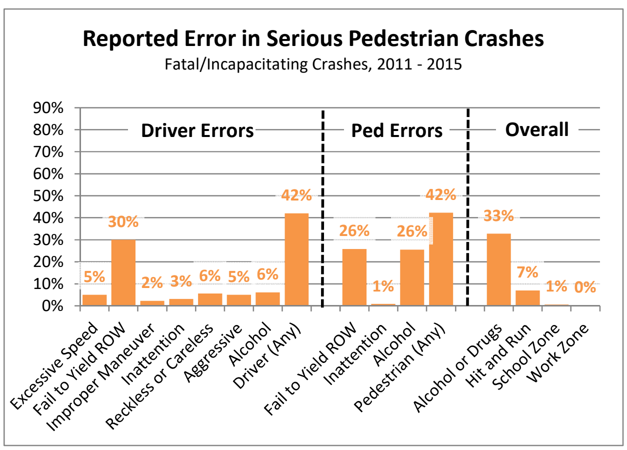
Figures 7-16 and 7-17

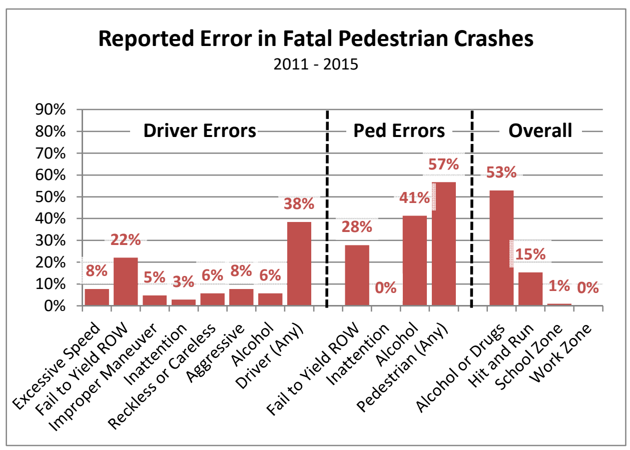




Figures 7-18 and 7-19 present the proportion of crashes by common contributing factor and reported error source for Serious Pedestrian and Fatal Pedestrian crashes, respectively.

Figures 7-18 and 7-19





The Crash Factor Overllaps matrix, Figure 7-20, shows the percentage Serious crashes for different factors.

Crash Factor Overlaps - Percentage of Fatal and Serious Injuries by Row, 2011 to 2015

Figure 7-20 % of all % of left that were...

Guide to reading this chart: Starting with the row names in Column A; Column B represents the % of all crashes pertaining to that row in Column A (eg. 62% of all crashes were on an arterial). The columns following Column B are the % of column A that were also that thing (eg. 18% of arterial crashes [in Column A] were Ped Involved). The columns following Column K [i.e. Ped Involved] are the <u>% of serious crashes</u> that were both that row and column (eg. 55% of serious arterial crashes were at intersections). For rows 1-7, Columns K onward represent the injury type of the row rather than serious crashes.

Column A Col.B Col. K

Rows 1-7

Column A	All crashes	Fatal	Serious	A	B	C	PDO	Ped Involved	Bike Involved	Auto-only	Motorcycle Involved	Truck Involved	Freeway	Arterial	Collector	Local	Intersection	non-Intersection	Angle	Head-on	Rear-end	Turning	Fixed object	Daylight	Darkness- lit	Darkness- no lights	Dawn/ dusk	Speed Involved	Followed too closely	Fail to yield ROW	Improper maneuver	Inattention	Reckless/ Careless	Aggressive	Failed to stop	Alcohol Involved	Drug Involved	Hit & Run
All crashes	100%	0.3%	2.1%	1.8%	11%	40%	50%	2%	2%	91%	2%	3%	16%	62%	16%	7%	47%	53%	10%	1%	45%	22%	7%	71%	18%	4%	7%	12%	34%	30%	20%	5%	5%	42%	39%	4%	1%	6%
Fatal	0.3%		100.0%	12.2%	14%	15%		36%	4%	38%	18%	8%	7%	69%	21%	3%	37%	63%	7%	8%	7%	10%	26%	38%	39%	15%	7%	34%	2%	32%	27%	5%	11%	35%	3%	46%	20%	8%
Serious	2.1%	12.6%		88.9%	15%	22%		16%	7%	60%	15%	4%	10%	66%	18%	6%	49%	51%	11%	4%	21%	24%	17%	59%	26%	8%	7%	18%	14%	41%	20%	7%	12%	30%	16%	17%	5%	4%
A	1.8%	1.7%	100.0%		16%	23%		13%	8%	63%	14%	3%	10%	66%	18%	6%	50%	50%	12%	3%	23%	25%	16%	61%	24%	7%	7%	17%	15%	42%	19%	7%	12%	29%	17%	14%	3%	3%
B	11%	0.3%	2.8%	2.5%		26%		9%	12%	71%	7%	3%	12%	63%	19%	6%	55%	45%	15%	2%	26%	30%	11%	67%	21%	5%	7%	15%	19%	48%	16%	7%	9%	30%	20%	8%	1%	4%
C	40%	0.1%	1.1%	1.1%	7%			2%	2%	93%	1%	2%	17%	66%	13%	4%	48%	52%	10%	1%	57%	20%	4%	72%	17%	3%	7%	12%	42%	29%	13%	6%	5%	48%	48%	3%	1%	5%
PDO	50%							0%	0%	96%	1%	4%	16%	59%	16%	8%	45%	55%	9%	0%	42%	23%	9%	71%	17%	4%	7%	12%	31%	28%	26%	5%	4%	39%	36%	4%	1%	7%
Ped Involved	2%	4.7%	16.4%	12.0%	48%	38%	1%				2%	2%	2%	75%	16%	7%	53%	47%	1%	0%	1%	1%	2%	36%	40%	13%	11%	7%	1%	55%	4%	4%	6%	7%	1%	29%	9%	7%
Bike Involved	2%	0.4%	6.8%	6.4%	59%	32%	3%				1%	5%	1%	64%	25%	9%	73%	27%	27%	1%	3%	63%	0%	70%	18%	5%	8%	7%	1%	81%	14%	2%	7%	7%	0%	7%	2%	3%
Auto-only	91%	0.1%	1.4%	1.3%	9%	41%	53%						11%	66%	17%	5%	46%	54%	13%	5%	29%	23%	24%	61%	25%	8%	5%	20%	19%	34%	22%	9%	14%	37%	23%	16%	4%	3%
Motorcycle Involved	2%	2.8%	18.0%	15.3%	45%	28%	15%	2%	0%			1%	12%	58%	24%	6%	47%	53%	11%	3%	15%	33%	16%	66%	18%	8%	7%	28%	11%	38%	29%	4%	14%	35%	8%	15%	3%	1%
Truck Involved	3%	0.7%	2.5%	1.8%	10%	29%	62%	8%	10%		6%		25%	64%	8%	3%	43%	57%	8%	10%	28%	22%	9%	64%	24%	8%	5%	26%	17%	32%	31%	6%	13%	41%	18%	18%	3%	2%
Freeway	16%	0.1%	1.3%	1.2%	8%	43%	51%	3%	1%	70%	18%	9%					4%	96%	1%	1%	54%	1%	24%	57%	30%	9%	4%	37%	34%	3%	23%	9%	19%	61%	28%	16%	4%	3%
Arterial	62%	0.3%	2.2%	1.9%	11%	42%	48%	18%	7%	60%	13%	4%					55%	45%	12%	4%	20%	28%	13%	58%	27%	7%	7%	15%	14%	47%	18%	7%	11%	27%	17%	16%	5%	4%
Collector	16%	0.3%	2.5%	2.2%	14%	35%	53%	13%	10%	56%	19%	2%					51%	49%	14%	5%	11%	23%	25%	59%	21%	13%	7%	22%	7%	41%	24%	5%	11%	27%	9%	21%	5%	4%
Local	7%	0.1%	1.8%	1.7%	11%	24%	65%	19%	12%	52%	15%	2%					53%	47%	20%	4%	5%	16%	22%	67%	20%	9%	4%	19%	2%	40%	26%	6%	15%	20%	2%	19%	7%	4%
Intersection	47%	0.2%	2.1%	1.9%	13%	41%	48%	17%	11%	56%	14%	3%	1%	74%	19%	6%			22%	1%	14%	37%	8%	63%	26%	4%	7%	11%	9%	68%	12%	4%	10%	19%	12%	13%	3%	3%
non-Intersection	53%	0.3%	2.0%	1.7%	10%	39%	52%	15%	4%	63%	15%	4%	19%	59%	18%	5%			2%	7%	28%	11%	26%	55%	27%	12%	7%	26%	18%	15%	27%	9%	14%	40%	19%	21%	7%	4%
Angle	10%	0.2%	2.4%	2.2%	17%	41%	46%	2%	17%	66%	13%	3%	1%	67%	22%	10%	92%	8%						71%	23%	2%	4%	7%	0%	94%	3%	3%	9%	8%	0%	10%	2%	1%
Head-on	1%	3.3%	12.1%	9.8%	27%	41%	36%	0%	1%	79%	11%	10%	2%	69%	23%	5%	11%	89%						55%	19%	15%	11%	29%	1%	4%	89%	10%	18%	30%	1%	29%	12%	3%
Rear-end	45%	0.0%	0.9%	0.9%	6%	50%	46%	1%	1%	83%	11%	5%	26%	63%	10%	1%	32%	68%						70%	20%	3%	6%	21%	64%	1%	7%	13%	12%	74%	72%	7%	2%	6%
Turning	22%	0.1%	2.2%	2.1%	15%	36%	51%	1%	20%	58%	20%	3%	1%	78%	18%	4%	76%	24%						71%	18%	4%	6%	6%	1%	86%	15%	3%	8%	7%	1%	6%	1%	1%
Fixed object	7%	0.9%	4.8%	4.0%	17%	21%	59%	2%	0%	83%	14%	2%	14%	52%	27%	7%	24%	76%						39%	40%	17%	5%	47%	0%	3%	36%	10%	22%	47%	0%	37%	10%	2%
Daylight	71%	0.1%	1.7%	1.6%	11%	41%	50%	10%	9%	62%	17%	4%	9%	66%	19%	6%	52%	48%	14%	4%	25%	29%	11%					14%	17%	44%	19%	7%	9%	29%	20%	5%	3%	2%
Darkness- lit	18%	0.6%	3.0%	2.5%	13%	39%	49%	25%	5%	58%	10%	3%	11%	69%	15%	4%	48%	52%	10%	3%	16%	17%	26%					25%	8%	38%	18%	7%	20%	31%	10%	39%	6%	7%
Darkness- no lights	4%	1.1%	4.5%	3.6%	15%	31%	54%	24%	4%	55%	15%	4%	11%	54%	29%	6%	26%	75%	3%	7%	7%	11%	35%					32%	4%	21%	32%	6%	15%	34%	4%	41%	12%	6%
Dawn/ dusk	7%	0.2%	2.0%	1.7%	10%	41%	50%	26%	9%	48%	16%	2%	6%	72%	19%	3%	50%	50%	7%	6%	20%	23%	12%					15%	13%	44%	20%	7%	10%	26%	14%	15%	4%	4%
Speed Involved	12%	0.7%	3.1%	2.5%	13%	39%	49%	6%	3%	65%	22%	5%	20%	53%	22%	6%	28%	72%	4%	6%	23%	8%	44%	45%	35%	14%	6%		12%	10%	18%	3%	23%	100%	4%	35%	9%	5%
Followed too closely	34%	0.0%	0.8%	0.8%	6%	50%	46%	1%	0%	83%	11%	5%	24%	65%	10%	1%	33%	67%	0%	0%	96%	2%	0%	75%	16%	2%	6%	17%		1%	2%	11%	8%	100%	76%	3%	1%	5%
Fail to yield ROW	30%	0.3%	2.8%	2.5%	18%	38%	46%	22%	15%	49%	13%	3%	1%	75%	19%	5%	82%	18%	26%	0%	1%	50%	1%	64%	25%	4%	7%	5%	0%		4%	3%	7%	5%	0%	11%	2%	2%
Improper maneuver	20%	0.4%	2.1%	1.8%	9%	27%	65%	3%	5%	66%	21%	6%	12%	59%	22%	7%	30%	70%	2%	17%	7%	18%	31%	57%	23%	13%	7%	17%	2%	9%		5%	15%	18%	3%	23%	6%	4%
Inattention	5%	0.2%	2.5%	2.4%	13%	47%	43%	10%	2%	77%	8%	3%	14%	68%	14%	5%	30%	70%	6%	6%	40%	9%	25%	60%	25%	7%	7%	9%	22%	20%	16%		23%	28%	32%	7%	2%	0%
Reckless/ Careless	5%	0.6%	5.4%	4.9%	23%	42%	39%	8%	4%	68%	17%	4%	16%	60%	17%	7%	39%	61%	9%	5%	21%	5%	31%	42%	42%	10%	6%	35%	9%	24%	24%	13%		42%	10%	44%	12%	6%
Aggressive	42%	0.2%	1.5%	1.3%	8%	47%	47%	4%	2%	74%	17%	5%	20%	59%	17%	4%	31%	69%	3%	4%	51%	5%	27%	57%	27%	9%	6%	62%	46%	7%	12%	6%	17%		37%	22%	6%	5%
Failed to stop	39%	0.0%	0.8%	0.8%	6%	50%	46%	1%	0%	88%	8%	4%	18%	71%	10%	1%	38%	62%	0%	0%	96%	1%	0%	75%	16%	2%	6%	5%	67%	1%	4%	14%	8%	71%		4%	1%	1%
Alcohol Involved	4%	2.9%	8.6%	6.0%	22%	30%	46%	27%	3%	56%	13%	4%	9%	63%	22%	6%	38%	62%	7%	6%	8%	8%	37%	16%	58%	19%	6%	37%	3%	26%	27%	3%	31%	38%	4%		14%	8%
Drug Involved	1%	7.1%	13.1%	7.5%	18%	33%	44%	29%	3%	57%	10%	3%	8%	65%	19%	9%	29%	71%	4%	10%	11%	4%	38%	39%	35%	21%	5%	37%	3%	20%	26%	3%	32%	38%	3%	51%		11%
Hit & Run	6%	0.4%	1.2%	0.9%	8%	34%	59%	29%	7%	58%	6%	2%	7%	65%	21%	7%	41%	59%	5%	3%	33%	9%	9%	30%	50%	13%	7%	27%	19%	28%	20%	2%	21%	41%	23%	38%	14%	

% of serious crashes that were also...

MPAC Worksheet

Agenda Item Title: Regional Freight Strategy Update

Presenter: Tim Collins, Senior Transportation Planner

Contact for this worksheet/presentation: Tim Collins 503-797-1762

Purpose/Objective
The purpose of this memorandum is to provide MPAC an opportunity to discuss the draft 2018 Regional Freight Strategy, including regional freight policies, a revised Regional Freight Network map, and proposed actions that address each of the freight policies. The 2018 Regional Freight Strategy will replace the current Regional Freight Plan (June 2010).

Action Requested/Outcome
There is no formal action requested. Staff will provide an update on the Regional Freight Strategy.

Staff would like to know if MPAC has any feedback or concerns related to the revised freight policies, regional freight network map, or freight actions that should be addressed as part of finalizing the Regional Freight Strategy for public review.

What has changed since MPAC last considered this issue/item?

<u>RTP Regional Freight Concept has been revised</u>

The Regional Transportation Plan defines a vision and supporting policies to guide investment in each part of the regional transportation system, including the multimodal regional freight network.

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.

<u>Regional Freight Network Map has been revised</u>

The Regional Freight Network Map 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. The Regional Freight Network map has been updated for the discussion draft of the Regional Freight Strategy and is significantly different than the one found in the 2014 Regional Transportation Plan and the 2010 Regional Freight Plan.

<u>Regional Freight Network Policies have been revised</u>

The proposed new and updated freight policies are:

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.

2. Manage first-rate multi-modal freight networks to reduce delay, increase reliability, improve safety and provide shipping choices.
3. Educate the public and decision-makers on the importance of freight and goods movement issues.
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.
5. Integrate freight mobility and access needs into land use and transportation plans and street design to protect industrial lands and critical freight corridors with access to commercial delivery activities.
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.
7. Eliminate fatalities and serious injuries caused by freight vehicle crashes with passenger vehicles, bicycles, and pedestrians, by improving roadway and freight operational safety.

What packet material do you plan to include?

1. Memo to MPAC on the Regional Freight Strategy Update
2. Regional Freight Strategy Discussion Draft (April 2, 2018)
3. Regional Freight Concept (Figure 5 in the discussion draft)
4. Regional Freight Network map (Figure 6 in the discussion draft)

Memo

Metro
600 NE Grand Ave.
Portland, OR 97232-2736

Date: Monday, April 16, 2018
To: Metro Policy Advisory Committee (MPAC) and interested parties
From: Tim Collins, Senior Transportation Planner
Subject: Regional Freight Strategy Update

PURPOSE

The purpose of this memorandum is to provide MPAC an opportunity to discuss the draft 2018 Regional Freight Strategy, including regional freight policies, a revised Regional Freight Network map, and proposed actions that address each of the freight policies. The 2018 Regional Freight Strategy will replace the current Regional Freight Plan (June 2010).

ACTION REQUESTED

There is no formal action requested. Staff will provide an update on the Regional Freight Strategy.

Staff would like to know if MPAC has any feedback or concerns related to the revised freight policies, regional freight network map, or freight actions that should be addressed as part of finalizing the Regional Freight Strategy for public review.

BACKGROUND

The Portland metropolitan region is the trade and transportation gateway and economic engine for the state of Oregon.

The RTP defines a vision and supporting policies to guide investments in the region's multimodal freight network. The 2018 Regional Freight Strategy updates and replaces 2010 Regional Freight Plan. The Regional Freight Strategy will define how the region can enhance freight and goods movement. With the help of the Metro Council, MTAC, TPAC, JPACT, and the Regional Freight Work Group, staff has produced a discussion draft of the Regional Freight Strategy.

At the May 2017 work session, Metro Council directed staff to add a new freight safety policy. MPAC will be reviewing the seven updated Regional Freight Network policies and map that will be included in Chapter 2 of the 2018 RTP. The freight strategy will serve as the freight component of the 2018 Regional Transportation Plan (RTP).

REGIONAL FREIGHT POLICY FRAMEWORK

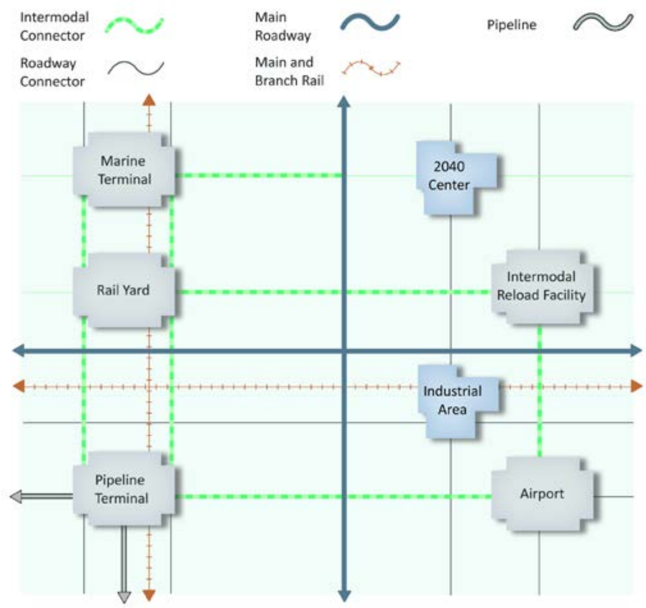
RTP Regional Freight Network Vision and Policies

The Regional Transportation Plan defines a vision and supporting policies to guide investment in each part of the regional transportation system, including the multimodal regional freight network.

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 1** shows the components of the regional freight system and their relationships. Figure 1 has been updated to show a new designation for Intermodal Connectors.

Figure 1 Regional Freight Concept



Rivers, mainline rail, pipeline, air routes, and arterial streets and throughways connect our region to international and domestic markets and suppliers beyond our boundaries. Inside our region, throughways and arterial streets distribute freight moved by truck to air, marine, 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.

The **Regional Freight Network Map** 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. The Regional Freight Network map has been updated for the discussion draft of the Regional Freight Strategy and is significantly different than the one found in the 2014 Regional Transportation Plan and the 2010 Regional Freight Plan.

A 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.

Regional 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. Regional Intermodal Connectors are of critical importance for carrying commodities that are being exported from and imported into the state and across the county. More detail is provided in Chapter 3 of the Regional Freight Strategy Discussion Draft.

Key updates to the Regional Freight Network Map:

- Added a new designation to identify Regional Intermodal Connectors
- Map has a larger format with insets that focus on freight facilities and improve readability

Regional Freight Network Policies

As part of the 2018 Regional Freight Strategy, the intent of the 2010 goal statements have been maintained by combining them with the 2010 freight 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.

The proposed new and updated freight policies are:

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.
2. Manage first-rate multi-modal freight networks to reduce delay, increase reliability, improve safety and provide shipping choices.
3. Educate the public and decision-makers on the importance of freight and goods movement issues.
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.
5. Integrate freight mobility and access needs into land use and transportation plans and street design to protect industrial lands and critical freight corridors with access to commercial delivery activities.
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.
7. Eliminate fatalities and serious injuries caused by freight vehicle crashes with passenger vehicles, bicycles, and pedestrians, by improving roadway and freight operational safety.

These freight network policies were used to develop the freight actions that are outlined in Chapter 8 of the Regional Freight Strategy Discussion Draft.

NEXT STEPS

- Regional Freight Strategy Discussion Draft for JPACT input on May 17
- Update the Regional Freight Strategy Discussion Draft to finalize for release of the Regional Freight Strategy for public review in June of 2018

/Attachments

1. Regional Freight Strategy Discussion Draft (April 2, 2018)
2. Regional Freight Concept (Figure 1 in this memo and Figure 5 in the discussion draft)
3. Regional Freight Network map (Figure 6 in the discussion draft)

DISCUSSION DRAFT

2018 Regional Transportation Plan

Regional Freight Strategy

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

April 2, 2018

oregonmetro.gov/freight

Metro respects civil rights

Metro fully complies with Title VI of the Civil Rights Act of 1964 that requires that no person be excluded from the participation in, be denied the benefits of, or be otherwise subjected to discrimination on the basis of race, color or national origin under any program or activity for which Metro receives federal financial assistance.

Metro fully complies with Title II of the Americans with Disabilities Act and Section 504 of the Rehabilitation Act that requires that no otherwise qualified individual with a disability be excluded from the participation in, be denied the benefits of, or be subjected to discrimination solely by reason of their disability under any program or activity for which Metro receives federal financial assistance.

If any person believes they have been discriminated against regarding the receipt of benefits or services because of race, color, national origin, sex, age or disability, they have the right to file a complaint with Metro. For information on Metro's civil rights program, or to obtain a discrimination complaint form, visit www.oregonmetro.gov/civilrights or call 503-797-1536.

Metro provides services or accommodations upon request to persons with disabilities and people who need an interpreter at public meetings. If you need a sign language interpreter, communication aid or language assistance, call 503-797-1700 or TDD/TTY 503-797-1804 (8 a.m. to 5 p.m. weekdays) 5 business days before the meeting. All Metro meetings are wheelchair accessible. For up-to-date public transportation information, visit TriMet's website at www.trimet.org.

Metro is the federally mandated metropolitan planning organization designated by the governor to develop an overall transportation plan and to allocate federal funds for the region.

The Joint Policy Advisory Committee on Transportation (JPACT) is a 17-member committee that provides a forum for elected officials and representatives of agencies involved in transportation to evaluate transportation needs in the region and to make recommendations to the Metro Council. The established decision-making process assures a well-balanced regional transportation system and involves local elected officials directly in decisions that help the Metro Council develop regional transportation policies, including allocating transportation funds.

Regional Transportation Plan website: **oregonmetro.gov/rtp**
Regional Freight Strategy web site: **oregonmetro.gov/freight**

The preparation of this strategy was financed in part by the U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration. The opinions, findings and conclusions expressed in this strategy are not necessarily those of the U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration.

Public service

We are here to serve the public with the highest level of integrity.

Excellence

We aspire to achieve exceptional results

Teamwork

We engage others in ways that foster respect and trust.

Respect

We encourage and appreciate diversity in people and ideas.

Innovation

We take pride in coming up with innovative solutions.

Sustainability

We are leaders in demonstrating resource use and protection.

Metro's values and purpose

We inspire, engage, teach and invite people to preserve and enhance the quality of life and the environment for current and future generations.

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CHAPTER 1

INTRODUCTION

FREIGHT'S ROLE IN THE REGION'S ECONOMY

The 2018 Regional Freight Strategy sets regional freight policy. 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.

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 has been 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, TPAC and 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: The following is a list of the members of the Regional Freight Work Group:

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: Alternates for the Regional Freight Work Group:

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 for better incorporating 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

To be completed later.

1.5 Document organization

To be completed later.

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.

> **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.

The Cost of Congestion to the Economy of the Portland Region (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. These industries depend on a well-integrated and well-functioning international and domestic transportation system to stay competitive in a global economy. 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[1] – 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 here 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 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, yet increasingly fragile.

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.[2] 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

[1] 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 are 30.2% (population) and 39.2% (employment).

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

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 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. This trend places new demands on the goods movement infrastructure and reinforces the need to reconsider our approach to providing goods movement infrastructure. 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 economy, 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 failing certain 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. Other resource based industries in, or 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.

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.

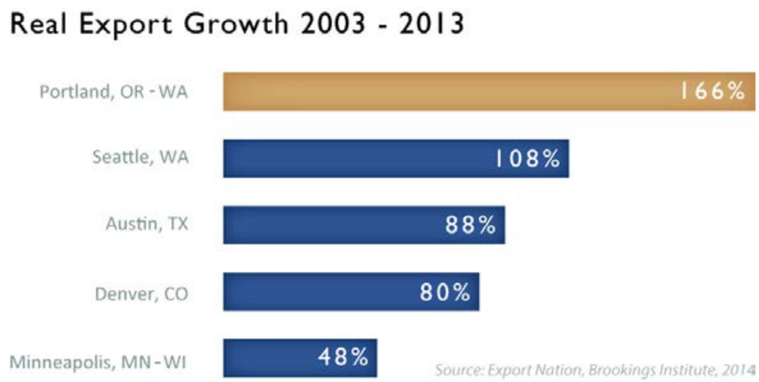
And as the global economy recovers and grows, the Portland metro region will be called upon to address vastly expanded regional, national and international shipping needs reliably, safely, efficiently and sustainably. We have a responsibility to the region, the state and the nation to maintain an efficient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

2.4 Portland 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.

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 1: 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. (Portland Business Journal April 2017)
- 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 10 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 can 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.

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 serving as an economic pump, 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 regional 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. 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 and can also result in a loss of customers over time. This can drive companies to consider relocating outside the region or prevent companies from starting up operations in the region.

2.7 Jobs and infrastructure

The logistics and (freight) transportation sectors provide 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 also perform the vital task of distributing the myriad of goods that Oregonians consider essential to the maintenance of our households, businesses and communities.

One critical element of sustaining the region's high quality of life is ensuring that residents have access to family wage employment. 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.

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. The study uses both aspirational cities and peer cities as comparators to help offer perspective on exactly how Portland-Metro is performing as a region in relation to other parts of the country. Fundamentally, the objective of the report is to present comprehensive data on the trends of Middle-income jobs and to highlight the impacts these trends have on the Portland-metro area and its residents.

The term middle-income is used frequently throughout the study. Within the bounds of this study middle-income is defined as an annual income between $29,420 and $50,360 based on median wages in 2013. The middle is also divided into two categories lower-middle and upper-middle. The lower-middle ranges from $29,420 to $35,170 while the upper-middle is defined as jobs that pay between $40,730 and $50,360. By providing these two categories we are able to more accurately track the trends of job polarization.

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.

While the list above is not comprehensive it gives a good outline of the markets that typically offer middle-income jobs. Understanding these markets and the educational requirements of jobs in this income range are the first steps toward understanding why we have experienced a proportional decline in the amount of middle-income jobs in the last 30 years.

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 2: Change in employment by wage group, peers

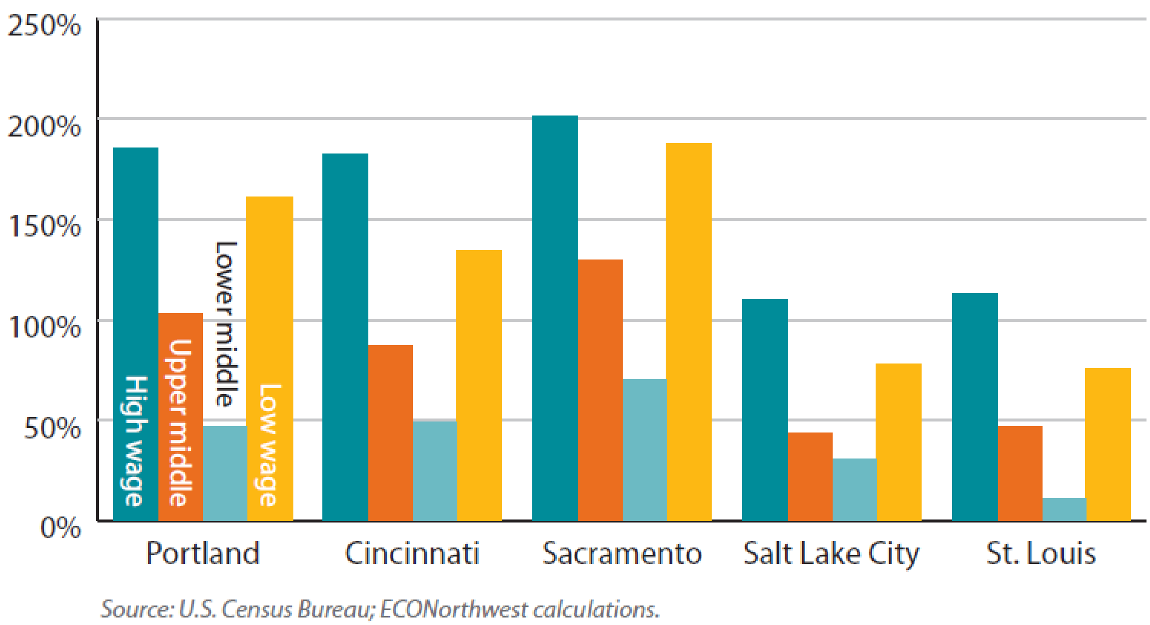
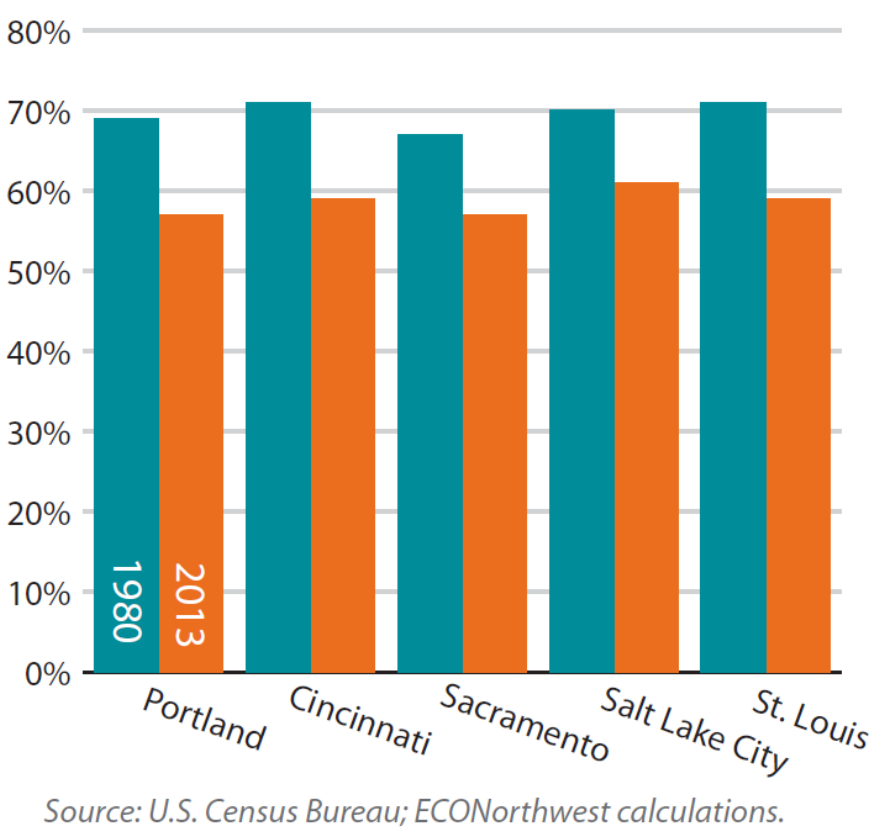


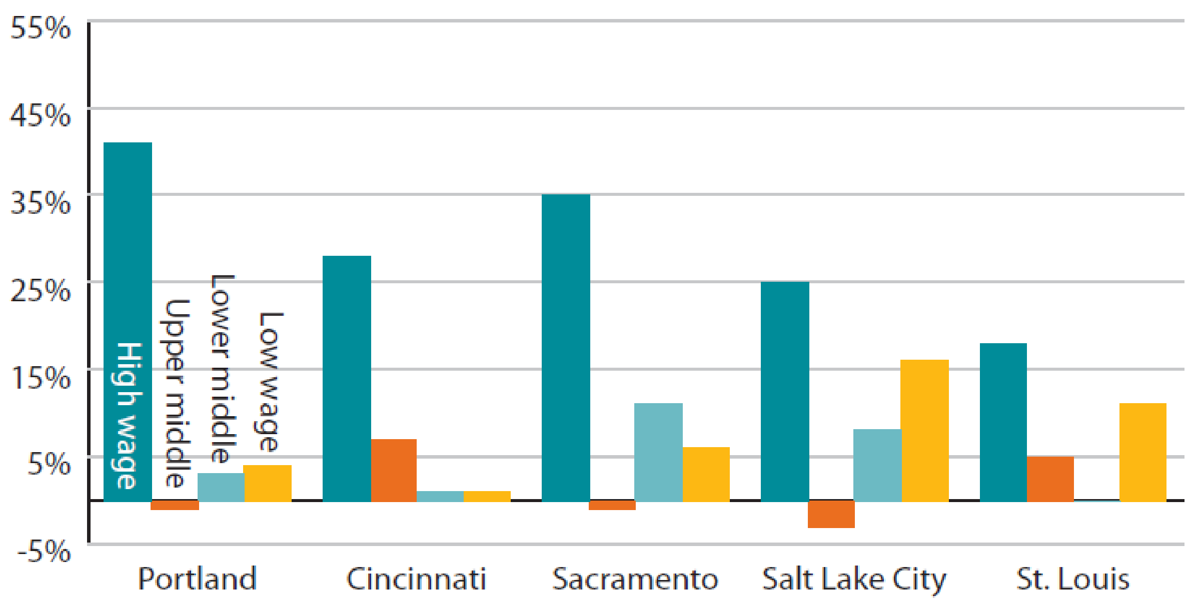
Figure 3: Middle-wage job share, peer cities, 1980 and 2013



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 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 worse in growth of median wages in every category except high-wage.

Figure 4: Growth in real median wages by wage group, peers, 1980-2013



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

Findings

As technology has progressed, naturally job markets have as well. The result of all this data offers a pretty clear outline of what is happening in the Portland-Metro area and, what will likely continue to happen if strategies to change the trend are not engaged.

It is important to come up with strategies that help make this 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** – Technology will continue to advance and many jobs today won't be jobs tomorrow. However, regions that invest in education and training will be more resilient to the changes associated with more technology-based 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 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. Policies and programs designed to take advantage of the opportunities hidden in the downturn should begin to be refined and implemented, to ensure that the Portland metro region is flexibly and securely positioned for the future of freight and goods movement.

However, in addition to regional policy and program development and implementation, 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; our economic future depends on it. 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 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.

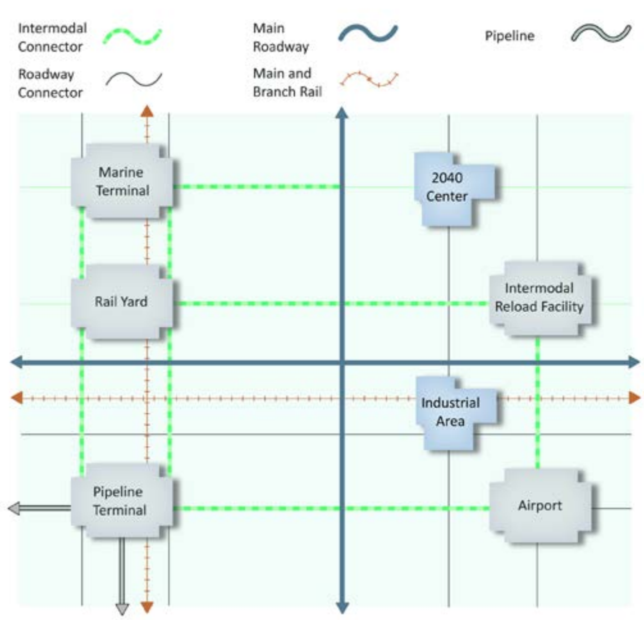
3.2 Regional Freight Concept

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 5 shows the components of the regional freight system and their relationships.

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.

Figure 5. Regional freight concept



Note: Figure 5: Regional freight concept will also be in Chapter 2 of the updated RTP.

The Regional Freight Network map, shown as Figure 6 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 being 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 GIS 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"[3] (footnote: FHWA Freight Management and Operations NHS Connectors). The four subsystems are Interstates; Other Principal Arterials; the Strategic Highway Network; and Major Strategic Highway Connectors. NHS intermodal connectors account for less than one

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

percent of total nationwide NHS mileage, but these roads are critical for the timely and reliable movement of freight[4].

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 [5]
- 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

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

[5] *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

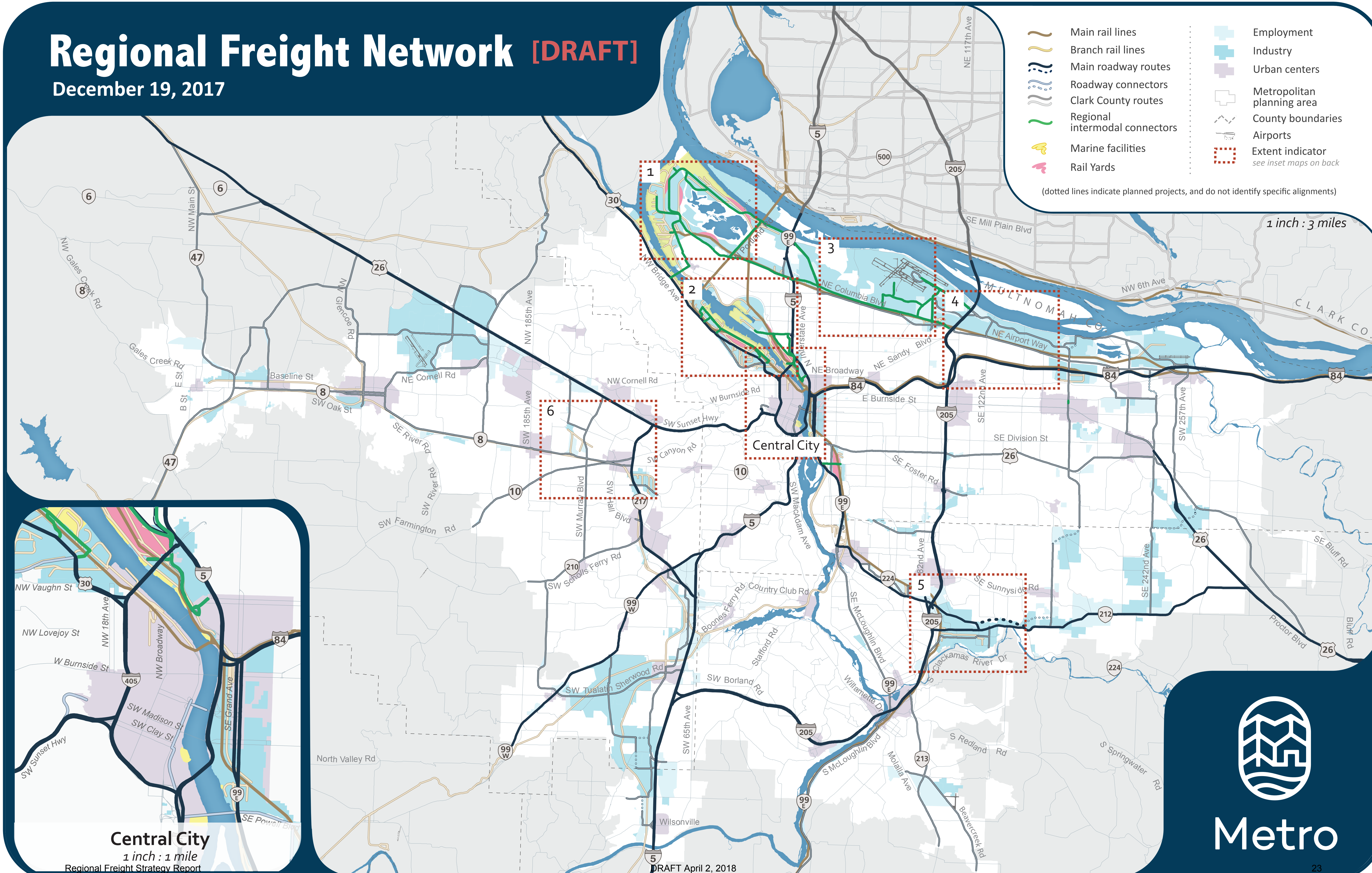
In 2008, the Regional Freight and Goods Movement (RFGM) Task Force developed six goal statements to elaborate a policy framework that would protect and improve the cost-effective functioning of the critical regional freight network. They also developed five policies to serve as the foundation of the 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:** Educate 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:** Integrate freight mobility and access needs into land use and transportation plans and street design to protect industrial lands and critical freight corridors with access to commercial delivery activities.
- **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.

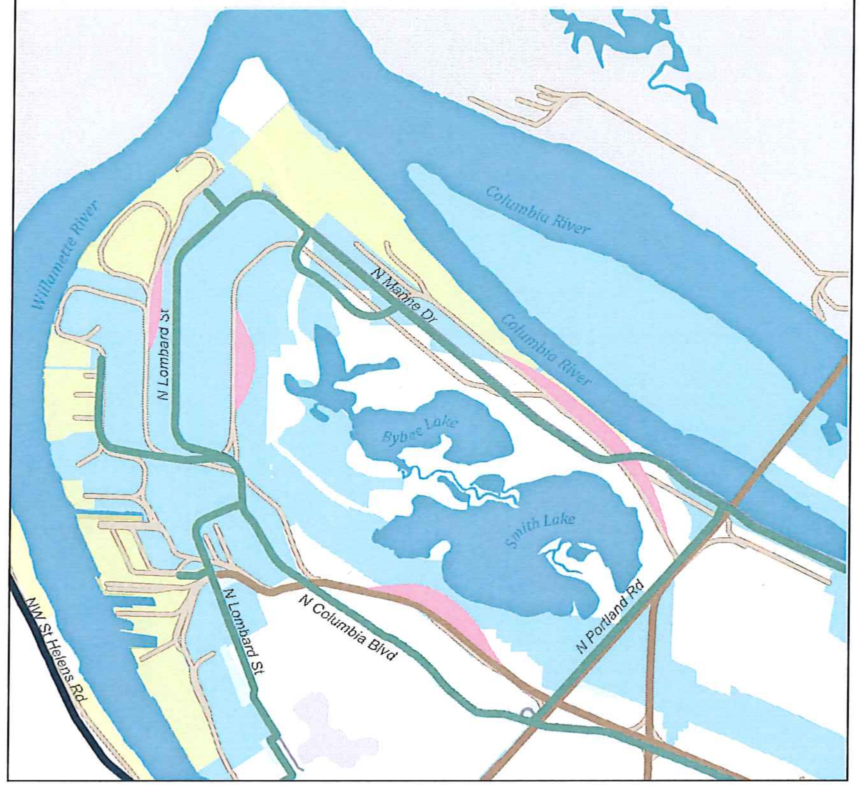
Regional Freight Network [DRAFT]

December 19, 2017

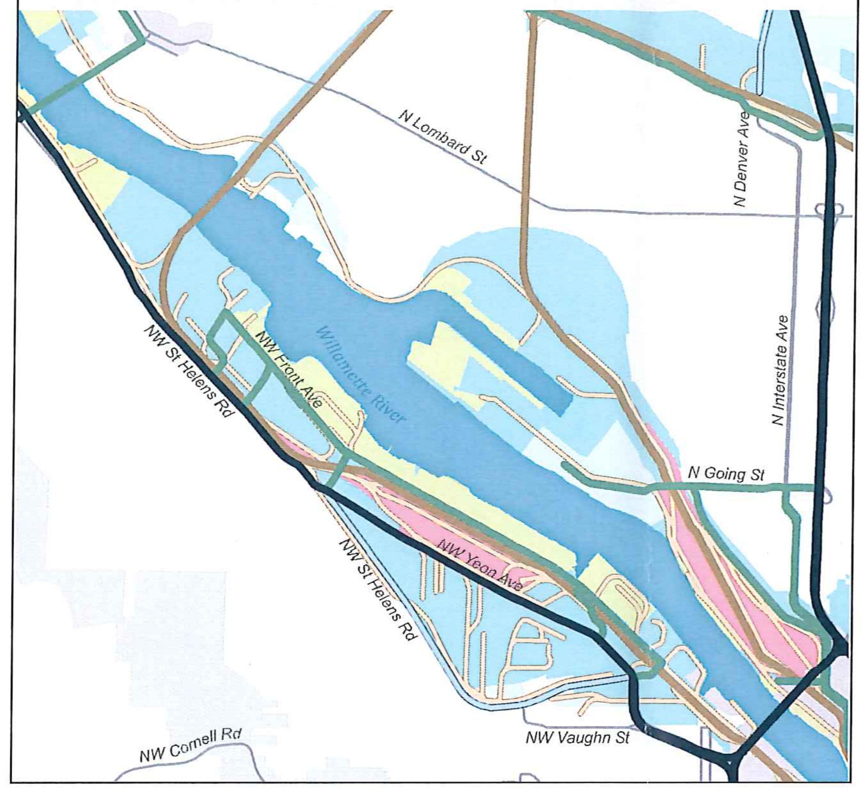


[DRAFT]

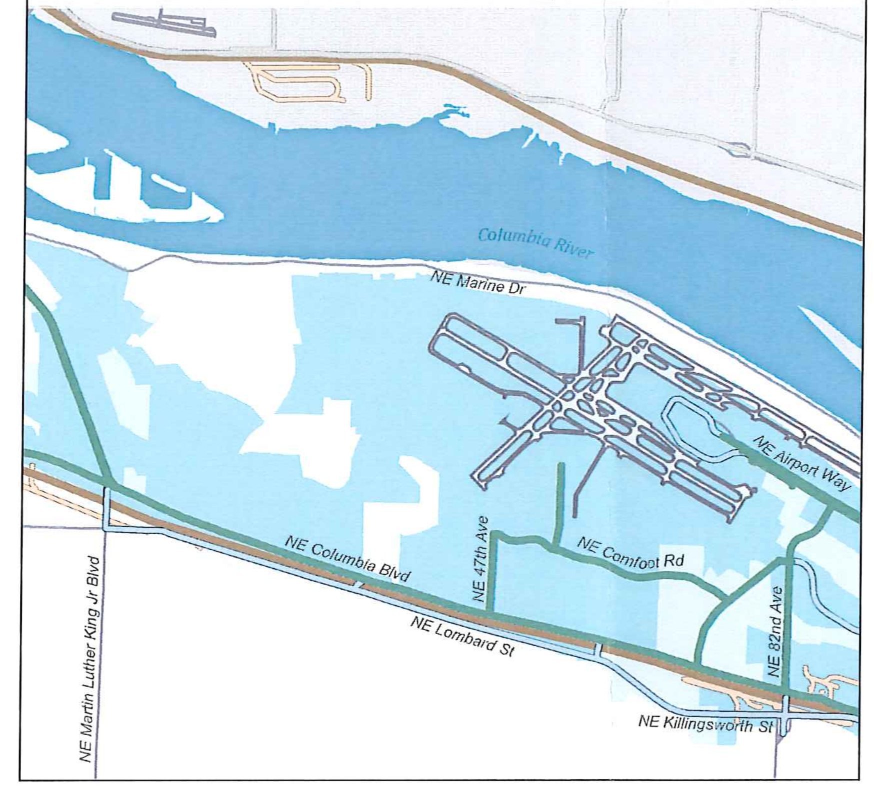
1. North Portland Marine Terminals



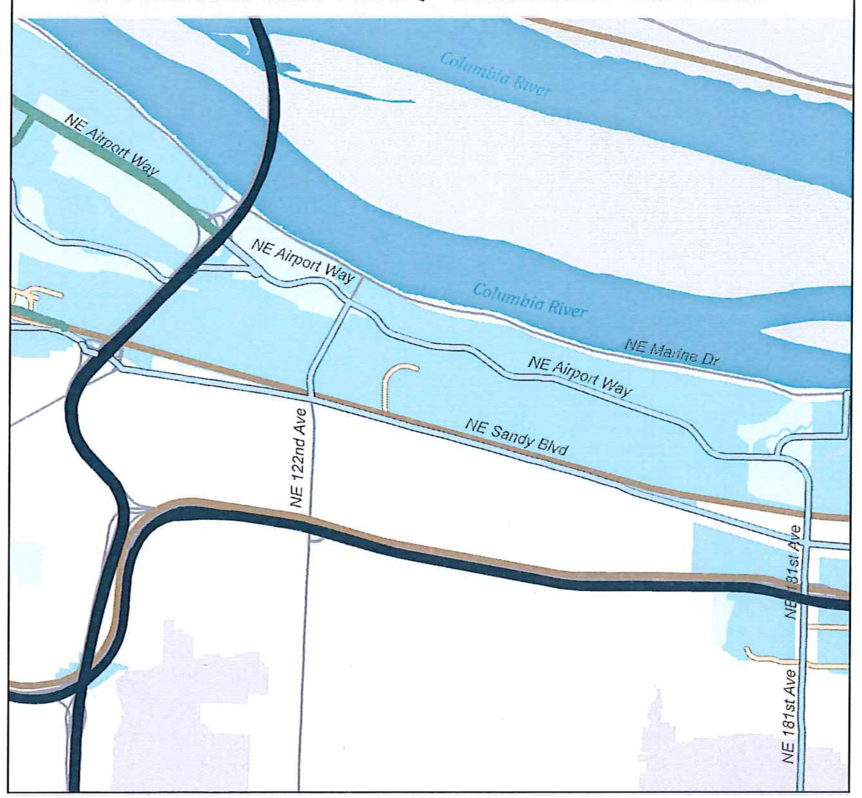
2. NW Industrial and Swan Island Areas



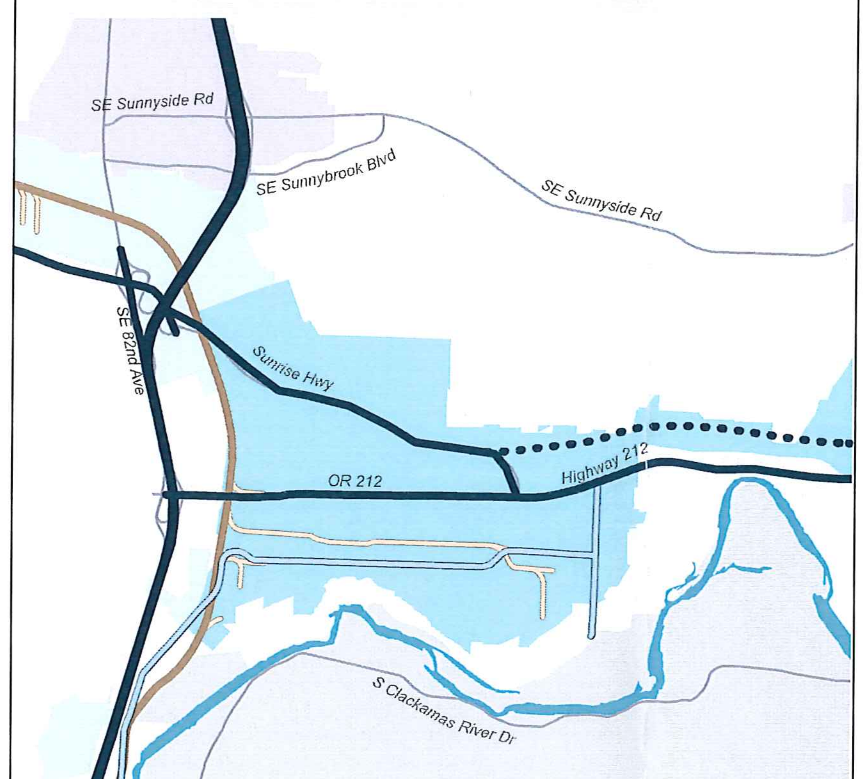
3. Portland International Airport + Airfreight



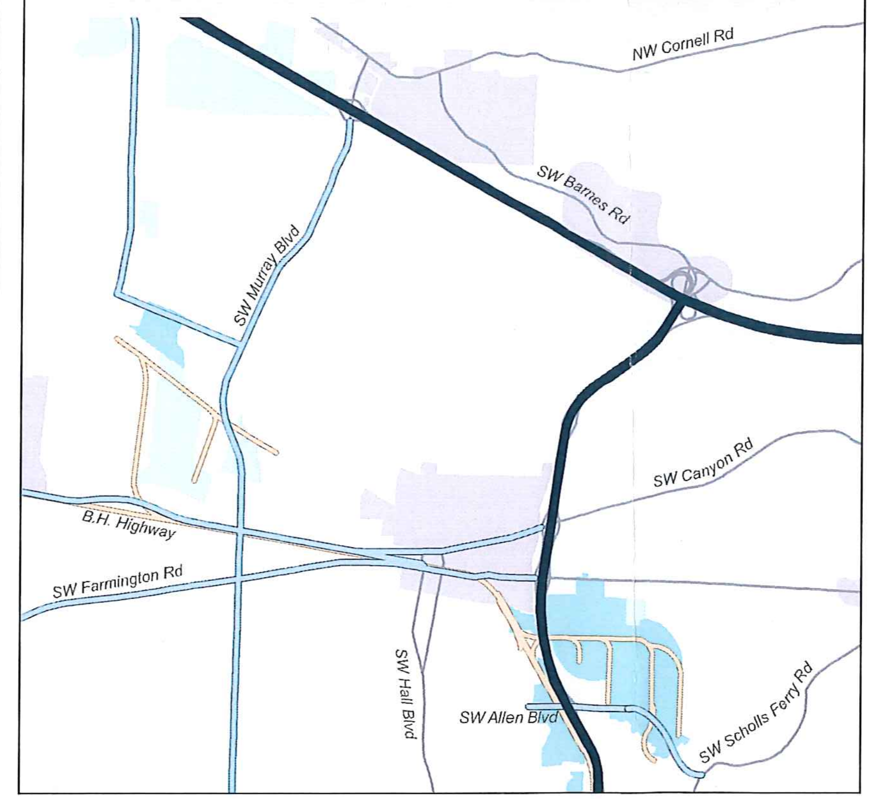
4. Kenton Rail Line / Columbia Corridor



5.Clackamas Industrial Area



6. Beaverton Industrial + Branch Rail Lines



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

All insets adhere to the following scale:

1 inch : 1 mile

October 18, 2017

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 ause 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.
- Deepen 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)

Issue category	Key issues
Environment	• Air quality impacts from diesel engine emissions • Residential noise impacts from truck, rail and air cargo operations • Water quality
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:

<u>Freight bottlenecks and congestion</u>

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 7: Corridor-Level Performance

Corridor-level performance

Region's corridors with slowest average weekday speed (mph)

Source: FHWA NPMRDS

Average Speeds				
Corridor Location	Time of Day	2013	2015	Change
I-405 SB	12	31.9	29.0	-2.9
I-405 NB	12	33.8	30.2	-3.6

I-405's average speed for the PM period is the lowest in the region.

I-5 NB	12	36.4	31.5	-4.9
I-5 SB	12	42.3	38.2	-4.1

I-5's average speed for the PM period is among the lowest in the region, with a significant degradation of speed from 2013 to 2015.

I-205 NB	12	42.6	35.4	-7.2

I-205's average speed for the PM period is among the lowest in the region, with the largest degradation of speed from 2013 to 2015.

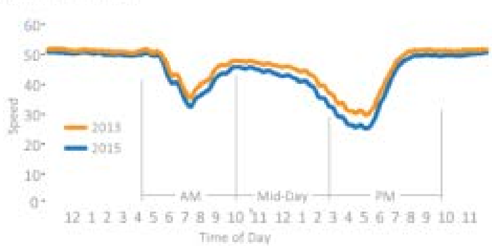
OR 217 SB	12	32.4	35.3	+2.9

OR 217 SB's average speed for the PM period is among the lowest in the region, but it has shown a slight improvement in speed. This is a result of the Active Traffic Management implementation project in 2014.

Weekday system speed by time of day

2013 vs. 2015

Source: FHWA NPMRDS



2016 Portland Traffic Performance Report
Oregon Department of Transportation

Region's top recurring bottlenecks

These are the most severe recurring bottlenecks for each corridor

Source: FHWA NPMRDS

Bottleneck location	2013	2015	Change
I-5 NB I-5 Interstate Bridge ► Capitol Hwy 11.5 Miles	1:30 - 7:30 PM *6.0 hrs*	1:30 - 7:30 PM *6.0 hrs*	--
I-5 SB Rose Quarter ► Rosa Parks Way 3.0 Miles	7:45 9:30 AM *1.75 hrs* 12:30 - 6:00 PM *5.5 hrs*	7:45 - 9:45 AM *2.0 hrs* 11:00 AM - 6:15 PM *6.5 hrs*	*+2.0 hrs*
I-84 EB I-205 ► I-5 6.0 Miles	1:00 PM- 7:00 PM *6.0 hrs*	12:30- 7:00 PM *6.5 hrs*	*+0.5 hrs*
I-205 NB Abernathy Bridge ► I-5 8.5 Miles	— —	3:15 - 6:15 PM *0"#$%&'*	*+3.0 hrs*
I-205 NB Glenn Jackson Bridge ► Powell 5.8 Miles	3:30 - 6:30 PM *0"#$%&'*	2:45 - 6:30 PM *0"/)$%&'*	*+0.75 hrs*
I-205 SB Division ► Glenn Jackson Bridge 5.3 Miles	2:30 - 6:00 PM *3.5 hrs*	2:15 - 6:00 PM *3.5 hrs*	--
I-405 SB I-5 ► Fremont Brg. 3.5 Miles	2:30- 6:15 PM *3.75 hrs*	2;15 - 6:15 PM *4.0 hrs*	*+0.75 hrs*
US 26 EB Vista Ridge Tunnel ► OR 217 4.9 Miles	7:00 - 9:15 AM *2.25 hrs* 12:00 PM- 7:00 PM *7.0 hrs*	6:15 - 11:59 AM *5.75 hrs* 12:00 PM- 7:45 PM *7.75 hrs*	*+4.25 hrs*
OR 217 SB Hall Blvd ► US 26 3.5 Miles	1:00 - 6:15 PM *5.25 hrs*	12:00 - 6:15 PM *6.25 hrs*	*+1 hour*
OR 217 NB Denny Rd ► I-5 3.5 Miles	7:15 - 9:00 AM *1.75 hrs* 3:00 - 6:30 PM *3.5 hrs*	7:15 - 9:00 AM *1.75 hrs* 3:00 6:30 PM *3.5 hrs*	-- --

Figure 8: Travel Time Reliability Summary

Region's reliability

Travel time reliability summary

Source: FHWA NPMRDS

Corridor location	Time of day	Travel time buffer (minutes) 2013	2015	Change	% Change
Corridors with least reliable travel*					
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*					
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*					
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 location	Time of day	Travel time buffer (minutes) 2013	2015	Change	% Change
Corridor with improved buffer time* and reliability					
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 location	Time of day	2013	2015	Change	% Change
Corridor that experienced sustainable reliability					
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 9: 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 10: Corridor Length

I-5 Corridor –I-5 truck volume accounts for 10 to 17 percent of total traffic, and has 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.

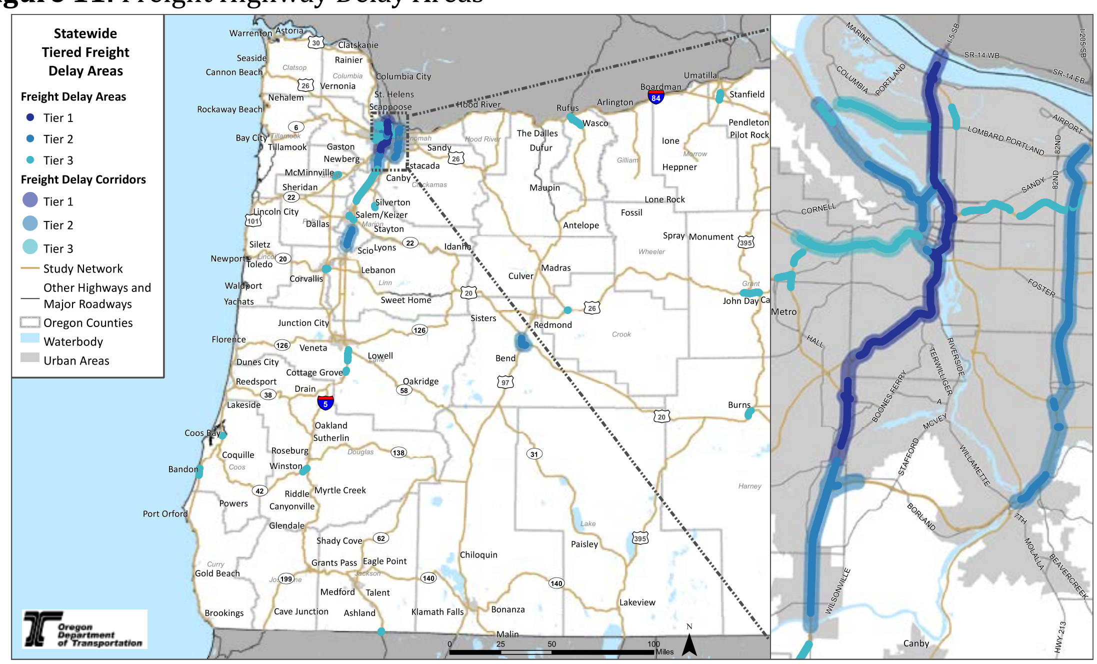
Some considerations the stakeholder groups identified at various points in the project that were incorporated into the final list included:

- **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 were 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 11: 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 12.) Note that the study area within these corridors includes the ramp merge and diverge locations in addition to the roadway mainline. Figure 12 (below) highlights the boundaries of the study area.

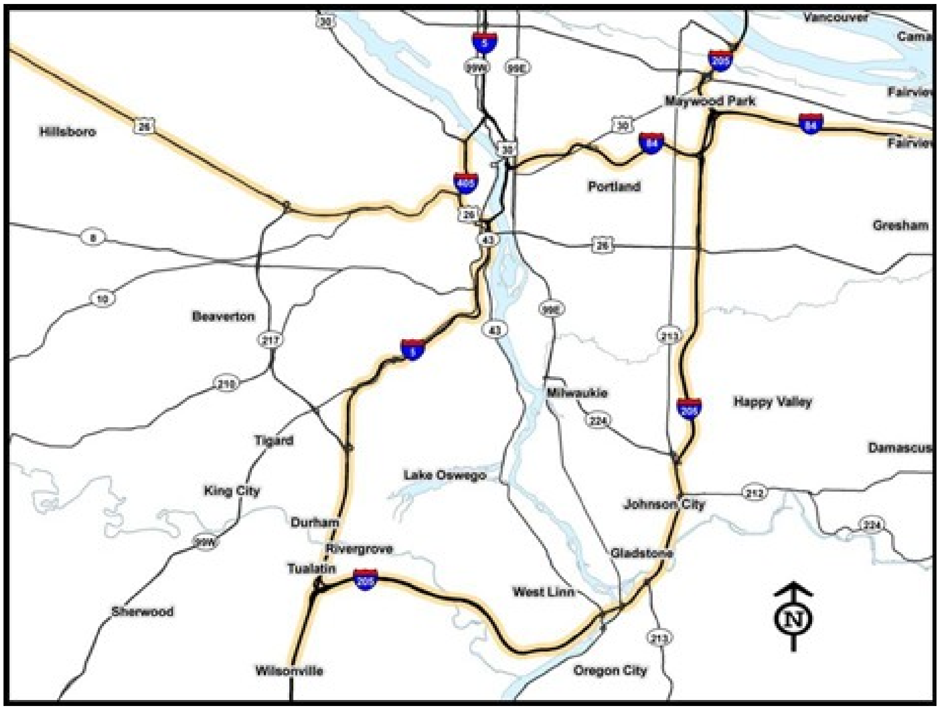


Figure 12: The Study Area in the CBOS

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

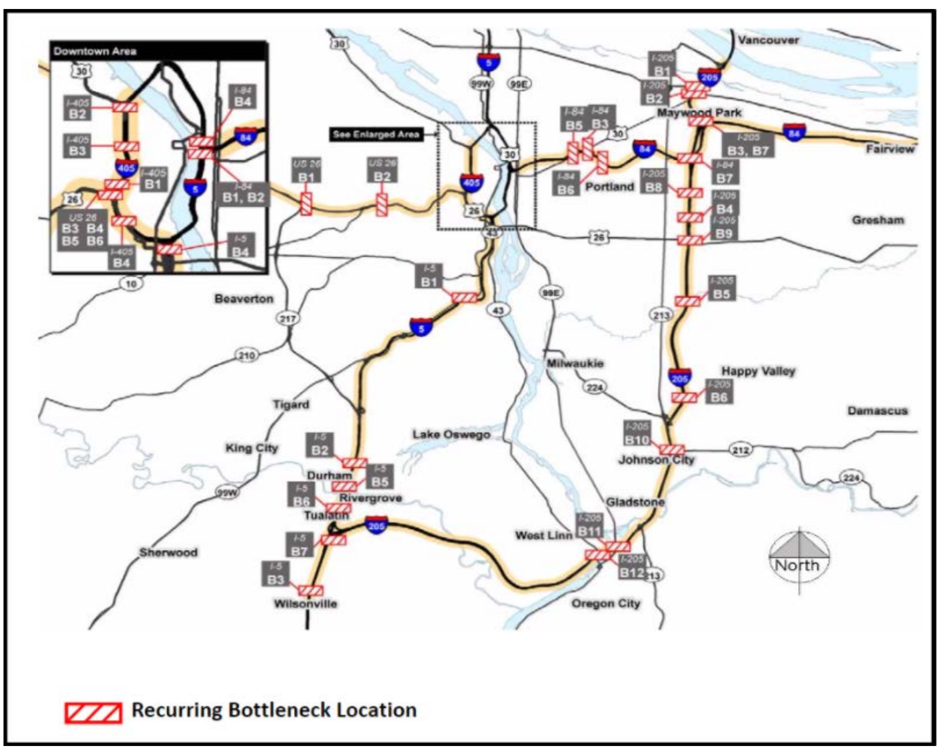


Figure 13: Bottleneck Locations

Findings
The conclusion of the study offered helpful information regarding the location, duration, and typical cause of each bottleneck. The study identified thirty-six (36) recurring bottleneck locations distributed throughout the five corridors. Figure 13 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 of 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.

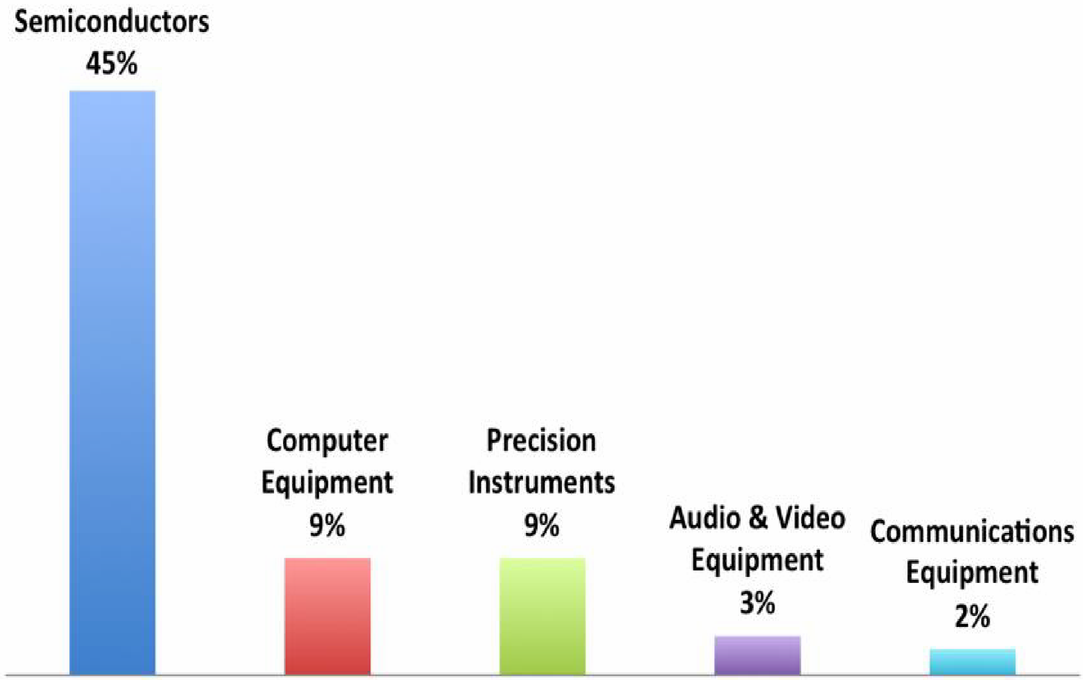
- Failure to adequately invest in the transportation system will result in significant losses to Oregon's economy, job base and quality of life. Congestion is becoming an increasing problem statewide, and that investments in infrastructure can strongly mitigate these conditions.
- These travel time savings 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.

<u>Freight access and logistics</u>

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 (Figure14). 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 14: Industries Representing Two Percent or More of the Portland Region's Exported Goods



Source: Brookings Instituion Export Nation 2013 (http://www.brookings.edu/research/interactives/export-nation)

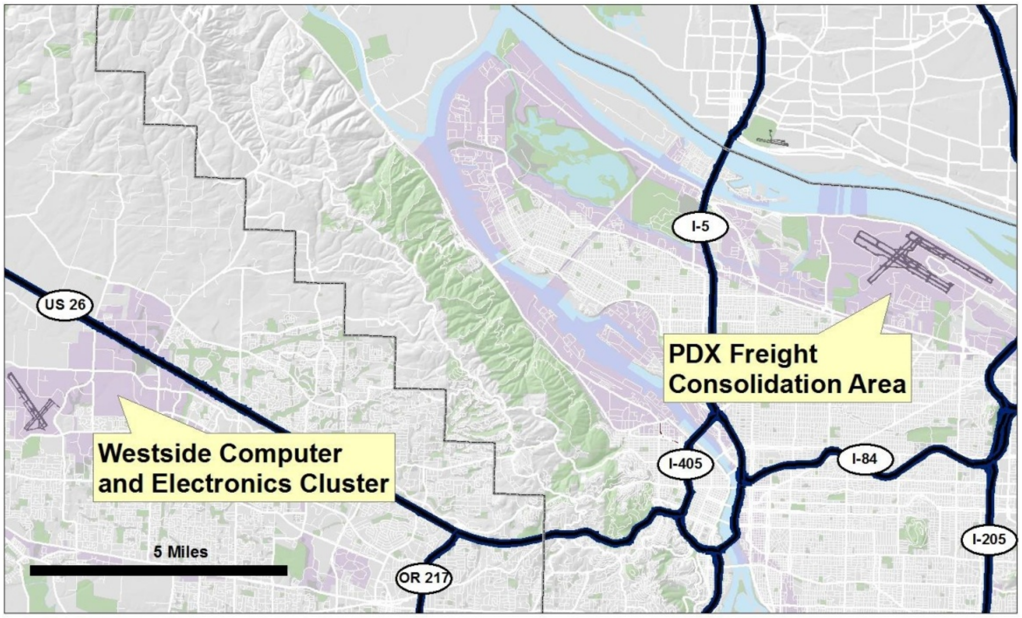
While this study focused on a single sector of the region's export economy, it is important to recognize that policies and investments that support the computer and electronics industry may support other key export industries such as footwear, apparel, and agricultural products.

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 15. 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 15: 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 and 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 p.m. "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 Masterplan.

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

Figure 16: Insert a map of Highway Over-Dimension Load Pinch Point location if available

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.

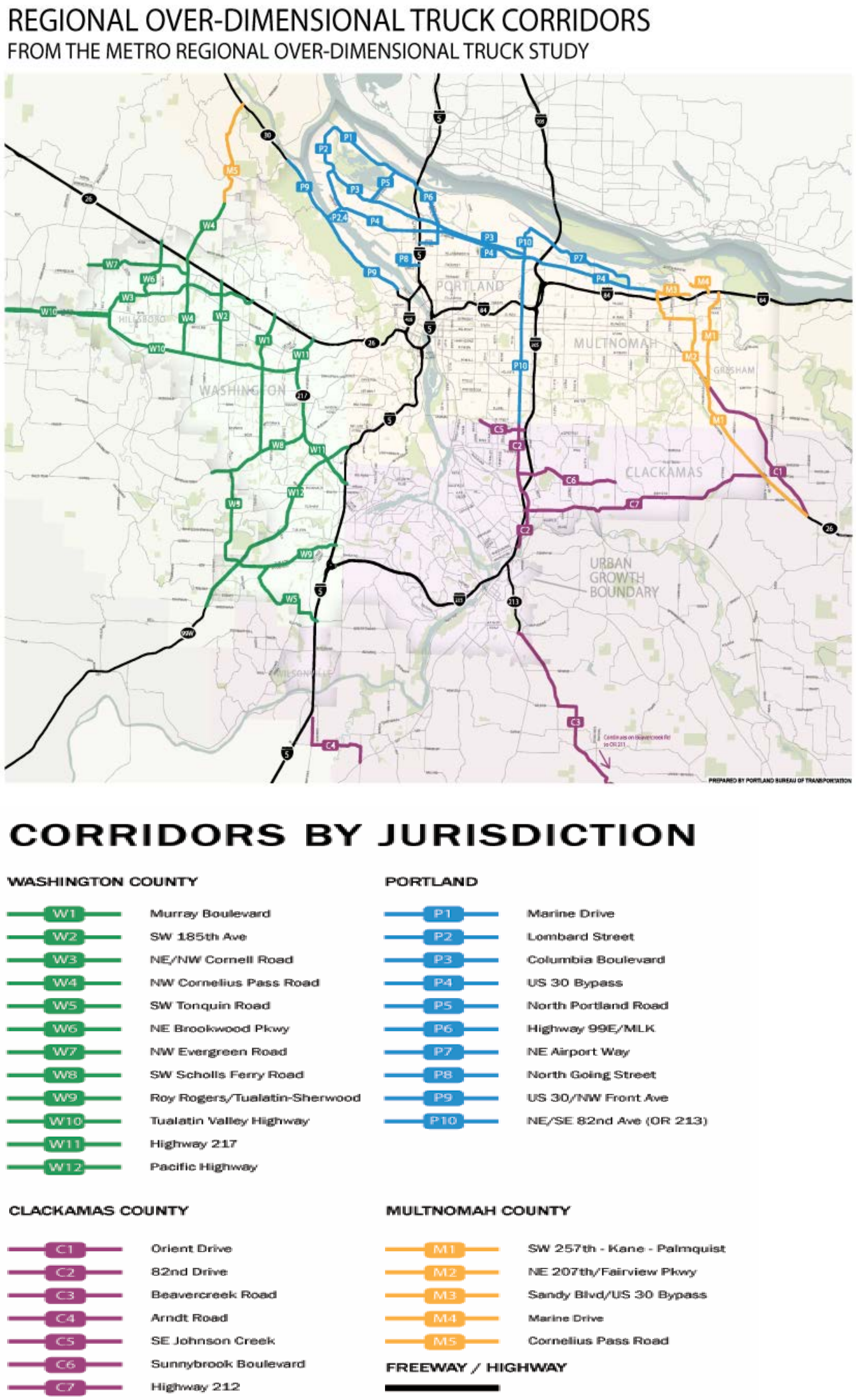
The study was initiated in October 2015 and concluded in March 2017. The Project Management Team (PMT) consists of representatives from the partner agencies to provide project oversight and guidance. The project consultant conducted the technical planning and engineering analysis, cost considerations 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 17).

Figure 17: 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 skirts 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.

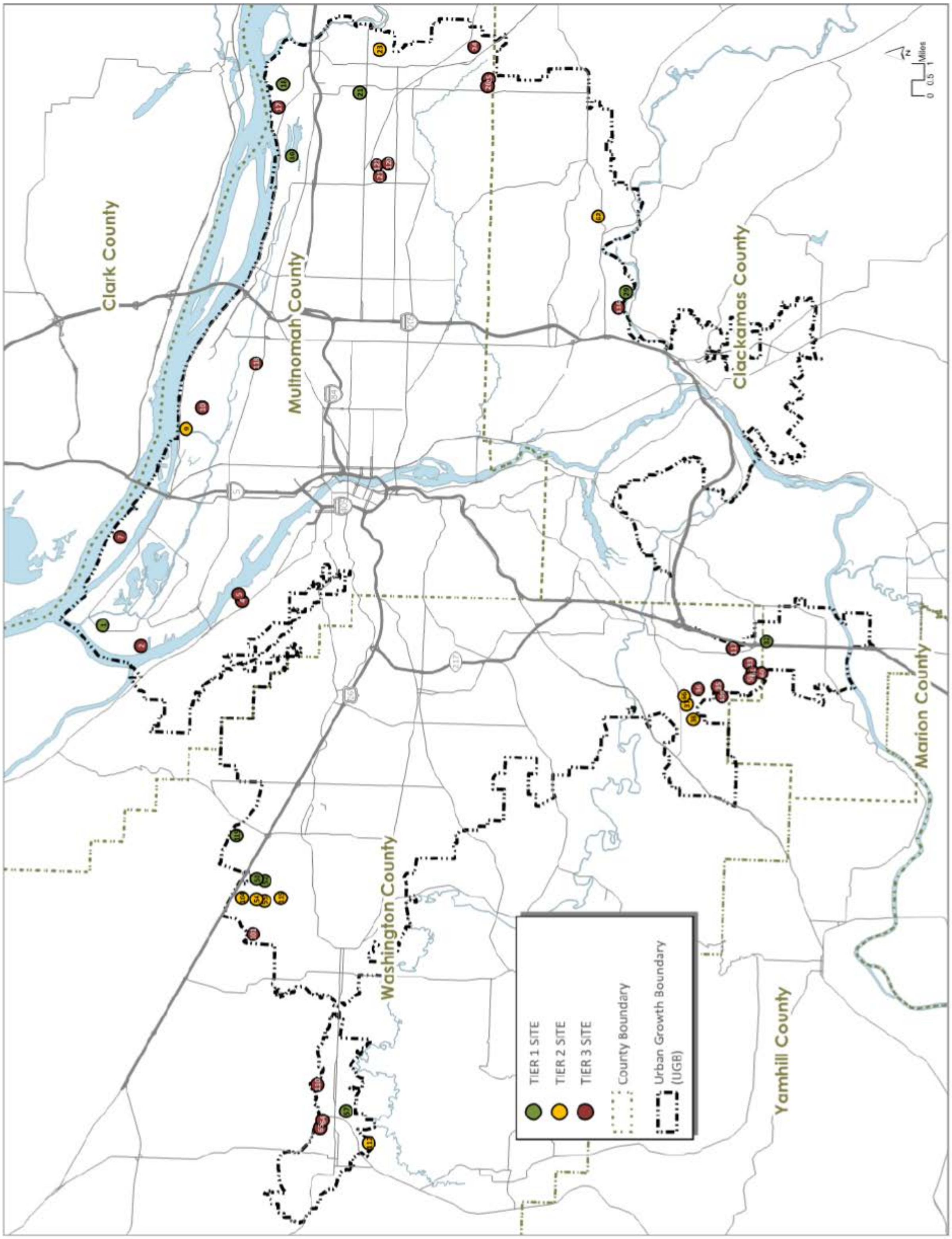
State Legislative Actions

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 18: 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 during 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[6].

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.

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[6] 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 12.7million 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

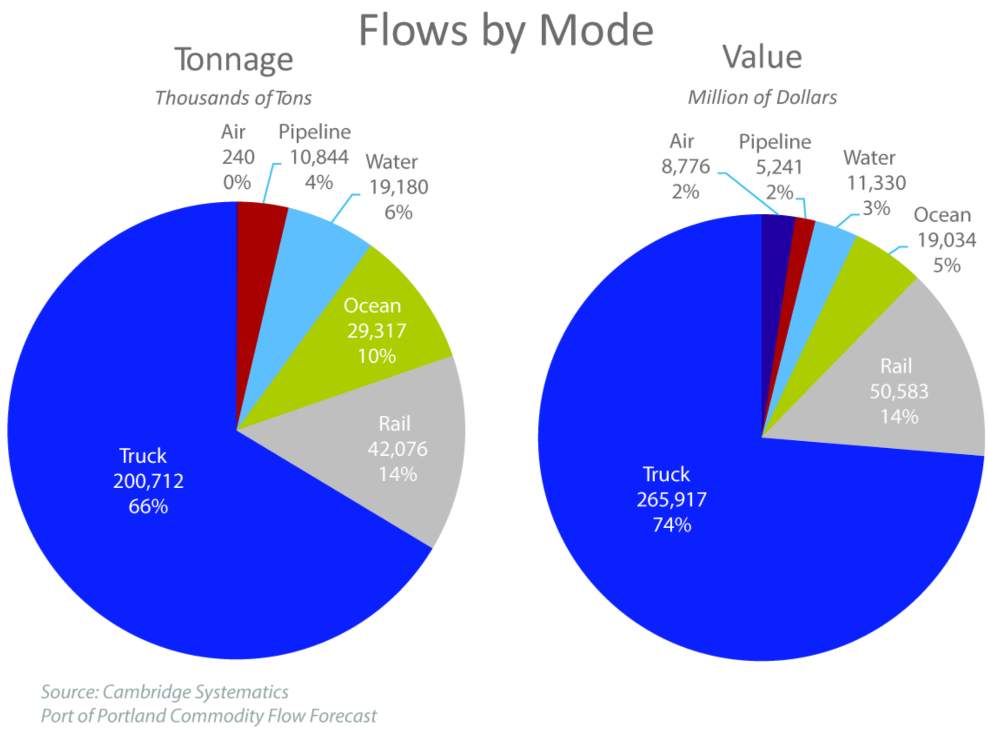
Trucks will remain the predominant mode of freight transport for the foreseeable future, due to their flexibility, speed, adaptability and availability. And though more than 90 percent of total regional truck trips begin and/or end within our region, as much as 52 percent of the total truck traffic entering the region via the interstate system is through traffic[7]. This reflects the importance of

[7] 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. About 14% of the commodities moved by rail.[8]

Figure 19: 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.

[8] 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[9] 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.

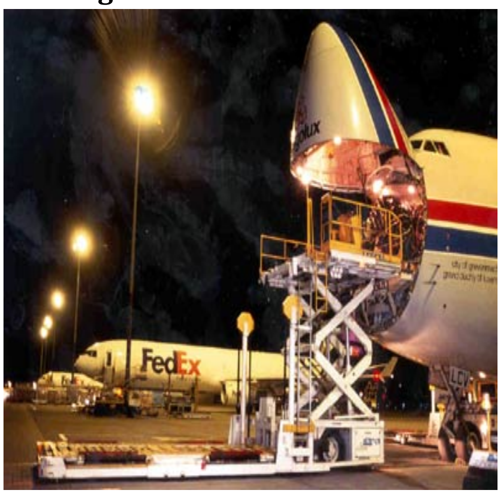
Issues in the Portland Triangle area include inadequate siding lengths (Class 1 railroads are now fielding up to 8,000 foot long unit trains), rail bridges with inadequate capacity and lowered sufficiency ratings, at-grade rail crossings, sidings and mainline track sections that are over capacity. Other 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.

[9] 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. [10] In 2015, air freight carriers moved 228,428 tons of cargo

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

through Portland International Airport. East Asia markets accounted for just over half of Oregon' air exports (Port of Portland)

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 bulks. 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.

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.[11]

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

[11] 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. Siting, 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.[12]

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.

[12] 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.[13]

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[14]. The goods movement industry is responding to the

[13] FHWA ITS Joint Program Office website

[14] *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 ten 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.[15]

[15] 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, ten 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).[16]

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.

[16] 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:
        - o 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
        - o System planning, modeling and analysis
    - ➢ Freight access/industrial land aspects of land use planning
        - o Input into selecting and carrying out regional corridor refinement plans
        - o Metropolitan Transportation Improvement Program (MTIP) funding and project selection processes
        - o Provide input into ConnectOregon criteria and selection
        - o Development of analytical tools, data bases, performance measures and policies
        - o Prioritization of investments and projects with a freight and economic development perspective
        - o 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
        - o Assisting localities with transportation system plan (TSP) freight components
    - ➢ Freight and goods movement, jobs and economic development
        - o Develop policy and business support for transportation funding initiatives, including possible fees or pricing strategies
        - o 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. Educate 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). 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 support 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**

  - ➢ 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 idle reduction regulations, etc.

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

8.6 Policy 5. Integrate freight mobility and access needs into land use and transportation plans and street design to protect industrial lands and critical freight corridors with access to commercial delivery activities

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 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 (noting, e.g., 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. 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 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:
    - o Leverages private investment
    - o Allows progression of a needed project that would otherwise not occur for a relatively modest investment
    - o Involves a facility's yard or terminal but has regional impacts
    - o Pays for intermodal links
    - o Creates new passenger capacity by solving freight bottlenecks
    - o Preserves or creates jobs, generates wealth and taxes
    - o Allows for more competition, modes or choices to shippers, businesses or consumers
    - o 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 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 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, the counties of Clackamas, Multnomah and Washington, and the cities within the region; as part of round 1 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.

(This section will be completed after the completion of round 2 of the RTP call for 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. 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-metalic 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 of 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 1-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 clearer understanding of land use policies such as the role of warehousing and distribution in the process, and 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 of 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 identifies 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 need for this study will be determined and defined later. Consideration will be made for the Kenton Rail Line Study to become part of the Regional Freight Rail Study.

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
    - 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 22nd 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; 3) Pedestrian crossing improvements to enhance safety at railroad crossings.

City of Portland staff suggested that the study look at a regional strategy for how and when 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.

Kenton Rail Line Study

The need for this study will be determined and defined later.

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 [17] 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 [18]	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. The 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

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[17] 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

[18] 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.)

would be replaced by the federal performance measure for ***Freight movement and economic vitality*** *using the same methodology:*

- Percent of Interstate System miles with reliable truck travel times[2].

(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 (example - 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 years. 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.

(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 years. 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).

(To be completed later)

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 the 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.

(This is placeholder language and will be completed later)

Freight Evaluation Measure and Refinement of Regional Mobility Policy (In development)

Freight Mobility and Industrial Access Measure

This measure is being developed and tested as part of the 2018 RTP Systems Evaluation work. The process has consisted of 1) choosing two industrial areas; one being the Tualatin Industrial Area off Tualatin-Sherwood Road; and the second being Marine Terminals 5 and 6, and the rail yards off Marine Drive; 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.

(This is placeholder language and will be completed later)

Refinement of the Regional Mobility Policy

The U.S. Department of Transportation issued new regulations for states and Metropolitan Planning Organizations that will require greater monitoring of mobility on the freeway system and setting targets for system performance.

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.

ACRONYMS

GLOSSARY

APPENDIX A

2018 REGIONAL TRANSPORTATION PLAN FREIGHT PRIORITIES PROJECT LIST

2018 RTP Freight Projects and Programs (final draft) - Appendix A

RTP Investment Category	County	Nominating Agency	2018 RTP ID	Project Name	Start Location	End Location	Primary Purpose	Description	Estimated Cost (2016 dollars)	Time Period	Financially Constrained?
Freight	Clackamas County	Milwaukie	11624	Local Street Improvements in Tacoma Station Area	Location-specific	Location-specific	Increase freight access to indust & intermodal fac	Construct street improvements on Stubb St, Beta St, Ochoco St, Hanna Harvester Dr, and Mailwell Dr. (TSAP)	$ 5,600,000	2028-2040	No
Freight	Clackamas County	Wilsonville	11764	Boones Ferry Road Extension	Commerce Circle	Ridder Road	Increase freight access to indust & intermodal fac	Construct 3-lane section with bike lanes and sidewalk	$ 2,100,000	2028-2040	Yes
Freight	Multnomah County	Gresham	10446	181st: at Burnside	181st/Burnside	181st/Burnside	Increase system efficiency	Optimize intersection operation. Transit/Enhanced Transit Corridor supportive project.	$ 1,000,000	2028-2040	Yes
Freight	Multnomah County	Gresham	10495	181st: at Halsey	Halsey St.	Halsey St.	Relieve current congestion	add 2nd LT lane to N & S legs, add RT lane to EB WB SB.	$ 1,089,615	2028-2040	Yes
Freight	Multnomah County	Gresham	10496	181st: at I-84	181st/I-84	181st/I-84	Increase freight access to indust & intermodal fac	Freight mobility improvements subject to refinement study. Transit/Enhanced Transit Corridor supportive project.	$ 1,000,000	2028-2040	Yes
Freight	Multnomah County	Multnomah County	11600	Marine Drive at 223rd	Marine Drive at 223rd	Marine Drive at 223rd	Increase freight access to indust & intermodal fac	Widen to accommodate freight traffic and provide bike/ped facilities	$ 10,630,000	2028-2040	No
Freight	Multnomah County	Port of Portland	10363	SW Quad Access	NE 33rd Ave.	SW Quad	Increase freight access to indust & intermodal fac	Provide street access from 33rd Ave. into SW Quad.	$ 6,290,303	2018-2027	Yes
Freight	Multnomah County	Port of Portland	10379	Marine Dr. Improvement Phase 2	BNSF grade crossing on Marine Drive	BNSF grade crossing on Marine Drive	Increase freight access to indust & intermodal fac	Construct rail overcrossing on Marine Dr.	$ 14,503,785	2018-2027	Yes
Freight	Multnomah County	Port of Portland	11207	T6 Modernization	Terminal 6	Terminal 6	Increase freight access to indust & intermodal fac	Provide improvements to container terminal including crane electronics and storm water improvements.	$ 8,504,000	2028-2040	Yes
Freight	Multnomah County	Port of Portland	11208	T4 Modernization	Terminal 4		Increase freight access to indust & intermodal fac	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
Freight	Multnomah County	Port of Portland	11306	T6 Second Entrance from Marine Drive	N. Bybee Lake Rd.	N. Pacific Gateway	Increase freight access to indust & intermodal fac	Construct 2nd entrance from Marine Drive and internal rail overcrossing to Terminal 6. .	$ 12,756,000	2028-2040	Yes
Freight	Multnomah County	Port of Portland	11307	T6 Suttle Road entrance	Terminus of N. Suttle Road	Terminal 6	Increase freight access to indust & intermodal fac	Access to the east end of Terminal 6 off the terminus of Suttle Road.	$ 3,189,000	2028-2040	Yes
Freight	Multnomah County	Port of Portland	11309	Cully Blvd. Grade separation	Columbia	Lombard	Increase system efficiency	Construct roadway overcrossing at NE Cully Blvd. over Kenton line.	$ 37,205,000	2028-2040	No
Freight	Multnomah County	Port of Portland	11353	West Hayden Island Rail Access	BNSF Rail Bridge	West Hayden Island	Increase freight access to indust & intermodal fac	Advance rail-dependent development.	$ 3,189,000	2028-2040	Yes
Freight	Multnomah County	Port of Portland	11354	West Hayden Island Rail Yard	West Hayden Island	West Hayden Island	Increase freight access to indust & intermodal fac	Advance rail development on West Hayden Island.	$ 10,098,500	2028-2040	Yes
Freight	Multnomah County	Port of Portland	11355	Barnes to Terminal 4 Rail	Terminal 4	Barnes Yard	Increase freight access to indust & intermodal fac	Improve Rail Access to Terminal 4.	$ 4,543,000	2018-2027	Yes
Freight	Multnomah County	Port of Portland	11357	Terminal 6 Rail Support Yard Improvements	Terminal 6	Terminal 6	Increase freight access to indust & intermodal fac	Increase Terminal 6 rail capacity.	$ 10,630,000	2018-2027	Yes
Freight	Multnomah County	Port of Portland	11649	T2 Redevelopment	Terminal 2	Terminal 2	Increase freight access to indust & intermodal fac	Construct rail, rail scale, and crane modernization.Table3[[#Headers],[RTP Investment Category]]	$ 4,783,500	2018-2027	Yes

2018 RTP Freight Projects and Programs (final draft) - Appendix A

RTP Investment Category	County	Nominating Agency	2018 RTP ID	Project Name	Start Location	End Location	Primary Purpose	Description	Estimated Cost (2016 dollars)	Time Period	Financially Constrained?
Freight	Multnomah County	Port of Portland	11651	T2 Track Reconfiguration and Siding	Terminal 2	Terminal 2	Increase freight access to indust & intermodal fac	Construct rail loops and support siding.	$ 9,460,700	2018-2027	Yes
Freight	Multnomah County	Port of Portland	11652	Bonneville Rail Yard Build Out	Bonneville Rail Yard	Bonneville Rail Yard	Increase freight access to indust & intermodal fac	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
Freight	Multnomah County	Port of Portland	11653	Ramsey Yard Utilization	Columbia Slough	Bonneville Yard	Increase freight access to indust & intermodal fac	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
Freight	Multnomah County	Port of Portland	11654	Time Oil Road Reconstruction	Lombard	Rivergate Boulevard	Increase freight access to indust & intermodal fac	Reconstruct Time Oil Road	$ 9,567,000	2028-2040	Yes
Freight	Multnomah County	Port of Portland	11659	Rivergate Blvd. Overcrossing	N. Lombard	Time Oil Road	Relieve current congestion	Relieve a congestion point in Rivergate Industrial Area, improve rail access to Terminal 5.	$ 22,263,790	2018-2027	Yes
Freight	Multnomah County	Port of Portland	11743	Troutdale Airport Master Plan Transportation Improvements	Sundial Road	Swigert Way/Graham Road	Increase freight access to indust & intermodal fac	Implement transportation improvements developed as part of the Troutdale Airport Master Plan	$ 5,000,000	2018-2027	Yes
Freight	Multnomah County	Port of Portland	11949	North Portland Junction: Undoing the "X"	UPRR Peninsula Junction	North Portland Junction	Increase freight access to indust & intermodal fac	Eliminate the at-grade crossing of UPRR and BNSF tracks at North Portland Junction.	$ 33,598,000	2028-2040	No
Freight	Multnomah County	Port of Portland	11953	Six mph Curves Railroad Improvements	Steel Bridge	Just north of Steel Bridge	Increase system efficiency	Realign the curves just north of the Steel Bridge to improve rail speed and capacity.	$ 23,600,000	2028-2040	No
Freight	Multnomah County	Port of Portland	11955	Railroad Bridge and Track Improvements	Columbia Slough Rail Bridge	Columbia River Rail Bridge	Increase system efficiency	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
Freight	Multnomah County	Port of Portland	11956	Rivergate Columbia Slough Rail Bridge	Terminal 6	Terminal 5	Increase freight access to indust & intermodal fac	Construct a rail bridge across Columbia Slough to provide rail connection to South Rivergate from Terminal 6.	$ 10,840,000	2028-2040	No
Freight	Multnomah County	Portland	10218	Burgard-Lombard Street Improvements	N Burgard St & Columbia Blvd	Burgard Viaduct	Increase freight access to indust & intermodal fac	Construct roadway improvements, including pedestrian and bicycle facilities.	$ 2,635,000	2018-2027	Yes
Freight	Multnomah County	Portland	10331	Columbia Blvd / Railroad Bridge Replacement	N Columbia Blvd over BNSF railroad	N Columbia Blvd over BNSF railroad	Keep system in good repair	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
Freight	Multnomah County	Portland	10337	Marine Dr & 33rd Intersection Improvements	Marine Dr & 33rd Ave, NE	Marine Dr & 33rd Ave, NE	Increase freight access to indust & intermodal fac	Signalize intersection to improve freight operations.	$ 1,000,000	2018-2027	Yes
Freight	Multnomah County	Portland	10340	Cornfoot Rd Corridor Improvements	NE 47th Ave	NE Alderwood Rd	Increase freight access to indust & intermodal fac	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
Freight	Multnomah County	Portland	10376	Columbia Blvd Freight Improvements: Design/Construction	NE 60th Ave.	NE 82nd Ave.	Increase system efficiency	Construct street and intersection modifications to improve freight reliability and access to industrial properties.	$ 14,000,000	2028-2040	No
Freight	Multnomah County	Portland	11570	Columbia/Alderwood Intersection Improvements	NE Columbia Blvd & Alderwood Rd	Columbia/Alder wood	Increase system efficiency	Improve intersection and install traffic signal at Columbia & Alderwood.	$ 5,050,654	2018-2027	Yes

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Freight	Multnomah County	Portland	11796	Going St Connected/Automated Vehicle Connection	Swan Island Industrial Area	I-5	Increase system efficiency	Design and construct a Connected/Automated Vehicle connection between Swan Island and I-5.	$ 5,000,000	2028-2040	Yes
Freight	Multnomah County	Portland	11799	Suttle Rd Freight Street Improvements	N Portland Rd	T6	Increase freight access to indust & intermodal fac	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	2028-2040	Yes
Freight	Multnomah County	Portland	11800	Columbia Blvd Pedestrian Overpass Replacement	N Columbia Blvd west of N Midway Ave	N Columbia Blvd west of N Midway Ave	Increase freight access to indust & intermodal fac	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
Freight	Multnomah County	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	Increase freight access to indust & intermodal fac	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
Freight	Multnomah County	Portland	11802	N Portland Rd over Columbia Slough Bridge Replacement	N. Portland Rd at Columbia Slough	N. Portland Rd at Columbia Slough	Increase freight access to indust & intermodal fac	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
Freight	Multnomah County	Portland	11841	Central Eastside Access and Circulation Improvements	Central Eastside	Central Eastside	Increase freight access to indust & intermodal fac	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 & MLK, Ankeny & Sandy, 16th & Irving, and modifying signals at Stark & Grand, Clay & Grand, and Mill & MLK. Improve Clay Street from Water to Grand and add multimodal safety improvements.	$ 5,205,879	2018-2027	Yes
Freight	Multnomah County	Portland	11871	Going/Greeley Interchange Improvements	N Going/Greeley	N Going/Greeley	Increase freight access to indust & intermodal fac	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
Freight	Multnomah County	Portland	11880	Cully Blvd Rail Overcrossing	NE Cully Blvd (over Kenton line)	NE Cully Blvd (over Kenton line)	Increase freight access to indust & intermodal fac	Construct roadway overcrossing at NE Cully Blvd. over Kenton line.	$ 35,000,000	2028-2040	No
Freight	Multnomah County	Portland	12004	Columbia Blvd Freight Improvements: Project Development	NE 60th Ave	NE 82nd Ave	Increase freight access to indust & intermodal fac	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
Freight	Washington County	Wilsonville	10588	Grahams Ferry Road Improvements	Day Road	Washington/ Clackamas County line	Increase freight access to indust & intermodal fac	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
Freight	Multnomah County	Gresham	10445	181st at Glisan: Intersection Improvements	181st/Glisan	181st/Glisan	Relieve current congestion	Construct Gresham/Fairview Trail between Halsey and Sandy. This ultimately connects the regional trail between the Springwater Trail and Marine Dr. Trail.	$ 4,899,153	2018-2027	Yes
Freight	Multnomah County	Multnomah County	10394	Replace RR Over-crossing on 223rd Ave.	2000' north of I-84		Build complete street	Reconstruct railroad bridge on 223rd Ave, 2000' north of I-84 to accommodate wider travel lanes, sidewalks and bike lanes.	$ 7,441,000	2018-2027	Yes
Freight	Multnomah County	Port of Portland	11952	Columbia River Rail Bridge Improvements	Columbia River Rail Bridge	Columbia River Rail Bridge	Increase system efficiency	Replace Existing swing span with lift span and relocate position to mid-river channel.	$ 35,548,800	2028-2040	No
Freight	Multnomah County	Portland	10244	Kittridge Bridge Seismic Retrofit	NW Kittridge/Yeon Bridge	NW Kittridge/Yeon Bridge	Keep system in good repair	Retrofit existing seismically vulnerable bridge (#010) across railroad tracks to ensure emergency response and access to petroleum supplies located along the Willamette River in the event of an earthquake.	$ 15,249,213	2028-2040	No

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Roads and Bridges	Clackamas County	Clackamas County	10002	Johnson Creek Blvd. Improvements	55th Ave	82nd Ave.	Increase freight access to indust & intermodal fac	Widen to 3 lanes with bikeways and pedestrian facilities from 55th Ave to 82nd Ave improving freight access to industrial area and increasing accessibility for historically marginalized communities.	$ 14,237,510	2028-2040	Yes
Roads and Bridges	Clackamas County	Clackamas County	10023	82nd Dr. Improvements	Hwy 212	Strawberry Lane Intersection	Relieve current congestion	Widen 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
Roads and Bridges	Clackamas County	Clackamas County	11514	82nd Drive/Strawberry Lane Intersection	82nd Dr/Strawberry Lane intersection	N/A	Relieve current congestion	Install traffic signal and turn lanes on eastbound and northbound approaches, improve ADA accessibility as necessary.	$ 1,520,870	2028-2040	Yes
Roads and Bridges	Clackamas County	Happy Valley	10033	172nd Ave & 190th Connector	Clatsop	Sunnyside Rd.	Relieve current congestion	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.	$ 39,841,240	2028-2040	Yes
Roads and Bridges	Clackamas County	Happy Valley	10041	162nd Ave. Extension South Phase 1	Rock Creek Blvd.	Hwy. 212	Relieve current congestion	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.	$ 5,315,000	2018-2027	Yes
Roads and Bridges	Clackamas County	Happy Valley	11135	Rock Creek Blvd. improvements	Hwy. 212/224 (planned Sunrise Corridor Rock Creek Interchange)	177th Ave.	Increase freight access to indust & intermodal fac	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.	$ 23,673,010	2018-2027	Yes
Roads and Bridges	Clackamas County	Milwaukie	10000	Linwood/Harmony Rd./ Lake Rd. Intersection	Railroad Ave / Linwood Ave / Harmony Rd Intersection	Railroad Ave / Linwood Ave / Harmony Rd Intersection	Relieve current congestion	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

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Roads and Bridges	Clackamas County	Milwaukie	11537	Group 4--Pedestrian Improvements at Hwy 224	Harrison St	Freeman Way	Relieve current congestion	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 pedestrian crossing. Intersection Improvements at Hwy 224 and 37th Ave = Improve pedestrian crossing. Hwy 224 Crossing Improvements at Oak and Washington St = Improve intersection crossing safety for bicyclists at Washington St and Oak St. Intersection Improvements at Hwy 224 and Freeman Way = Improve pedestrian crossing. Intersection Improvements at Hwy 224 and Harrison St = Improve pedestrian crossing. Intersection Improvements at Hwy 224 and Monroe St = Improve pedestrian crossing. Intersection Improvements at Harrison St and Hwy 224 = Add left-turn lanes and protected signal phasing on Harrison St approaches.	$ 3,100,000	2028-2040	Yes
Roads and Bridges	Clackamas County	Milwaukie	11623	Group 11--Intersection Improvements in North Industrial Area	Ochoco St	Harrison St	Relieve current congestion	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.	$ 2,300,000	2028-2040	No
Roads and Bridges	Clackamas County	Oregon City	10119	OR 213 & Redland, Phase 2	Redland Road	Redland Road Undercrossing	Relieve current congestion	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
Roads and Bridges	Clackamas County	Oregon City	10140	OR 213 Widening	Clackamas Community College	Conway Drive	Relieve current congestion	Add one Southbound through lane and one Northbound through lane, bike lanes, and sidewalks. (TSP D77, W31)	$ 5,200,000	2028-2040	Yes
Roads and Bridges	Clackamas County	Oregon City	10144	Hwy 99E & I-205 SB Interchange Access	Dunes Drive	I-205 SB Ramp Terminus	Relieve current congestion	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)	$ 3,000,000	2028-2040	No
Roads and Bridges	Clackamas County	Oregon City	11544	Meyers Road Extension (West)	OR 213	High School Avenue	Relieve current congestion	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
Roads and Bridges	Multnomah County	Gresham	10416	Hogan Corridor Improvements	Stark	Burnside	Increase system efficiency	Interim capacity improvements and access controls.	$ 20,346,310	2028-2040	No
Roads and Bridges	Multnomah County	Gresham	10417	Hogan: Palmquist to Rugg - New Arterial Connection	Palmquist	Rugg Rd.	Relieve future congestion	Complete project development and construct new principal arterial connection with multi-use path.	$ 36,152,117	2028-2040	No
Roads and Bridges	Multnomah County	Gresham	10430	Orient: South City limits to Kane Dr. widening	South City Limits	Kane Dr	Build complete street	Upgrades to arterial 4 lane standards.	$ 9,567,000	2028-2040	No

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Roads and Bridges	Multnomah County	Gresham	10434	Burnside: 212th to Hogan Road	Wallula	Hogan	Build complete street	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
Roads and Bridges	Multnomah County	Gresham	10443	Sandy: 181st to 202nd Widening	181st Ave.	202nd	Relieve current congestion	Widens Sandy Blvd. to 5 lanes with sidewalks, bike lanes from 181st to 202nd Ave.	$ 5,000,000	2018-2027	Yes
Roads and Bridges	Multnomah County	Gresham	10445	181st at Glisan: Intersection Improvements	181st/Glisan	181st/Glisan	Relieve current congestion	Improve Intersection.	$ 1,107,505	2018-2027	Yes
Roads and Bridges	Multnomah County	Gresham	10493	181st: I-84 to Sandy Widening	Sandy	I-84	Relieve current congestion	Add southbound aux lane & widen RR overcrossing.	$ 1,000,000	2028-2040	No
Roads and Bridges	Multnomah County	Gresham	10497	181st: at Stark and Sandy Intersections	Sandy	Stark	Increase system efficiency	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	No
Roads and Bridges	Multnomah County	Gresham	10503	Burnside at Powell	Powell	Powell	Increase system efficiency	At Powell: eliminate EB and WB left turn lanes.	$ 1,000,000	2028-2040	Yes
Roads and Bridges	Multnomah County	Gresham	10511	Hogan at Stark: Turn Lane Additions	Stark	Stark	Relieve future congestion	Add right turn lanes on all approaches and second northbound and southbound left turns.	$ 3,500,000	2018-2027	Yes
Roads and Bridges	Multnomah County	Gresham	10512	Hogan: Powell to Burnside Blvd. Design and Intersection Improvements	Powell	Burnside	Relieve current congestion	Improve to boulevard standards, and intersection improvements at Burnside, Division and Powell.	$ 9,289,906	2018-2027	Yes
Roads and Bridges	Multnomah County	Gresham	10527	Hogan: Powell to Palmquist Widening	Powell	Palmquist	Build complete street	Improve to arterial standards.	$ 13,228,630	2028-2040	No
Roads and Bridges	Multnomah County	Gresham	10533	190th: 30th to Cheldelin	30th	Cheldelin	Serve new urban area	Improve existing road to major arterial standards, signalize 190th @ Giese, Butler, Richey, Cheldelin.	$ 30,448,832	2018-2027	Yes
Roads and Bridges	Multnomah County	Gresham	11261	181st/182nd: ACM with Transit Priority Treatment	Glisan	Powell	Relieve current congestion	Includes the ACM project with transit signal priority added to traffic signals along a facility.	$ 4,252,000	2028-2040	Yes
Roads and Bridges	Multnomah County	Gresham	11262	181st: ACM with Adaptive Signal Timing and Transit Priority Treatment	I-84	Glisan	Increase system efficiency	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	2028-2040	Yes
Roads and Bridges	Multnomah County	Gresham	11264	US 26: Portland to Gresham Roadside Travel Time Information	Portland	Gresham	Increase system efficiency	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 as of March 2014.	$ 1,169,300	2018-2027	Yes
Roads and Bridges	Multnomah County	Gresham	11682	181st: Stark to I-84 Rockwood Safety Corridor	I-84	Stark	Reduce crashes	Safety corridor: 181st/Rockwood {I-84 - Stark}	$ 2,019,700	2018-2027	Yes
Roads and Bridges	Multnomah County	Gresham	11687	Powell at Eastman: Left Turn Lane Addition	Powell at Eastman	Powell at Eastman	Relieve current congestion	Powell and Eastman {additional southbound left turn}	$ 1,000,000	2028-2040	Yes
Roads and Bridges	Multnomah County	Gresham	10431	190th/Highland: 11th to 30th Widening	200' south of SW 11th	30th	Build complete street	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
Roads and Bridges	Multnomah County	Gresham	10454	181st: Glisan to Yamhill Boulevard Improvements	Glisan	Yamhill	Build complete street	Complete boulevard design improvements.	$ 12,160,785	2028-2040	Yes
Roads and Bridges	Multnomah County	Gresham	10473	223rd at Stark: Lane Additions	223rd at Stark	223rd at Stark	Increase system efficiency	Add EB and NB RT lanes and 2nd NB and SB LT lanes.	$ 5,500,000	2018-2027	Yes

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Roads and Bridges	Multnomah County	Gresham	10498	182nd: Powell and Division Intersections	181st at Division	181st at Powell	Relieve current congestion	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
Roads and Bridges	Multnomah County	Multnomah County	10386	Glisan Street Multi-Modal Improvements	202nd Ave./Gresham-Fairview Trail	207th Ave./Salish Ponds Natural Area	Build complete street	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.	$ 12,224,500	2028-2040	No
Roads and Bridges	Multnomah County	Multnomah County	10399	Reconstruct Sandy Blvd.	201st Ave.	230th	Increase system efficiency	Reconstruct Sandy Blvd to minor arterial standards with bike lanes, sidewalks and drainage improvements, utilizing recommendations from TGM grant.	$ 7,906,594	2018-2027	Yes
Roads and Bridges	Multnomah County	Multnomah County	10401	Reconstruct Marine Drive	Interlachen	I-84	Increase system efficiency	Reconstruct Marine Drive between Interlachen and the frontage roads in Troutdale.	$ 14,882,000	2028-2040	No
Roads and Bridges	Multnomah County	Multnomah County	11297	NE 207th Ave. ACM	Sandy	Glisan	Increase system efficiency	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 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.	$ 1,647,650	2028-2040	No
Roads and Bridges	Multnomah County	Multnomah County	11300	238th/ 242nd/ Hogan Drive ACM	Sandy	Palmquist	Increase system efficiency	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
Roads and Bridges	Multnomah County	Multnomah County	11373	NE 238th Drive Freight and Multimodal Improvements	Halsey St.	Glisan St	Increase freight access to indust & intermodal fac	Construct southbound travel lanes with passing lane and northbound travel lane. Add bike and pedestrian facilities on both northbound and southbound sides.	$ 9,567,000	2018-2027	Yes
Roads and Bridges	Multnomah County	Port of Portland	11951	Columbia Boulevard Rail Overcrossing	Columbia Boulevard at Penn Junction	Columbia Boulevard at Penn Junction	Relieve future congestion	Grade separate Columbia Blvd. at Penn Junction to eliminate three at-grade crossings.	$ 28,935,000	2028-2040	No
Roads and Bridges	Multnomah County	Portland	10237	Southern Triangle Access Improvements	Powell (12th/Ross Island Bridge)	Hawthorne Bridge (railroad mainline)	Increase access to jobs	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
Roads and Bridges	Multnomah County	Portland	10242	Interstate-Larrabee Overpass	N Interstate/Larrabee Bridge	N Interstate/Larrabee Bridge	Keep system in good repair	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
Roads and Bridges	Multnomah County	Portland	10334	11th/13th Ave Rail Overcrossing	NE 11th Ave & NE Lombard Pl	NE 11th Ave & NE Lombard Pl	Increase system efficiency	Construct roadway overcrossing at NE 11th/13th over Kenton line.	$ 35,000,000	2028-2040	No

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Roads and Bridges	Multnomah County	Portland	10335	NE 42nd/47th Ave Bridge & Corridor Improvements	NE Killingsworth St	NE Columbia Blvd	Keep system in good repair	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
Roads and Bridges	Multnomah County	Portland	10336	Columbia & Cully Intersection Improvements	NE Cully Blvd & Columbia Blvd	NE Cully Blvd & Columbia Blvd	Increase freight access to indust & intermodal fac	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	2028-2040	Yes
Roads and Bridges	Multnomah County	Portland	11117	Willbridge Industrial Area Rail Overcrossing	NW Balboa	NW St Helens Rd	Increase system efficiency	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
Roads and Bridges	Multnomah County	Portland	11793	SE Yamhill /Taylor Couplet	SE Water	SE Grand	Increase system efficiency	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
Roads and Bridges	Multnomah County	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)	Keep system in good repair	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
Roads and Bridges	Washington County	Cornelius	10798	Davis Street Extension - West	4th Ave	7th Ave	Increase system efficiency	Construct new collector.	$ 4,130,629	2028-2040	No
Roads and Bridges	Washington County	Cornelius	10795	Holladay Street Extension - West	4th Ave	Yew St.	Increase freight access to indust & intermodal fac	Construct new collector.	$ 2,657,500	2028-2040	Yes
Roads and Bridges	Washington County	Cornelius	10802	29th Avenue Traffic Signals and Crossing Gates	TV Hwy (OR 8)	S. Alpine St.	Relieve future congestion	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
Roads and Bridges	Washington County	Forest Grove	10774	OR 47/23rd Ave Extension	OR HWY 47	24th Avenue	Increase access to jobs	Intersection improvement with connections to Martin Road intersection improvement.	$ 4,000,000	2028-2040	Yes
Roads and Bridges	Washington County	Forest Grove	11661	Hwy 47/ Martin Road Intersection	OR 47	Martin Road	Relieve current congestion	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
Roads and Bridges	Washington County	Forest Grove	11950	Hwy 47/ Purdin Rd./Verboort Intersection	HWY 47	Purdin Road	Relieve future congestion	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
Roads and Bridges	Washington County	Forest Grove	10780	OR 47/ Pacific Avenue Intersection Improvements	OR 47	OR 8	Relieve future congestion	Construct intersection improvement to add a west-bound left turn lane.	$ 4,000,000	2028-2040	Yes
Roads and Bridges	Washington County	Hillsboro	10817	Aloclek Dr Gap Completion	Cornelius Pass Rd	Amberwood Dr	Build complete street	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

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Roads and Bridges	Washington County	Hillsboro	10824	Cornell Rd Turn Lanes and Bike/Ped Improvements (Main to Arrington)	Main St	Arrington Rd	Build complete street	Widen roadway from four to five lanes with bike/ped facilities	$ 9,830,624	2028-2040	No
Roads and Bridges	Washington County	Hillsboro	10831	Century Blvd Extension and Over-Crossing (North Hillsboro)	Bennett St	Wagon Way	Relieve future congestion	Construct three-lane road including US 26 overpass with bike/ped facilities; connect existing segments to provide new north-south connectivity	$ 13,733,960	2028-2040	Yes
Roads and Bridges	Washington County	Hillsboro	11140	Brookwood Pkwy Widening	Ihly Way	Cornell Rd	Relieve future congestion	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
Roads and Bridges	Washington County	Hillsboro	11145	Airport Rd Bike/Ped Gaps	Brookwood Pkwy	48th Ave	Build complete street	Complete missing bike lanes and sidewalk	$ 1,594,500	2028-2040	No
Roads and Bridges	Washington County	Hillsboro	11169	Cornell Rd & 25th Ave Intersection Improvements	N/A	N/A	Relieve future congestion	Widen 25th Ave to provide double southbound left-turn lanes and second northbound through lane	$ 6,378,000	2018-2027	Yes
Roads and Bridges	Washington County	Hillsboro	11170	Cornell Rd & Brookwood Pkwy and Cornell & 48th Ave Intersection Improvements	N/A	N/A	Relieve future congestion	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
Roads and Bridges	Washington County	Hillsboro	11280	Ronler Dr Extension	Cornelius Pass Rd	215th Ave	Increase system efficiency	Construct three-lane extension with bike/ped facilities	$ 1,000,000	2028-2040	No
Roads and Bridges	Washington County	Hillsboro	11284	Farmington Rd Widening and Bike/Ped Improvements, Phase 1	185th Ave	198th Ave	Serve new urban area	Widen roadway from two to five lanes with bike/ped facilities	$ 8,000,000	2018-2027	Yes
Roads and Bridges	Washington County	Hillsboro	11285	Farmington Rd Widening and Bike/Ped Improvements, Phase 2	198th Ave	209th Ave	Serve new urban area	Widen roadway to five lanes with bike/ped facilities; new signal at 209th Ave	$ 7,000,000	2028-2040	Yes
Roads and Bridges	Washington County	Hillsboro	11392	TV Hwy & River Rd Intersection Improvements	N/A	N/A	Relieve future congestion	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
Roads and Bridges	Washington County	Hillsboro	11905	25th Ave Turn Lanes and Bike/Ped Improvements	Cornell Rd	Griffin Oaks St	Build complete street	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
Roads and Bridges	Washington County	Hillsboro	10553	209th Ave Widening and Improvements, Phase 1	TV Hwy	Kinnaman Rd	Serve new urban area	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
Roads and Bridges	Washington County	Hillsboro	10821	Huffman St Extension, Phase 1	Brookwood Pkwy	Sewell Rd	Serve new urban area	Construct five-lane road with bike/ped facilities	$ 8,387,070	2018-2027	Yes
Roads and Bridges	Washington County	Hillsboro	10822	Starr Blvd Reconstruction and Improvements, Phase 1	Evergreen Rd	Huffman St (future extension)	Serve new urban area	Construct three-lane road with bike/ped facilities	$ 5,315,000	2018-2027	Yes
Roads and Bridges	Washington County	Hillsboro	10836	Evergreen Rd Widening and Bike/Ped Improvements	Glencoe Rd	15th Ave	Serve new urban area	Widen roadway from three to five lanes, complete missing sidewalks, and upgrade to buffered bike lanes	$ 5,782,720	2028-2040	Yes
Roads and Bridges	Washington County	Hillsboro	11147	Schaaf Rd Reconstruction	Helvetia Rd	New north-south collector	Serve new urban area	Reconstruct rural gravel road to three-lane roadway with bike/ped facilities	$ 4,252,000	2018-2027	Yes
Roads and Bridges	Washington County	Hillsboro	11149	Helvetia Rd Turn Lanes and Bike/Ped Improvements	Schaaf Rd	West Union Rd	Serve new urban area	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

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Roads and Bridges	Washington County	Hillsboro	11150	Jacobson Rd Turn Lanes and Bike/Ped Improvements	Helvetia Rd	Century Blvd	Increase freight access to indust & intermodal fac	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
Roads and Bridges	Washington County	Hillsboro	11341	West Union Rd Widening and Improvements	Helvetia Rd	Cornelius Pass Rd	Serve new urban area	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
Roads and Bridges	Washington County	Hillsboro	11364	Starr Blvd Reconstruction and Improvements, Phase 2	Huffman St (future extension)	Meek Rd	Serve new urban area	Construct three-lane road with bike/ped facilities	$ 4,252,000	2018-2027	Yes
Roads and Bridges	Washington County	Hillsboro	11383	New North-South Collector (North Hillsboro)	Jacobsen Rd	Schaaf Rd	Serve new urban area	Construct three-lane roadway with bike/ped facilities	$ 2,657,500	2018-2027	Yes
Roads and Bridges	Washington County	Hillsboro	11387	Meek Rd Improvements, Phase 1	Sewell Rd	Starr Blvd	Serve new urban area	Widen and improve roadway to three lanes with bike/ped facilities	$ 6,909,500	2028-2040	Yes
Roads and Bridges	Washington County	Hillsboro	11388	30th Ave Construction	Evergreen Rd	Meek Rd	Serve new urban area	Construct three-lane industrial collector with bike/ped facilities	$ 10,500,000	2028-2040	Yes
Roads and Bridges	Washington County	Hillsboro	11890	Huffman St Extension, Phase 2	Sewell Rd	Jackson School Rd	Serve new urban area	Construct five-lane road with bike/ped facilities	$ 6,500,000	2018-2027	Yes
Roads and Bridges	Washington County	Hillsboro	11906	25th Ave Extension	Evergreen Rd	Huffman St	Serve new urban area	Construct three-lane roadway with bike/ped facilities; realign intersection at Evergreen to avoid airport clear zone	$ 4,000,000	2028-2040	Yes
Roads and Bridges	Washington County	Hillsboro	11907	Jackson School Rd Improvements	Evergreen Rd	Storey Creek (UGB)	Serve new urban area	Improve roadway from rural to urban standard and widen to three lanes with bike/ped facilities	$ 11,400,000	2028-2040	Yes
Roads and Bridges	Washington County	Hillsboro	11910	Meek Rd Improvements, Phase 2	Jackson School Rd	Sewell Rd	Increase freight access to indust & intermodal fac	Improve Meek Rd to address safety for industrial access to/from Jackson School Rd	$ 3,000,000	2028-2040	Yes
Roads and Bridges	Washington County	Sherwood	10674	Oregon-Tonquin Roundabout	SW Oregon Street	SW Tonquin Rd	Relieve future congestion	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
Roads and Bridges	Washington County	Sherwood	10699	Oregon Street	SW Murdock Rd	SW Langer Farms Pkwy	Build complete street	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
Roads and Bridges	Washington County	Sherwood	10700	Arrow St	SW Langer Farms Parkway	SW Gerda Lane	Link land use with transportation investments	Construct 3-lane collector street to TSP standards between SW Langer Farms Parkway and SW Gerda Lane.	$ 8,200,000	2028-2040	No
Roads and Bridges	Washington County	Sherwood	11404	Baler Way Extension	SW Langer Farms Parkway	SW Tualatin-Sherwood Road	Link land use with transportation investments	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

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Roads and Bridges	Washington County	Sherwood	12046	Tonquin Area East-West Collector	SW 124th Avenue	SW Tonquin Road	Relieve future congestion	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
Roads and Bridges	Washington County	Sherwood	12047	Brookman Road Intersection Realignment	SW Pacific Highway	SW Brookman Road	Relieve future congestion	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
Roads and Bridges	Washington County	Tigard	10751	Hwy. 217 Overcrossing	Hunziker Road	Beveland	Relieve current congestion	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
Roads and Bridges	Washington County	Tigard	10755	72nd Ave. Improvements - 99W to Hunziker	99W	Hunziker Road	Build complete street	Improve as determined by study, with bikeways and sidewalks.	$ 14,400,000	2018-2027	Yes
Roads and Bridges	Washington County	Tigard	10768	Upper Boones Ferry Intersection Improvements	Durham Road	I-5	Relieve current congestion	Construct intersection improvements at Durham Road and Upper Boones Ferry Road to provide dual southbound right-turns, dual eastbound left-turns, eastbound right-turns, existing and improve signal timing. Install bike lanes on both sides of the streets from just south of Durham Rd to just north of Durham Rd.	$ 5,000,000	2028-2040	No
Roads and Bridges	Washington County	Tigard	10770	OR 99W Intersection Improvements (PE)	64th Ave.	Durham Rd.	Increase system efficiency	Project development phase: Provide increased capacity at priority intersections, including bus queue bypass lanes in some locations, improved sidewalks, priority pedestrian crossings, and an access management plan, while retaining existing 4/5-lane facility from I-5 to Durham Road. See 2035 Tigard TSP Project #66 for specific improvements.	$ 5,000,000	2028-2040	No
Roads and Bridges	Washington County	Tigard	11995	Hunziker Core Industrial Street	Hunziker Road	Tech Center Drive	Increase freight access to indust & intermodal fac	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	$ 8,000,000	2018-2027	Yes
Roads and Bridges	Washington County	Tualatin	10715	Herman	124th	Tualatin	Reduce crashes	Upgrade to standards. Improve the intersection of 118th and Herman Road.	$ 5,300,000	2018-2027	Yes
Roads and Bridges	Washington County	Tualatin	10738	Teton	Tualatin	Avery	Relieve current congestion	Reconstruct/widen to 3 lanes, Add bike lanes to Teton from Avery to Tualatin Rd. Right Turn Lane from Teton (N) to Tualatin-Sherwood Road (W). Signalize the intersection of Teton at Tualatin. Add southbound turn pocket on Teton to Avery and signalize intersection.	$ 5,151,298	2028-2040	Yes
Roads and Bridges	Washington County	Tualatin	11417	Blake Street Extension	115th	124th Ave	Increase access to jobs	Build the roadways from from the SW Concept Plan including; Extend Blake Street to create an east - west connection between 115th and 124th. Install signal at Blake and 124th. Extend 120th south to 124th.	$ 11,161,500	2018-2027	Yes
Roads and Bridges	Washington County	Tualatin	11420	Nyberg	I-5 on-ramp	I-5 on-ramp	Relieve current congestion	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.	$ 1,138,473	2028-2040	No
Roads and Bridges	Washington County	Tualatin	11423	Avery	Teton	Tualatin-Sherwood	Build complete street	Widen to 3-lanes	$ 3,826,800	2028-2040	Yes
Roads and Bridges	Washington County	Tualatin	10716	Myslony	112th	124th Ave	Increase access to jobs	Reconstruct/widen from 112th to 124th to fill system, includes bridge. Improve the intersection of 124th and Myslony.	$ 10,000,000	2018-2027	Yes

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Roads and Bridges	Washington County	Tualatin	10717	Cipole Street Reconstruction	OR 99W	Tualatin-Sherwood	Increase access to jobs	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 designated urban growth boundary as of March 2014.	$ 21,291,890	2028-2040	No
Roads and Bridges	Washington County	Tualatin	10718	Herman	Cipole	124th Ave	Increase access to jobs	Reconstruction/ widen to 3-lanes from Cipole to 124th.	$ 2,736,162	2028-2040	Yes
Roads and Bridges	Washington County	Washington County	10560	Farmington Rd. Improvements	185th	Kinnaman Rd.	Relieve current congestion	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.	$ 29,000,000	2028-2040	Yes
Roads and Bridges	Washington County	Washington County	10561	Jenkins Rd. Improvements	158th Ave.	Murray	Relieve current congestion	Widen roadway from three to five lanes with bike lanes and sidewalks.	$ 7,000,000	2018-2027	Yes
Roads and Bridges	Washington County	Washington County	10575	West Union Rd.	Cornelius Pass Rd.	185th Ave.	Relieve current congestion	Widen from two to five lanes with bike lanes and sidewalks.	$ 22,000,000	2018-2027	Yes
Roads and Bridges	Washington County	Washington County	10578	Merlo/158th Improvements	170th Ave.	Walker Rd.	Relieve current congestion	Widen roadway to five lanes with bike lanes and sidewalks	$ 13,000,000	2028-2040	Yes
Roads and Bridges	Washington County	Washington County	10587	Cornelius Pass Rd. Improvements	Frances St.	T.V. Hwy.	Relieve current congestion	Widen to five lanes with bike lanes and sidewalks	$ 16,000,000	2018-2027	Yes
Roads and Bridges	Washington County	Washington County	10590	Tonquin Rd. Improvements	Grahams Ferry Rd.	124th	Build complete street	Realign and widen to three lanes with bike lanes and sidewalks and street lighting.	$ 11,400,000	2018-2027	Yes
Roads and Bridges	Washington County	Washington County	10591	Glencoe Rd. Improvements	Evergreen Rd.	Jackson Ave.	Increase travel options/alt. to driving alone	Widen to three lanes with bike lanes and sidewalks.	$ 27,700,000	2028-2040	No
Roads and Bridges	Washington County	Washington County	11452	Scholls Ferry Rd. Improvements	West of Tile Flat Rd.		Reduce crashes	Realign Curves to Improve Safety.	$ 4,600,000	2028-2040	Yes
Roads and Bridges	Washington County	Washington County	11486	Roy Rogers Rd.	Scholls Ferry Rd.	UGB	Relieve current congestion	Widen to five lanes with bike lanes and sidewalks	$ 21,300,000	2018-2027	Yes
Roads and Bridges	Washington County	Washington County	11487	Boones Ferry Improvements	Basalt Creek East-West Arterial	Day Rd.	Relieve future congestion	Widen from 3 lanes to 5 lanes with bike lanes, sidewalks and street lighting	$ 1,200,000	2028-2040	Yes
Roads and Bridges	Washington County	Washington County	11490	Day Rd Overcrossing	Boones Ferry Rd	Elligsen Rd	Relieve future congestion	Extend new 4-lane overcrossing over I-5 from Boones Ferry Rd to Elligsen Rd.	$ 46,900,000	2028-2040	No
Roads and Bridges	Washington County	Washington County	11914	Roy Rogers Rd	UGB	Chicken Creek Bridge	Relieve current congestion	Widen roadway to 4-5 lanes, includes sidewalks and bike lanes	$ 25,000,000	2018-2027	Yes
Roads and Bridges	Washington County	Washington County	11915	Scholls Ferry Rd	Tile Flat Rd.	Roy Rogers Rd.	Relieve future congestion	Widen roadway to 5 lanes, includes sidewalks and bike lanes	$ 8,300,000	2018-2027	Yes
Roads and Bridges	Washington County	Washington County	11924	Grahams Ferry Road (Tonquin to Day)	Tonquin Rd.	Day Rd.	Relieve future congestion	Widen roadway to 5 lanes, includes sidewalks and bike lanes	$ 6,000,000	2028-2040	No
Roads and Bridges	Washington County	Washington County	10557	Murray/TV Hwy. Intersection	Farmington Rd.	TV Hwy.	Relieve current congestion	Intersection improvement at TV Hwy. and Farmington with Murray Blvd.	$ 26,600,000	2028-2040	No
Roads and Bridges	Washington County	Washington County	10559	Cornell Improvements	Hwy. 26	Murray Blvd.	Relieve current congestion	Widen Cornell from three to five lanes with bike lanes and sidewalks.	$ 25,000,000	2028-2040	Yes
Roads and Bridges	Washington County	Washington County	10568	Tualatin-Sherwood Rd. Improvements	Langer Farms Pkwy.	Teton Ave.	Relieve current congestion	Widen from three to five lanes with bike lanes and sidewalks.	$ 35,000,000	2018-2027	Yes
Roads and Bridges	Washington County	Washington County	10596	Scholls Ferry Rd. Improvements	Hwy. 217	121st Ave.	Relieve current congestion	Widen to seven lanes with bike lanes and sidewalks.	$ 21,000,000	2028-2040	No
Roads and Bridges	Washington County	Washington County	10598	Southern Arterial	Hwy. 99W	I-5	Relieve future congestion	Purchase ROW. Construct 2/3 lane arterial with bike lanes and sidewalks.	$ 116,000,000	2028-2040	No
Roads and Bridges	Washington County	Washington County	11436	East-West Arterial Overcrossing	Boones Ferry Rd	East of I-5	Relieve future congestion	Extend new 4-lane overcrossing over I-5 from Boones Ferry Rd to 65th and Stafford Rd.	$ 40,400,000	2028-2040	No
Roads and Bridges	Washington County	Washington County	11469	124th Ave Improvements	Tualatin-Sherwood Rd.	Grahams Ferry Rd	Relieve future congestion	Widen 124th from 2 lanes to 5 lanes with bike lanes and sidewalks	$ 14,900,000	2028-2040	No

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Roads and Bridges	Washington County	Washington County	11470	Basalt Creek Parkway	Grahams Ferry Rd.	Boones Ferry Rd	Increase access to jobs	Extend new 5 lane Arterial with bike lanes, sidewalks and street lighting.	$ 31,700,000	2028-2040	Yes
Roads and Bridges	Washington County	Washington County	11737	Cornell @ 185th Intersection Improvements	185th Ave.	Cornell Rd	Relieve future congestion	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
Roads and Bridges	Washington County	Washington County	11903	Roy Rogers Rd.	Chicken Creek Bridge	Borchers Rd	Relieve current congestion	Widen roadway to 5 lanes, includes sidewalks and bike lanes	$ 11,000,000	2018-2027	Yes
Roads and Bridges	Washington County	Washington County	11923	Grahams Ferry Road (Helenius to Tonquin)	Helenius St	Tonquin Rd	Build complete street	Widen roadway to 3 lanes, includes sidewalks and bike lanes	$ 4,000,000	2028-2040	No
Roads and Bridges	Washington County	Wilsonville	11489	Boones Ferry / I-5 off ramp improvements	SB I-5 off ramp	Boones Ferry Rd	Relieve current congestion	construct second right-turn lane	$ 1,063,000	2028-2040	Yes
Roads and Bridges	Washington County	Wilsonville	11798	Elligsen Road Urban Upgrade	Parkway Center Drive	65th	Build complete street	Reconstruct street to 3 lanes with buffered bike lanes and sidewalks. (TSP project UU-P3)	$ 6,000,000	2028-2040	No
Roads and Bridges	Washington County	Wilsonville	10853	Garden Acres Road Extension	Day Road	Ridder Road	Increase freight access to indust & intermodal fac	Construct three lane road extension with sidewalks and bike lanes and reconstruct/reorient Day Road/Grahams Ferry Road/Garden Acres Road intersection.	$ 14,260,000	2018-2027	Yes
Roads and Bridges	Washington County	Wilsonville	11243	Day Road Improvements	Grahams Ferry Rd.	Boones Ferry Rd.	Relieve future congestion	Widen street from 3 to 5 lanes with bike lanes, sidewalks and street lighting. Improve structural integrity for increased freight traffic and provide congestion relief.	$ 10,560,000	2018-2027	Yes
Roads and Bridges	Washington County	Wilsonville	11809	Java Road Connection and Signal	Grahams Ferry Road	Garden Acres Road	Increase access to jobs	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
Throughways	Clackamas County	ODOT	10890	OR 212/224 Sunrise Hwy Phase 2: I-205 to SE 172nd (PE, ROW)	I-205	172nd Ave.	Relieve current congestion	Conduct preliminary engineering (PE) and acquire right-of-way (ROW) on 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
Throughways	Clackamas County	ODOT	11301	OR 212/224 Sunrise Hwy Phase 2: I-205 to SE 172nd (CON)	I-205	172nd Ave.	Relieve current congestion	Construction (CON) improvements on the OR 212/224 Sunrise corridor from I-205 to SE 172nd Ave consistent with the FEIS/ROD.	$ 100,000,000	2028-2040	Yes
Throughways	Clackamas County	ODOT	11350	OR 224 Milwaukie Expressway improvements	I-205	Rusk Rd	Increase system efficiency	Construct a third westbound lane on Milwaukie Expressway (Hwy-224) from I-205 to Rusk Rd	$ 12,000,000	2018-2027	Yes
Throughways	Clackamas County	ODOT	11585	I-205 Abernethy Bridge (PE and ROW)	OR99E Interchange	Oswego Hwy (OR 43) Interchange	Relieve current congestion	Widen bridge to address recurring bottlenecks on the bridge.	$ 8,000,000	2018-2027	Yes
Throughways	Clackamas County	ODOT	11969	I-205 Abernethy Bridge (CON)	OR99E Interchange	Oswego Hwy (OR 43) Interchange	Relieve current congestion	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	2028-2040	Yes
Throughways	Clackamas County	ODOT	11981	I-205 Northbound Auxiliary Lane, Sunrise Expressway Entrance to Sunnybrook	Sunrise Expressway Entrance	Sunnyside/ Sunnybrook Exit	Increase system efficiency	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

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Throughways	Clackamas County	ODOT	11990	I-5 Southbound: Wilsonville Rd to Wilsonville-Hubbard Hwy	Wilsonville Rd	Wilsonville-Hubbard Hwy	Increase system efficiency	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
Throughways	Clackamas County	ODOT	11992	I-205 Operational Improvements	Columbia River	I-5	Increase system efficiency	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
Throughways	Clackamas County, Multnomah County	ODOT	11305	I-205 Active Traffic Management	Columbia River	I-5	Increase system efficiency	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
Throughways	Multnomah County	ODOT	10893	I-5 Columbia River Bridge	Victory Blvd.	Washington state line	Relieve current congestion	Replace I-5/Columbia River bridges and improve interchanges on I-5. Project adds protected/buffered bikeways, cycle tracks and a new trail/multiuse path or extension.	$ 3,169,866,000	2028-2040	Yes
Throughways	Multnomah County	ODOT	11304	I-5 South Operational Improvements	Marquam Bridge	Region Boundary	Increase system efficiency	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
Throughways	Multnomah County	ODOT	11370	I-205 Northbound Auxiliary Lane Powell to I-84	Powell Entrance Ramp	I-84	Increase system efficiency	Design and construct an auxiliary lane on northbound I-205 from Powell Blvd to the I-84 interchange.	$ 15,000,000	2018-2027	Yes
Throughways	Multnomah County	ODOT	11583	I-5 Northbound: Lower Boones Ferry to Carman Auxiliary Lane Extension	Lower Boones Ferry Rd. Interchange	Carman Dr. Interchange	Increase system efficiency	Extend existing auxiliary lane between the Lower Boones Ferry Road interchange and the Carman Drive interchange.	$ 22,500,000	2028-2040	No
Throughways	Multnomah County	ODOT	11974	I-405 Operational Improvements	Fremont Bridge	I-5	Increase system efficiency	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
Throughways	Multnomah County	ODOT	11993	I-84 Operational Improvements	I-5	Troutdale	Increase system efficiency	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
Throughways	Multnomah County, Washington County	ODOT	11971	US 26 (Sunset Highway) Operational Improvements	I-405	West MPO Boundary	Increase system efficiency	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
Throughways	Region-wide	ODOT	11991	I-5 Freight Operational Improvements	Columbia River	South MPO Boundary	Increase system efficiency	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
Throughways	Washington County	Hillsboro	11279	US 26 & 185th Ave Interchange Refinement Study and Implementation	N/A	N/A	Relieve future congestion	Conduct interchange refinement study and implementation	$ 26,575,000	2028-2040	No
Throughways	Washington County	Hillsboro	11393	US 26 Widening - Brookwood to Cornelius Pass	Brookwood Pkwy/Helvetia Rd	Cornelius Pass Rd	Relieve future congestion	Widen US 26 from four to six lanes	$ 26,575,000	2028-2040	Yes
Throughways	Washington County	ODOT	11302	I-5/OR 217 Interchange Phase 2	I-5/OR 217 Interchange	N/A	Relieve current congestion	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

2018 RTP Freight Projects and Programs (final draft) - Appendix A

RTP Investment Category	County	Nominating Agency	2018 RTP ID	Project Name	Start Location	End Location	Primary Purpose	Description	Estimated Cost (2016 dollars)	Time Period	Financially Constrained?
Throughways	Washington County	ODOT	11402	I-5 Northbound: Auxiliary Lane Extension Nyberg to Lower Boones Ferry	Nyberg Rd. Interchange	Lower Boones Ferry Rd. Interchange	Increase system efficiency	Extend existing auxiliary lane.	$ 13,500,000	2028-2040	Yes
Throughways	Washington County	ODOT	11582	OR 217 Capacity Improvements	US 26 (Sunset Hwy)	I-5	Relieve current congestion	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
Throughways	Washington County	ODOT	11976	OR 217 Northbound Auxiliary Lane Extension Scholls Ferry to Allen/Denney	Scholls Ferry Road	Allen/Denney Interchange	Increase system efficiency	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
Throughways	Washington County	ODOT	11978	OR 217 Interchange, Safety, and Operational Improvements	US 26 (Sunset Highway)	I-5	Increase system efficiency	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
Throughways	Washington County	ODOT	11986	OR 217 Northbound Auxiliary Lane 99W to Scholls Ferry (CON)	99W	Scholls Ferry	Increase system efficiency	Extend OR 217 Northbound (NB) auxiliary lane from OR 99W to Scholls Ferry. Construction (CON) phase	$ 50,000,000	2018-2027	Yes
Throughways	Washington County	ODOT	11987	OR 217 Southbound Auxiliary Lane Beaverton Hillsdale Hwy to 99W (CON)	Beaverton-Hillsdale Hwy	OR99W	Increase system efficiency	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
Throughways	Washington County	ODOT	11988	OR 217 Southbound Braided Ramps Beaverton-Hillsdale Hwy to Allen Blvd	Beaverton-Hillsdale Hwy	Allen Blvd	Increase system efficiency	Design and construct braided ramps on southbound OR 217 at Canyon Rd and Beaverton Hillsdale Hwy.	$ 50,000,000	2028-2040	Yes
Throughways	Washington County	ODOT	12019	OR 217 Northbound Auxiliary Lane 99W to Scholls Ferry (PE, ROW)	OR99W	Scholls Ferry Interchange	Increase system efficiency	Extend OR 217 Northbound (NB) auxiliary lane from OR 99W to Scholls Ferry. ROW and PE phase	$ 7,500,000	2018-2027	Yes
Throughways	Washington County	Washington County	10599	Hwy. 217/72nd Ave. Interchange Improvements	OR 217/72nd Avenue	OR 217/72nd Avenue	Relieve future congestion	Complete interchange reconstruction with additional ramps and bridge structure replacement	$ 21,300,000	2028-2040	No
Throughways	Clackamas County	ODOT	11586	I-205 Southbound and Northbound widening (PE, ROW)	Oswego Hwy Interchange	Stafford Rd Interchange	Relieve current congestion	Widen highway to address recurring bottlenecks. The project or a portion of the project is outside the designated urban growth boundary as of March 2014.	$ 8,000,000	2018-2027	Yes
Throughways	Clackamas County	ODOT	11904	I-205 Southbound and Northbound widening (CON)	Oswego Hwy Interchange	Stafford Rd Interchange	Relieve current congestion	Widen Interstate 205 by one lane in both directions to address recurring bottlenecks. Construction (CON) phase.	$ 200,000,000	2028-2040	Yes
Throughways	Clackamas County	ODOT	12020	OR 212/224 Sunrise Project Phase 3	I-205	172nd Ave	Relieve current congestion	Construct remaining improvements in the Sunrise Corridor consistent with the FEIS/ROD	$ 475,000,000	2028-2040	No
Throughways	Clackamas County	West Linn	11242	I-205 / 10th Street Improvements	Willamette Falls Drive	Blankenship Rd / Salamo Road	Relieve current congestion	Construct a long-term interchange improvement to provide congestion relief, address safety issues, and improve bike/ped connectivity.	$ 7,800,000	2018-2027	Yes
Throughways	Multnomah County	ODOT	10867	I-5 from I-405 to I-84 (Rose Quarter/Lloyd District) PE, NEPA, ROW	I-84	Greeley St.	Reduce crashes	Conduct preliminary engineering and National Environmental Policy Act review, and right of way work to improve safety and operations on I-5, connection between I-84 and I-5, and multimodal access to and connectivity between the Lloyd District and Rose Quarter.	$ 15,000,000	2018-2027	Yes
Throughways	Multnomah County	ODOT	11176	I-5 from I-405 to I-84 (Rose Quarter/Lloyd District) Construction	I-84	Greeley St.	Reduce crashes	Construct improvements to enhance safety and operations on I-5, connection between I-84 and I-5, and multimodal access to and connectivity between the Lloyd District and Rose Quarter.	$ 375,000,000	2018-2027	Yes

2018 RTP Freight Projects and Programs (final draft) - Appendix A

RTP Investment Category	County	Nominating Agency	2018 RTP ID	Project Name	Start Location	End Location	Primary Purpose	Description	Estimated Cost (2016 dollars)	Time Period	Financially Constrained?
Throughways	Multnomah County	ODOT	11984	I-5 Southbound Truck Climbing Lane	Marquam Bridge	Multnomah Blvd	Keep system in good repair	I-5 Truck Climbing Lanes SB (Marquam to Multnomah Blvd). Preliminary Engineering (PE) and Right-of-Way (ROW) and Construction (CON) phases	$ 100,000,000	2028-2040	Yes
Throughways	Washington County	ODOT	11989	I-5 Northbound Braided Ramps I-205 to Nyberg	I-205	Nyberg Rd	Relieve current congestion	Replace the inside merge at I-205 entrance by constructing braided ramps.	$ 50,000,000	2028-2040	Yes
Throughways	Washington County	Tualatin	11420	Nyberg	I-5 on-ramp	I-5 on-ramp	Relieve current congestion	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.	$ 1,138,473	2028-2040	No

Total Cost of Financially Constrained RTP Freight Projects and Programs	$ 5,772,020,404
Total Cost of Strategic (non-Financially Constrained) RTP Freight Projects and Programs	$ 2,358,837,102
Total Cost of "Freight" Investment Category	$ 479,150,870
Total Cost of "Roads and Bridges " Investment Category	$ 1,548,452,163
Total Cost of "Throughways" Investment Category	$ 6,103,254,473
Grand Total Cost of all 2018 RTP Freight Projects and Programs	$ 8,130,857,506
	$ 8,130,857,506
Cost of Financially Constrained "Freight" Investment Category	$ 230,378,857
Cost of Financially Constrained "Roads and Bridges " Investment Category	$ 905,987,525
Cost of Financially Constrained "Throughways" Investment Category	$4.6 billion

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	**Tom Dechenne** Norris, Beggs & Simpson	**Susie Lahsene** Port of Portland	**Paul Smith** City of Portland
Grant Armbruster Columbia Sportswear	**John Drew** Far West Fibers	**Brian McMullen** WSDOT	**John Speight** Portland & Western RR
Steve Bates Redmond Heavy Haul	**Ann Gardner** Schnitzer Steel Industries	**Jeanne Morgan** Xerox	**Paul Thalhofer** City of Troutdale
Scott Bricker Bicycle Transportation Alliance	**Pete George** PW George Consulting	**James Nave** Union Pacific RR	**Jason Tell** ODOT
Katy Brooks Port of Vancouver	**Cam Gilmour** Clackamas County	**Rod Park** Metro	**Elizabeth Wainwright** Merchants Exchange
Gary Cardwell NW Container Service	**Van Hooper** Sysco Foods	**Michael Powell** Powell's Books	**Tracy Ann Whalen** ESCO Corporation
Terry Cleaver Columbia Grain	**Tom Hughes** City of Hillsboro	**Warren Rosenfeld** Calbag Metals	**Rick Williams** Lloyd District TMA
Lynda David Southwest Washington RTC	**Monica Isbell** Starboard Alliance	**Robert Russell**	

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 submodes (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.

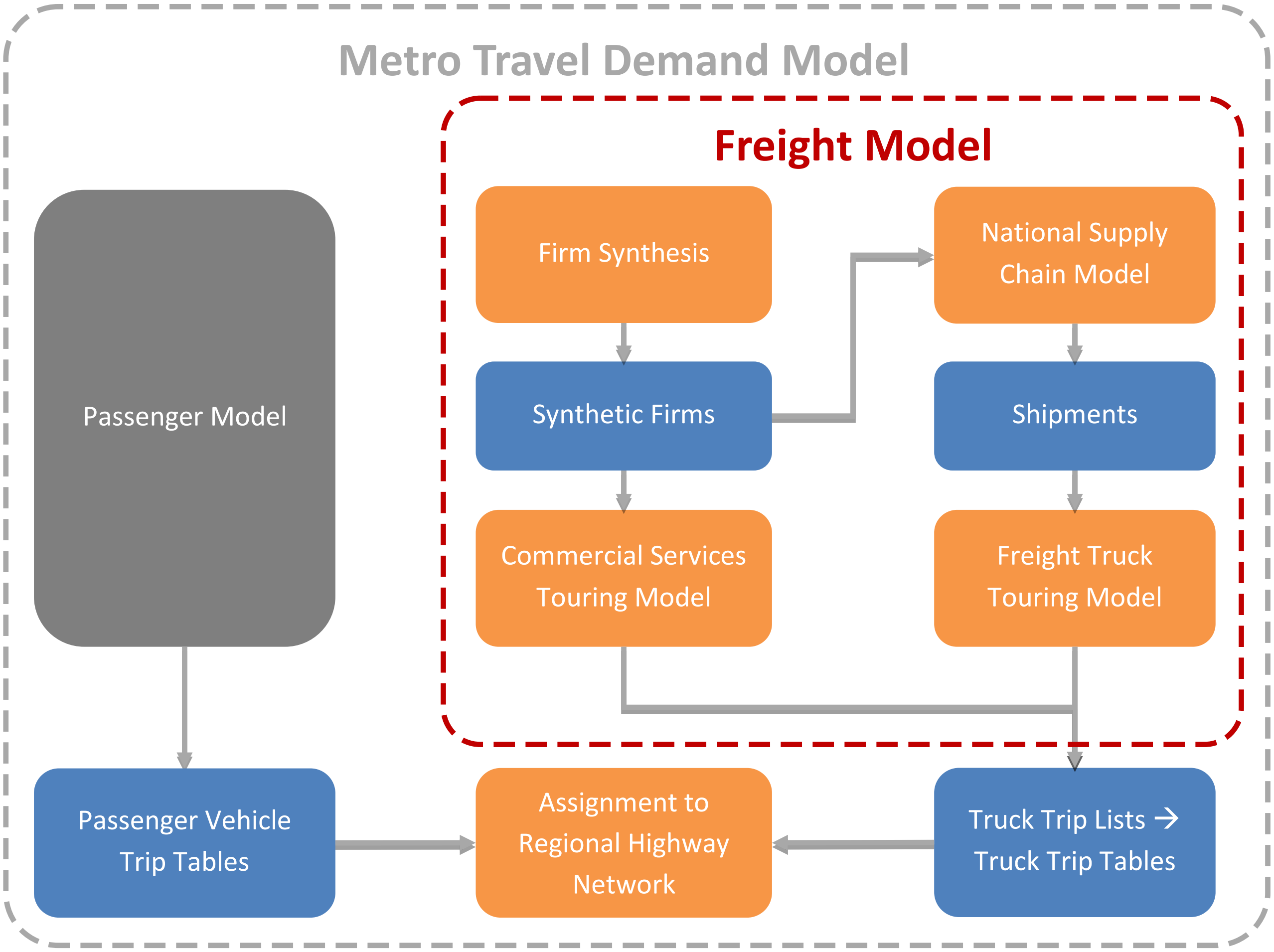
The model represents imports and exports, but does not explicitly model global freight movements, so the impacts of global changes could be represented by adjusting these inputs as a scenario analysis. Operational analysis would benefit from integrating truck movements produced by the model with an operational 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

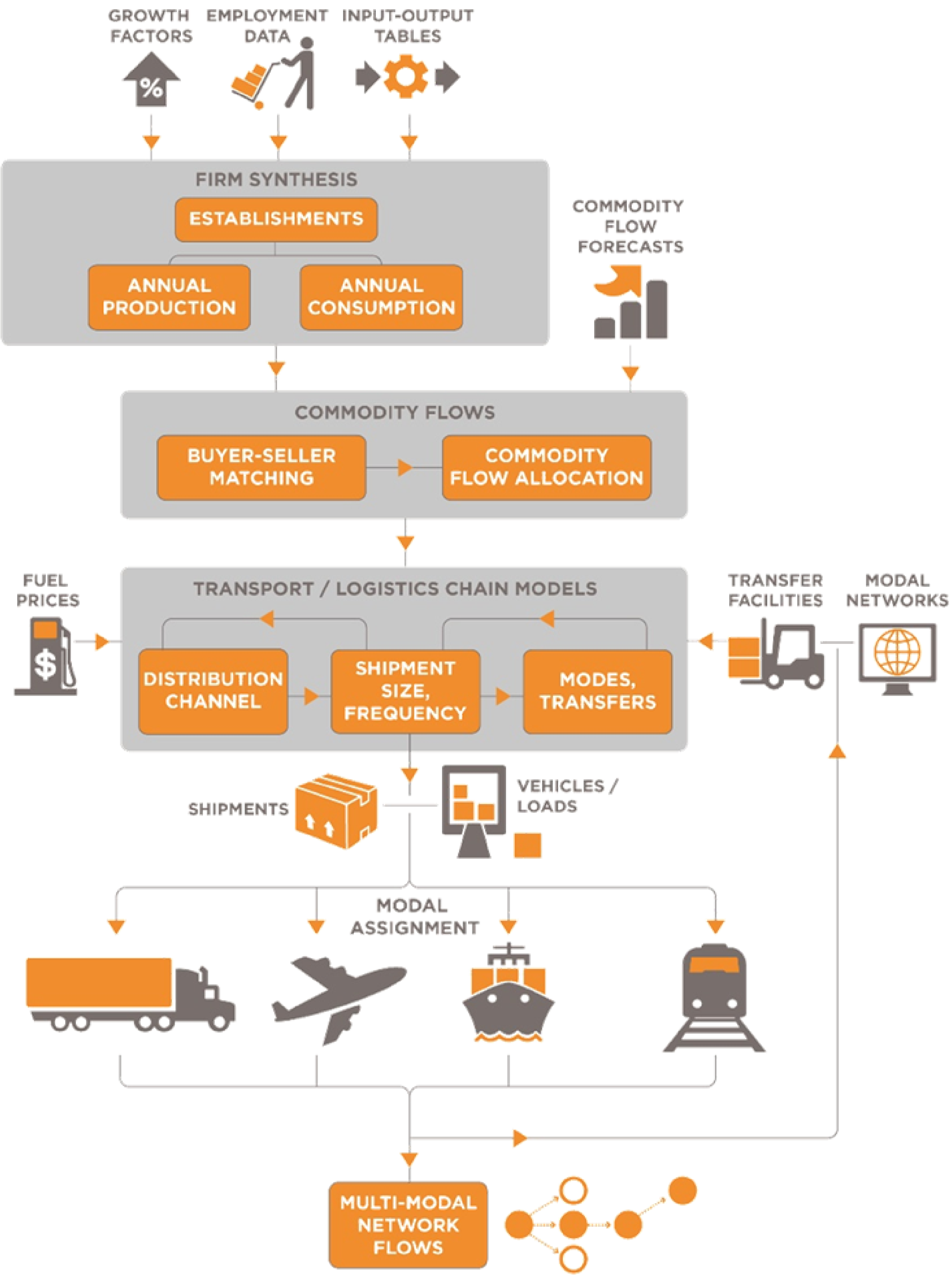
The Portland freight model is based on a combined supply chain and tour-based framework developed with Federal Highway Administration research funding by RSG and implemented in Chicago, Florida, Piedmont and Baltimore with rFreight™ software. This framework is comprised of several steps that simulate 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.

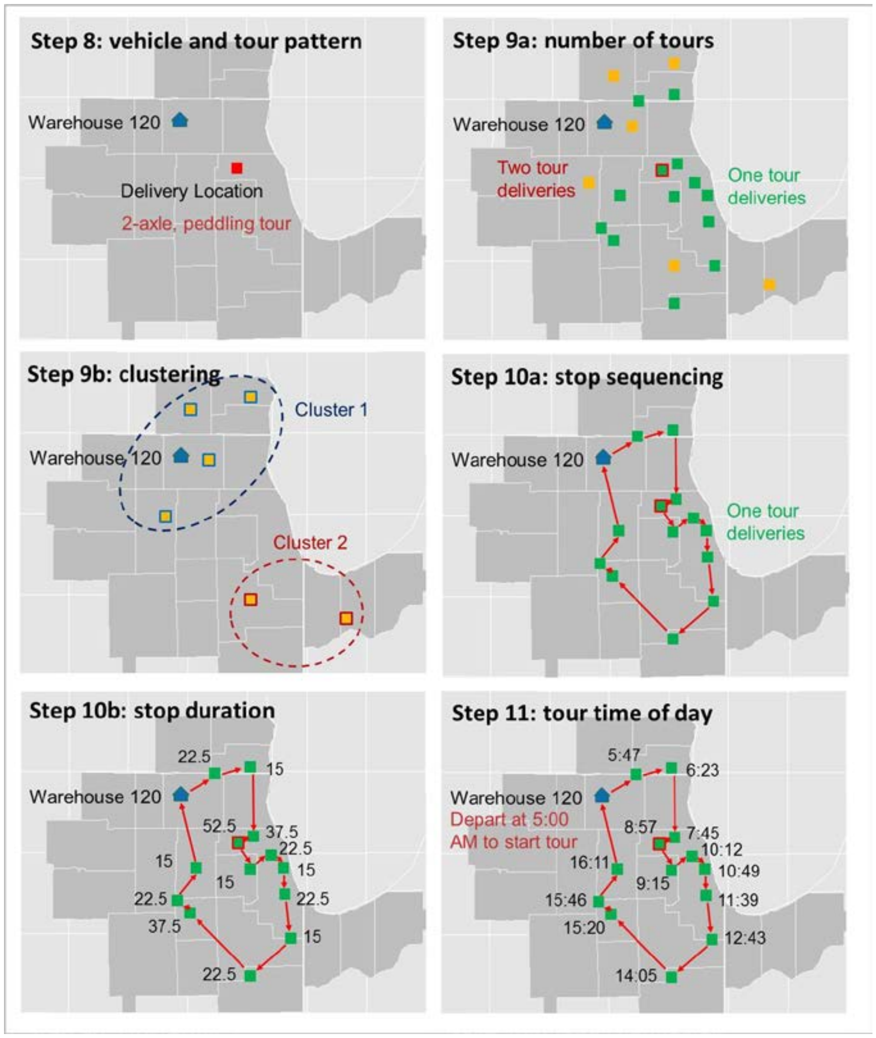
The regional freight truck and commercial vehicle touring models were transferred from the work done in Baltimore. These were calibrated and validated using locally collected data.

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

If you picnic at Blue Lake or take your kids to the Oregon Zoo, enjoy symphonies at the Schnitz or auto shows at the convention center, put out your trash or drive your car – we've already crossed paths.

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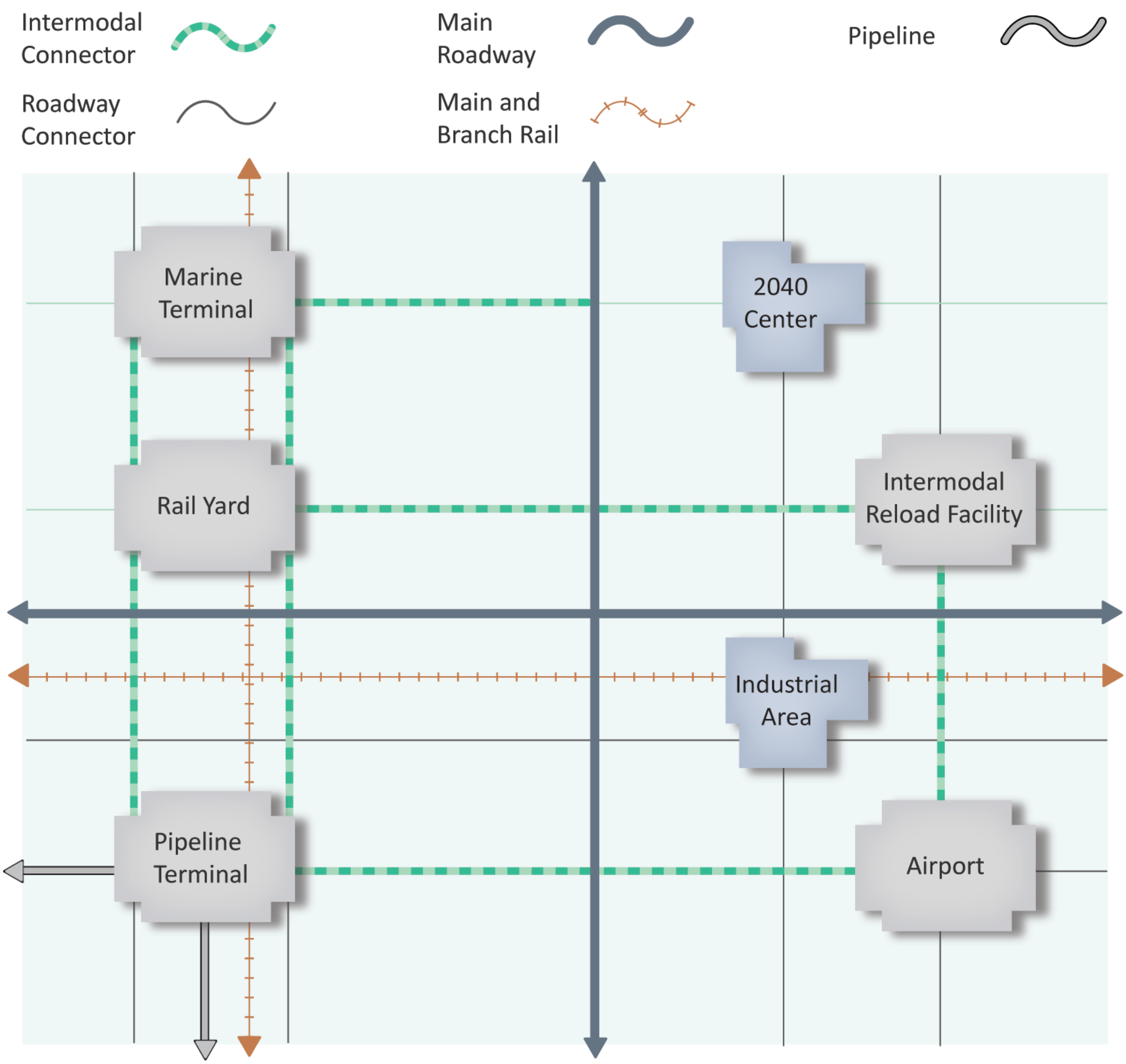
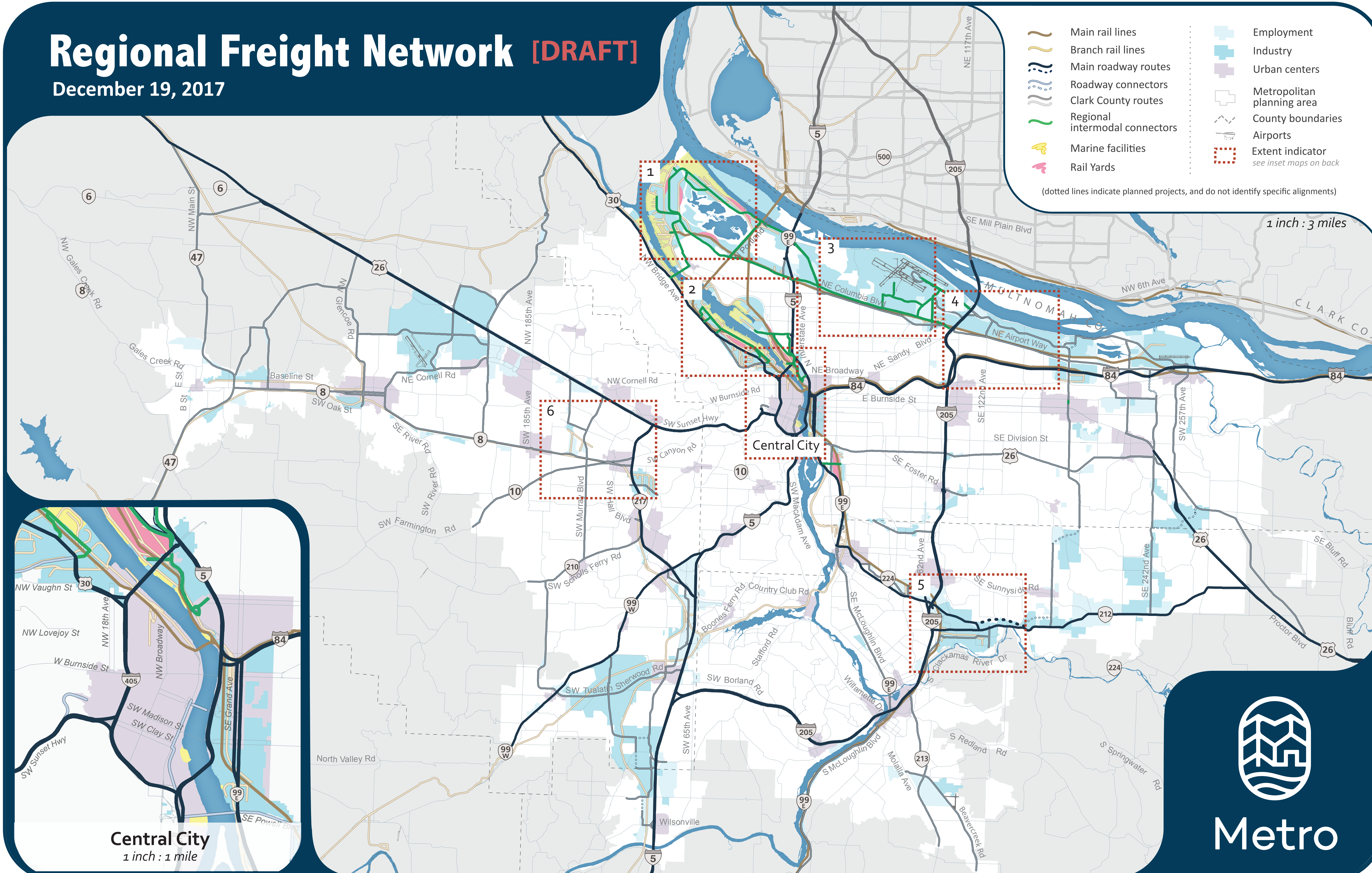
April 2, 2018

Regional Freight Concept



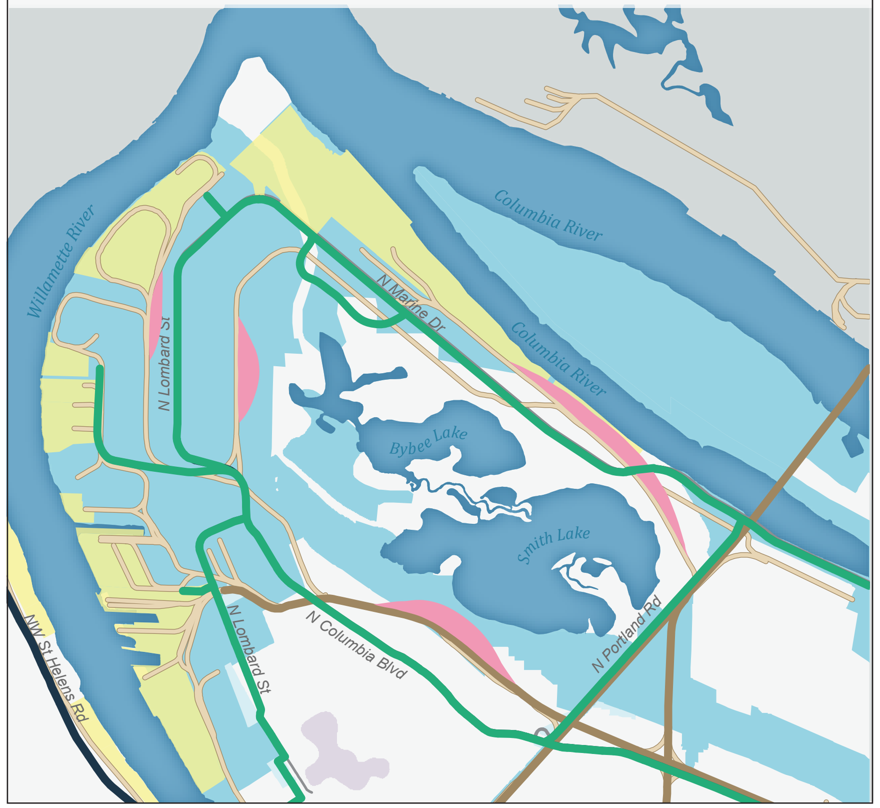
Regional Freight Network [DRAFT]

December 19, 2017

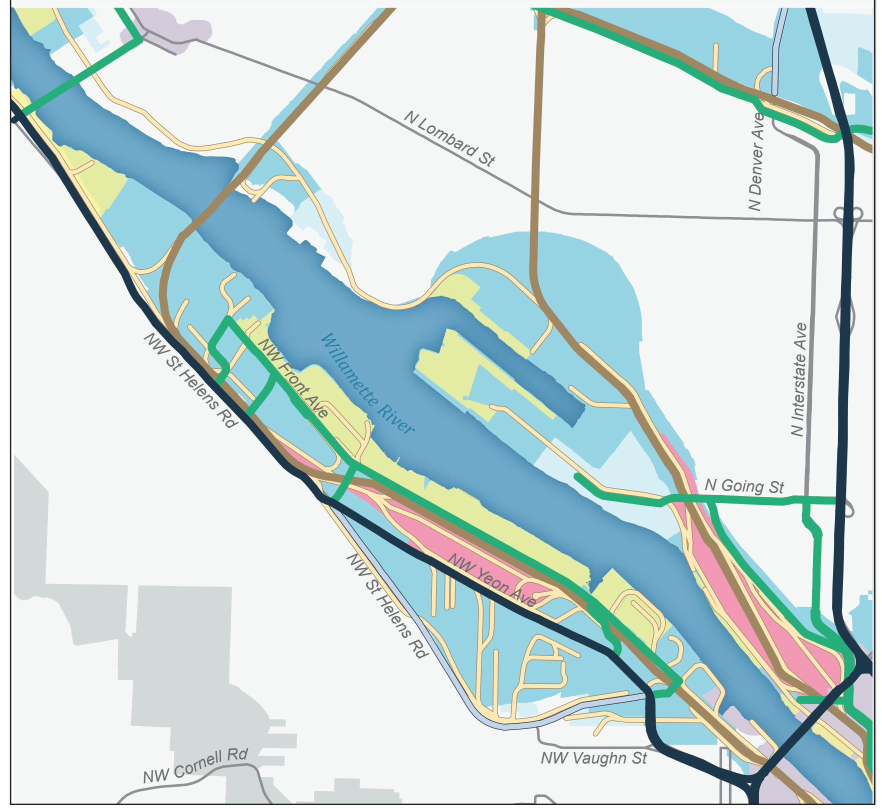


[DRAFT]

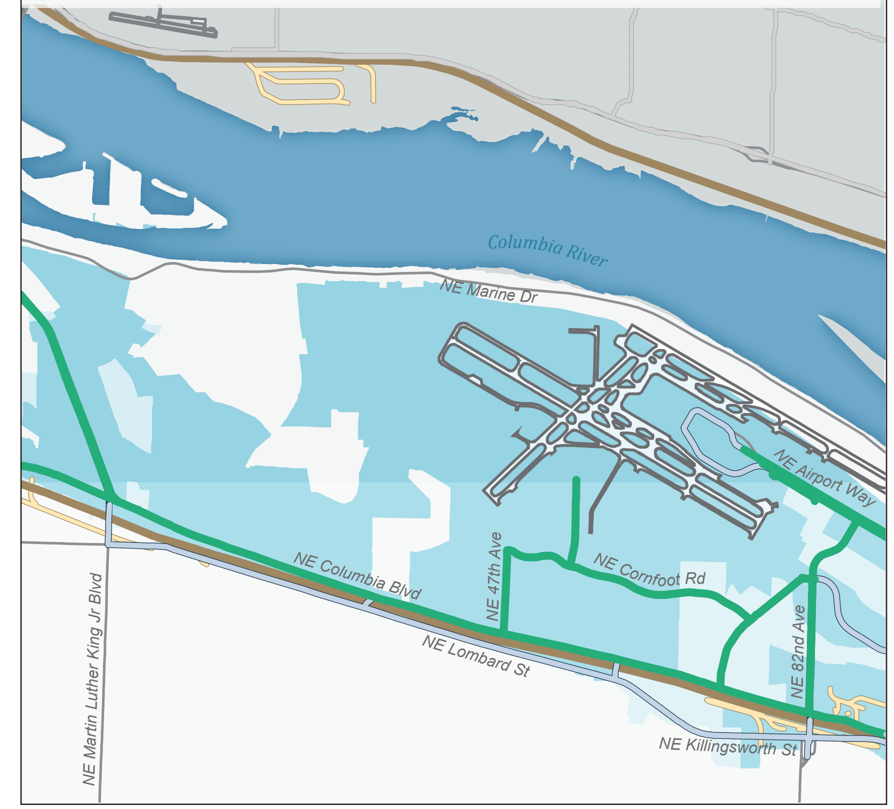
1. North Portland Marine Terminals



2. NW Industrial and Swan Island Areas



3. Portland International Airport + Airfreight



Legend

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

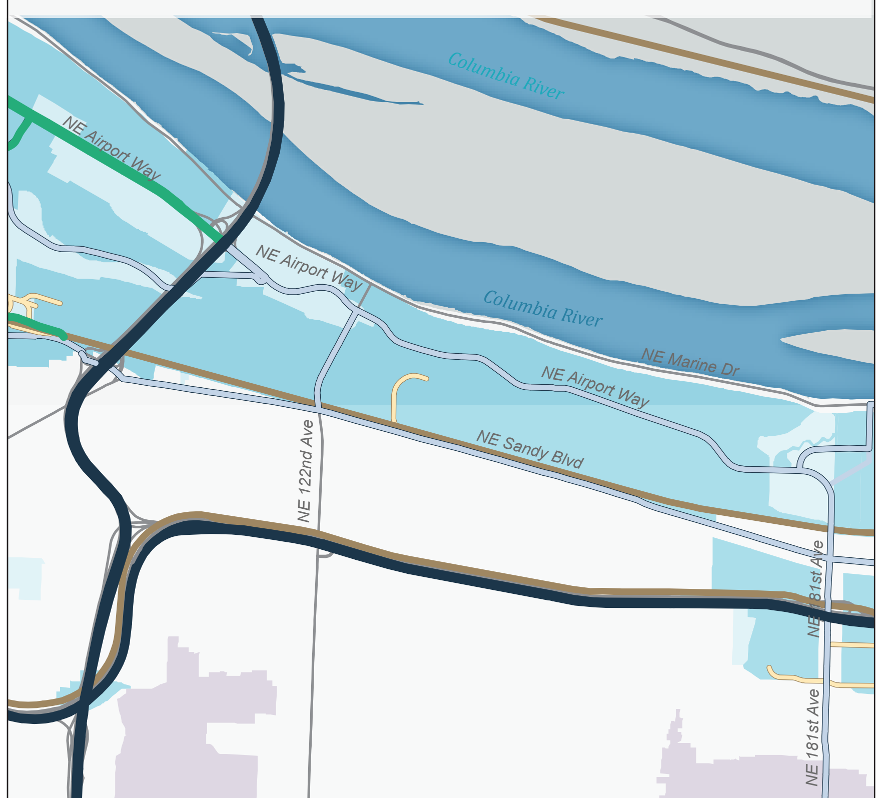
- Main rail lines
- Branch rail lines
- Main roadway routes
- Roadway connectors
- Regional intermodal connectors
- Marine facilities
- Rail Yards
- Employment
- Industry
- Urban Centers
- Urban Growth Boundary
- County Boundaries
- Airports

All insets adhere to the following scale:

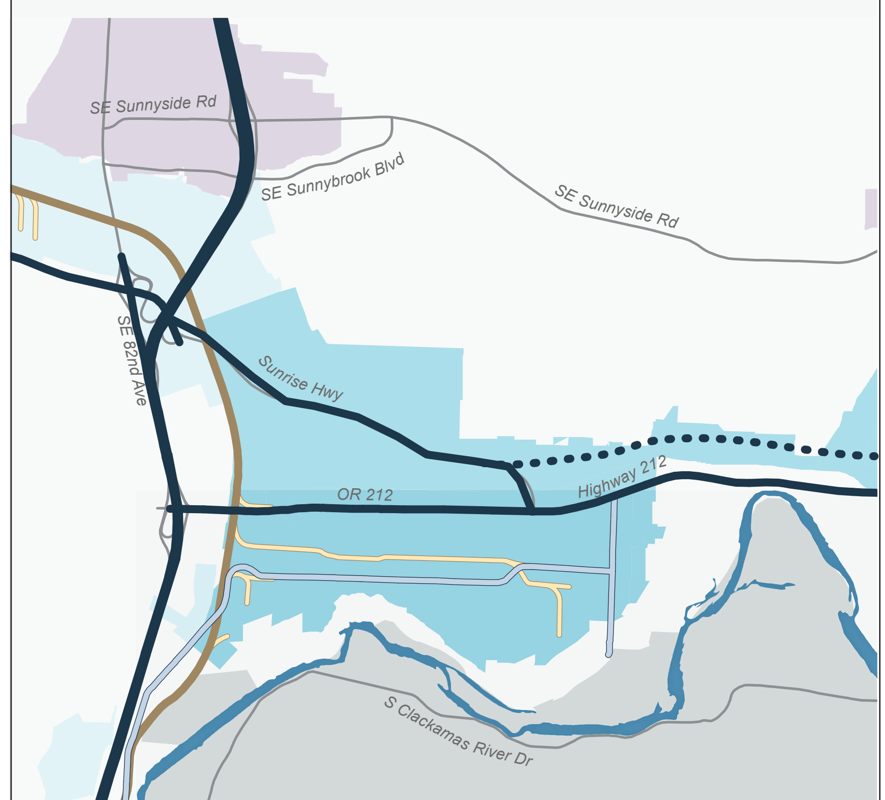
1 inch : 1 mile

October 18, 2017

4. Kenton Rail Line / Columbia Corridor



5.Clackamas Industrial Area



6. Beaverton Industrial + Branch Rail Lines