Agenda

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

Meeting: Metro Technical Advisory Committee (MTAC) and Transportation Policy Alternatives Committee (TPAC) workshop meeting
Date: Wednesday, February 19, 2020
Time: 10:00 a.m. – 12 noon
Place: Metro Regional Center, Council Chamber

10:00 am	**1.**		**Call To Order and Introductions**	**Tom Kloster, Chair**
10:05 am	**2.**		**Committee and Public Communications on Agenda Items**	
10:10 am	**3.**	*	**Minutes Review from January 15, 2020 MTAC meeting**	**Tom Kloster, Chair**
10:15 am	**4.**	*	**Regional Emergency Transportation Routes (ETR) Update-Draft Criteria and Methodology** Purpose: Provide a project update and seek feedback on the draft definitions and criteria to be used to update the regional emergency transportation routes.	**Kim Ellis, Metro** **Laura Hanson, RDPO** **Thuy Tu,** **Thuy Tu Consulting** **Allison Pyrch,** **Salus Resilience**
11:00 am	**5.**	*	**Regional Barometer** Purpose: Awareness of Metro's new web tool and open data platform.	**Cary Stacey, Metro**
11:30 am	**6.**	*	**Regional Transportation Safety Discussion** Purpose: Provide an update on serious crashes in the region through 2017. Group discussion on elevating awareness of safety in the region.	**Lake McTighe** **Noel Mickelberry/ Metro**
12:00 pm	**7.**		**Adjourn**	**Tom Kloster, Chair**

Next MTAC Meeting: March 18, 2020

Next TPAC/MTAC Workshop Meeting: April 15, 2020

***Material will be emailed with meeting notice**

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Metro

August 2016

2020 Metro Technical Advisory Committee (MTAC) Work Program
As of 1/29/2020

January 15, 2020 – MTAC Meeting Comments from the Chair Agenda Items • Missing Middle Housing/HB 2001 implementation (Oregon Department of Land Conservation & Development staff, Ethan Stuckmayer; 30 min) • Beaverton's Housing Options Project (Anna Slatinsky, 40 min) • Portland's Residential Infill Project (Tom Armstrong, 40 min)	**March 18, 2020 – MTAC Meeting** Comments from the Chair Agenda Items • Regional Mobility Policy Update (Kim Ellis, Metro/Lidwien Rahman, ODOT, 35 min) • Metro Parks & Nature Updates (Jonathan Slasher; 35 min) • *Housing Bond and Communications Update (Jes Larson and Emily Lieb, Metro; 35 min)*
May 20, 2020 – MTAC Meeting Comments from the Chair Agenda Items • Regional Mobility Policy Update (Kim Ellis, Metro/ Lidwien Rahman, ODOT, 40 min) • Prosper Portland Economic Development Investments & Programs (Tory Campbell & Lisa Abuaf, 45 min) • Transportation Regional Investment Measure Update (Andy Shaw, Metro; 30 min)	**July 15, 2020 – MTAC Meeting** Comments from the Chair Agenda Items • Regional Mobility Policy Update (Kim Ellis, Metro/ Lidwien Rahman, ODOT, 30 min) • 2040 Planning and Development Grants Program (Lisa Miles/Tim O'Brien; 30 min) • Multnomah County Drainage Districts and Levee Ready Columbia (Colin Rowan/Mark Wilcox, MCDD and US Army Corps of Engineers TBD, 45 min)
September 16, 2020 – MTAC Meeting Comments from the Chair Agenda Items • Regional Mobility Policy Update (Kim Ellis, Metro/ Lidwien Rahman, ODOT, 30 min) • Missing Middle Housing/HB 2001 implementation updates(Oregon Department of Land Conservation & Development staff, Ethan Stuckmayer; 30 min)	**November 18, 2020 – MTAC Meeting** Comments from the Chair Agenda Items

MTAC meetings held every other month on the 3rd Wednesday of the month from 10:00 a.m. to 12 p.m.
For MTAC agenda and schedule information, call 503-797-1766 or e-mail marie.miller@oregonmetro.gov

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2020 Metro Technical Advisory Committee (MTAC) and
Transportation Policy Alternatives Committee (TPAC) workshop meetings Work Program
As of 2/11/2020

February 19, 2020 – TPAC/MTAC Workshop Comments from the Chair Agenda Items • Regional Emergency Transportation Routes (ETR) Update-Draft Criteria and Methodology (Kim Ellis, Metro/Laura Hanson, RDPO/Thuy Tu, Thuy Tu Consulting/ Allison Pyrch, Salus Resilience; 45 min) • Regional Barometer (Cary Stacey, 30 min) • Regional Transportation Safety Discussion (McTighe; Mickelberry, 30 min)	**April 15, 2020 – TPAC/MTAC Workshop** Comments from the Chair Agenda Items • *Climate Smart Strategies, Initiatives, Implementations, Public Health Partnerships, and Updates from across the region (Tim Lynch, Multnomah County, reps from WA Co & Clackamas Co TBD, City of Portland TBD; 60 min or full 2 hours?)*
June 17, 2020 – TPAC/MTAC Workshop Comments from the Chair Agenda Items • Jurisdictional Transfer Framework update (John Mermin; 60 min) • Regional Mobility Policy Update (Kim Ellis, Metro/Lidwien Rahman, ODOT; 60 min)	**August 19, 2020 – TPAC/MTAC Workshop** **MTAC/TPAC meeting called if needed**
October 21, 2020 – TPAC/MTAC Workshop Comments from the Chair Agenda Items • Regional Emergency Transportation Routes (ETR) Update-Draft ETR Routes and Report (Kim Ellis, Metro/Laura Hanson, RDPO/Thuy Tu, TTU Consulting; 60 min) • Annual Air Quality Year-in-Review (Grace Cho, Metro/Karen Williams, Cory Ann Wind, DEQ; 45 min)	**December 16, 2020 – TPAC/MTAC Workshop** Comments from the Chair Agenda Items • *Best Practices and Data to Support Natural Resources Planning (Metro Parks and Metro Planning Staff; 2 hours)*

TPAC/MTAC workshops held every other month starting February on the 3rd Wednesday of the month from 10:00 a.m. to 12 p.m.

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Meeting minutes

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

Meeting: **Metro Technical Advisory Committee (MTAC) meeting**

Date/time: Wednesday, January 15, 2020 | 10 a.m. to 12 p.m.

Place: Metro Regional Center, Council chamber

Members Attending	**Affiliate**
Tom Kloster, Chair	Metro
Jae Douglas	Multnomah Co. Health Dept., Environmental Health
Katherine Kelly	City of Gresham
Laura Weigel	City of Hillsboro
Raymond Eck	Washington County Citizen
Denny Egner	City of Milwaukie
Erika Palmer	City of Sherwood
Jeff Owen	TriMet
Jennifer Donnelly	Department of Land Conservation & Development
Anne Debbaut	Department of Land Conservation & Development
Chris Deffebach	Washington County
Mary K. McCurdy	1000 Friends of Oregon
Ramsey Weit	Housing Affordability Organization Representative
Tom Armstrong	City of Portland
Marlee Schuld	City of Troutdale
Steve Koper	City of Tualatin
Mike O'Brien	Environmental Science Associates
Erik Olson	City of Lake Oswego
Laura Terway	City of Oregon City
Erika Palmer	Washington County, Other Cities
Theresa Cherniak	Washington County
Jeannine Rustad	Tualatin Hills Parks & Recreation District
Dr. Gerald Mildner	Portland State University

Guests Attending	**Affiliate**
Rob Zoeller	City of Beaverton
Ethan Stuckmayer	Department of Land Conservation & Development
Charles Ormsby	Birdshill CPO
Dan Pauly	City of Wilsonville
Miranda Babeschell	City of Wilsonville
Karen Buehrig	Clackamas County
Seth Brumley	Oregon Department of Transportation
Mike Weston	King City
Keenan Ogdon-Bakalian	Jordan Ramis, PC
Alma Flores	Reach Community Development

Metro Staff Attending

Ted Reid, Principal Regional Planner	Chris Johnson, Manager II, Research Center
Megan Gibb, Manager II, Planning & Dev.	Tim O'Brien, Principal Regional Planner

Jes Larson, Principal Regional Planner Tim Collins, Senior Transportation Planner
Marie Miller, TPAC & MTAC Recorder

1. **Call to Order and Introductions**
   Chairman Tom Kloster called the meeting to order at 10 a.m. Introductions were made.

2. **Committee and Public Communications on Agenda Items**
   - Jeannine Rustad announced that Tualatin Hills Parks & Recreation is accepting applications for an Urban Planner, which is posted online and open for three weeks.
   - Charles Ormsby commented on the transit challenges for those with wheelchairs and disabilities in the region. Several specific sites in the region were noted for time delays and accessibility not available for wheelchair ridership in public transit. It was encouraged to check the data and get real-time information on this issue.
   - Tim O'Brien announced the kick-off of the 2040 Planning & Development Grants 2020 cycle soon. Information on this will be posted on the website. Categories for grant applications would include concept planning, urban areas and equitable development, with a new category this year for community engagement. On Feb. 3 an optional information meeting at Metro is planned. The final deadline to apply is April 2. Part of the review this year is the interviews with the screening committee which takes place April 27. The Council is expected to award the grants on July 30.

     The equitable development grants will require a community partner as part of the application. Asked for a definition on this, Mr. O'Brien reported this was a community based organization, or could be a local liaison in small communities. It was noted that community engagement grants were broad in nature and had a 2040 plans focus.

   - Katherine Kelly asked for corrections to the Dec. 18, 2019 workshop minutes. On pages 3 and 4 where Springwater Corridor is named, this should be changed to read Springwater Planning Area. Chairman Kloster noted that a regular agenda item listing for future MTAC meetings will include a review of past minutes to collect any corrections or additions.

3. **Missing Middle Housing/House Bill 2001 Implementation (Ethan Stuckmayer, Oregon Department of Land Conservation & Development)**
   Ethan Stuckmayer presented information on elements and implications from Oregon's housing initiatives; House Bill 2001 that requires updates of local rules that have limited housing choices, House Bill 2003 that address housing needs and production, and noted the rulemaking website where this information can be found. Middle housing described in HB 2001 includes duplex standard, triplex, fourplex, townhomes and cottage clusters. HB 2003 addressing housing needs and increased unit production with analysis updates on a regular basis and production strategy in 11 regions of the state. The Rulemaking and Technical Advisory Committees to the DLCD was reviewed. Following meetings this year, it was expected the rules, model codes and strategies would be adopted by Dec. 31, 2020.

   Requirements for medium-sized cities are all Oregon cities outside the Portland Metro boundary with a population between 10,000 and 25,000. The requirement is for duplexes to be allowed on each lot or parcel zoned for residential use that allows for the development of detached single family dwellings. Requirements for large cities with a population of more than 25,000, unincorporated areas within the

Portland Metro boundary that are served by sufficient urban services, and all cities with the Portland Metro boundary with a population of more than 1,000. The requirement is for duplexes as listed for medium-sized cities, and triplexes, quadplexes, cottage clusters, and townhouses in areas zones for residential use that allow for the development of detached single family dwellings. The middle housing bill enables both medium and large cities to regulate siting and design of middle housing types. Two versions of the model code will be required, one for medium cities and one for the large cities. The codes will be written such that local governments can apply them directly.

Comments from the committee:

- Marlee Schuld asked how soon from the time the model codes are issued before implementation is required. Mr. Stuckmayer noted the goal to have the model codes published is end of September 2020. Medium cities will require implementation by June 30, 2021 while Large cities have to the end of 2020.
- Denny Egner asked if consultants were hired to work on the model code drafts, which was confirmed by Mr. Stuckmayer as partly from Angelo Planning and Sera Architects as part of this rule making effort. Noting the large number on the committees it was agreed that designing this system with so many different sizes of cities is a big undertaking. Asked if sidewalks was included in the model codes, it was noted this is more a transportation infrastructure plan rather than housing.
- Laura Terway asked if these rules came with guidance for development. Mr. Stuckmayer noted there would be a desire for the model codes to show guidance in designs that would be applied to the rules of the House Bills for implementation.
- Tom Armstrong asked if there was a limit of time in the legislative ruling for this. Mr. Stuckmayer noted this was listed as a reasonable amount of time with internal engineering planning work possible time extensions. The infrastructure based time extension requests allow additional time for implement in areas with infrastructure limitations. Medium cities extension requests are due by Sept. 30, 2020, and large cities and all of Metro area is June 30, 2021.

Mr.Stuckmayer noted other HB 2001 provisions:

- 3% limit on density increase assumptions related to UGB expansions
- Owner-occupancy and on-site parking requirements not allowed for ADUs
- Housing production survey to include ADUs and middle housing
- DCBS to develop single family conversion standards
- Prohibits new CC and R's that prohibit middle housing types or ADUs

Technical assistance funds of $4.5 million to support local government implementation is planned for HB 2001 ($3.5 million) for middle housing codes and infrastructure-based time extension request, with HB 2003 allocating $1million to develop housing production strategies, housing needs analyses and implement other elements of the bill.

It was noted that the rulemaking website did not list member affiliate information. Mr. Stuckmayer noted this would be updated soon with both the rule making committee and technical advisory committee members listed to show where their input in the process comes from.

Forums are scheduled across the state, including in the Portland Metro area; Jan. 29 in Hillsboro and Jan. 30 at Clackamas Community College. A speaker's bureau is available for outreach to local governments and other interested parties. Dates and events were shared noting committee meetings.

House Bill 2003 was briefly reviewed. A pilot program on Regional Housing Needs Analysis is to be completed by Sept. 1, 2020. Two reports from the analysis due by March 1, 2021 is the summary of results, and evaluation of regional analysis as a tool. HB 2003 requires all cities larger than 10,000 to regularly update their housing needs analyses, and LCDC is required to establish or delegate the update schedule by Dec. 31, 2019.

Housing production strategies in HB 2003 must include a list of specific actions, including the adoption of measures and policies that the city shall undertake to promote development within the city to address a housing need identified. Other provisions in the bill authorizes the use of publicly-owned land for affordable housing development, subject to certain stipulations, and clarifies provisions from 2017 Senate Bill regarding building height, density limitations, and affordable housing on church properties.

4. Beaverton's Housing Options Project (Anna Slatinsky and Rob Zoeller, City of Beaverton)

Anna Slatinsky and Rob Zoeller presented information on Beaverton's Project Housing Options (HOP). The project was launched in 2018 with a purpose to consider where and how additional housing types could be allowed in the city's residential neighborhoods. The project schedule was reviewed that is now in the timeline of studying neighborhood patterns, developing alternatives and conducting economic analysis.

A graphic showing comparison between the HOP and HB 2001 was presented. Neighborhood patterns were studied from community character using GIS analysis and site visits. The results showed three construction periods over the time span with unique design and development patterns. Results from 1965-1984 showed:

- Types. Middle housing built steadily until 1979:
    - 1965-1974. Most existing duplexes in the city were built in this period
    - 1978. City updates development code
    - 1980 onward. Detached single-family becomes prevailing pattern

Street patterns were noted with curvilinear grids and cul-de-sacs among the designs. Middle housing from 1920 to the present are a mix of duplexes, triplexes, quadplexes and townhouses in all neighborhoods.

Roughly 30 neighborhood engagement meetings were held for input. Common themes among all groups showed:

- Multigenerational living options
- Homes for older adults
- Homeownership opportunities
- Design compatibility with the neighborhood

Differences among groups:

- Multicultural groups wanted more options near schools, parks and houses of worship

- Open houses and neighborhood association meetings wanted more options near transit, markets and shopping

The next steps with the project will be developing alternatives that continue work with neighborhood pattern studies and modeling. Economic analysis will be studied to evaluate capacity and affordability issues. Interviews are planned with developers and lending institutions. And more multicultural community engagement meetings to create housing leadership cohorts.

Comments from the committee:

- Denny Egner asked if research through the multi-cultural groups provided input that might affect your design standards. There was discussion on street standards with preferences on inward/outward designs. Costs of construction, trade-offs with designs and other factors will add to relevant discussion as more is planned.
- Jae Douglas asked how co-housing or multi-housing options might fit into some of the design standards, especially with senior housing options. It was noted that they sometimes fit existing standard codes, or sometimes not. Seniors tend to care more about the neighborhood as fit rather than specific housing types.

5. Portland's Residential Infill Project (Tom Armstrong, City of Portland)

Tom Armstrong presented information on the City of Portland's Residential Infill Project that addresses housing options and scale, and building designs. The proposals would add more housing options to meet people's changing needs. The proposal would allow more housing units to be built in residential neighborhoods, but only if they follow new limits on the size of new buildings.

When addressing Portland's housing crisis, it became clear that zoning codes were only one small part of factors needing study. Residential infill was last updated five years ago. Since then smaller building options appear to be part of the solution. The Residential Infill Project includes detached single-family homes, duplex, triplex and fourplex designs. Project outcomes showed:

- Increases access to more types of housing in all Portland neighborhoods
- Allows more units at lower prices on each lot
- Applies new limits on building scale and height
- Reduces displacement overall

Maps that showed the cost of home sales from 2000 to 2017 pointed to the issue of housing affordability becoming out of reach. Zoning limits housing choice and supply, with currently 43% of land in Portland used for single-dwelling purpose.

Recommendations from the project are to allow more housing types including duplexes on corner lots, and triplexes and fourplexes in some places. Three units in one box may trigger building/safety code concerns which are being studied. Where additional housing types would be allowed was shown on a map, with sections yet to be further studied for future zoning. There will be one more revision to the plan with infrastructure studies where street improvements are required.

Recommendations are also made to reduce the scale of development through use of floor-to-area ration (FAR), vary by number of units, and bonus FAR for affordability or preserving house. This applies to both remodel or conversion, and new construction. Senate Bill 535 allows housing rezoning on narrow lots that are historically plotted, currently 1,400.

The project looked at annual incomes of residents in the area and housing costs which pointed to the challenge of ability to pay rent or own homes. Examples of lower priced houses with three potential futures were shown. For the same moderate priced space, units added could lower costs, but if kept to single-dwelling space the cost would not make them affordable. Part of the concern with rising costs is having higher paying jobs in the region that some residents can afford to pay, while others cannot.

Discussion was held on the displacement risk and households vulnerable to displacement. Factors where displacement is vulnerable are with renters, low income, people of color and population without higher education. The evaluation of displacement risk asked:

- Which properties are likely to redevelop under new zoning and where
- Who is affected by redevelopment of these sites? In general and in specific locations?
- Is this impact greater or less than current zoning?

In summary: More housing types + smaller size, scaled by number of units + allowed everywhere = More units, smaller units, less expensive units, and less displacement overall.

6. Adjourn

There being no further business, meeting was adjourned by Chair Kloster at noon.
Respectfully submitted,
Marie Miller, MTAC Recorder

Attachments to the Public Record, MTAC meeting, January 15, 2020

Item	Document Type	Document Date	Document Description	Document No.
1	Agenda	01/15/2020	01/15/2020 MTAC Meeting Agenda	011520M-01
2	MTAC Work Program	01/03/2020	MTAC Work Program, as of 01/03/2020	011520M-02
3	MTAC/TPAC Workshop Work Program	12/19/2019	MTAC/TPAC workshop Work Program, as of 12/19/2019	011520M-03
4	Minutes	12/18/2019	Meeting minutes from December 18, 2019 MTAC and TPAC workshop meeting	011520M-04
5	Handout	November 2019	Cities and Counties Affected by HB 2001	011520M-05
6	Handout	N/A	House Bill 2001: More Housing Choices for Oregonians	011520M-06
7	Handout	11/6/2019	Key elements of House Bill 2001 (Middle Housing)	011520M-07
8	Handout	August 2019	Residential Infill Project Summary	011520M-08
9	Presentation	1/15/2020	Update on Oregon's Housing Initiatives	011520M-09
10	Presentation	1/15/2020	Beaverton's Project Housing Options Project Overview	011520M-10
11	Presentation	1/15/2020	Residential Infill Project	011520M-11

Memo

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

Date: February 12, 2020

To: Transportation Policy Alternatives Committee (TPAC), Metro Technical Advisory Committee (MTAC) and interested parties

From: Kim Ellis, Metro Project Manager
Laura Hanson, Regional Disaster Preparedness Organization (RDPO)

Subject: Regional Emergency Transportation Routes (RETRs) Update – Feedback requested on draft evaluation framework (definitions and criteria)

PURPOSE

Seek feedback on the evaluation framework (e.g., draft definitions and criteria) proposed to update the Regional Emergency Transportation Routes (RETRs). *See attached memo from the Thuy Tu consulting team.*

BACKGROUND

This project is updating Regional Emergency Transportation Routes (RETRs) designated for the five-county Portland-Vancouver metropolitan region, which includes Clackamas, Columbia, Multnomah and Washington counties in Oregon and Clark County in Washington. The last update occurred in 2006.

The Regional ETRs are travel routes that, in the case of a major regional emergency or natural disaster, would be prioritized for rapid damage assessment and debris-clearance and used to facilitate life-saving and life-sustaining response activities, including the transport of first responders (e.g., police, fire and emergency medical services), patients, fuel and essential supplies.

The RETRs were first designated in 1996 and were most recently updated in 2006. The current regional ETRs were established in a memorandum of understanding between the Oregon Department of Transportation (ODOT), Washington State Department of Transportation (WSDOT), the Port of Portland, Clackamas, Columbia, Multnomah and Washington counties and the City of Portland in 2006.

Regional ETRs are travel routes that, in the case of a major regional emergency or natural disaster, would be prioritized for rapid damage assessment and debris-clearance. These routes would be used to move resources and materials, such as first responders (e.g., police, fire and emergency medical services), patients, fuel and essential supplies.

rdpo.net/emergency-transportation-routes

Co-led by the Regional Disaster Preparedness Organization (RDPO) and Metro, this project was identified in the 2018 Regional Transportation Plan (RTP) implementation chapter (Chapter 8) as a necessary step to better integrate transportation planning with planning for resiliency, recovery and emergency response. The project is supported by a work group comprised of local, regional and state partners and a team of local consultants that includes a Geographical Information System (GIS) analyst, transportation planner and geotechnical engineer.

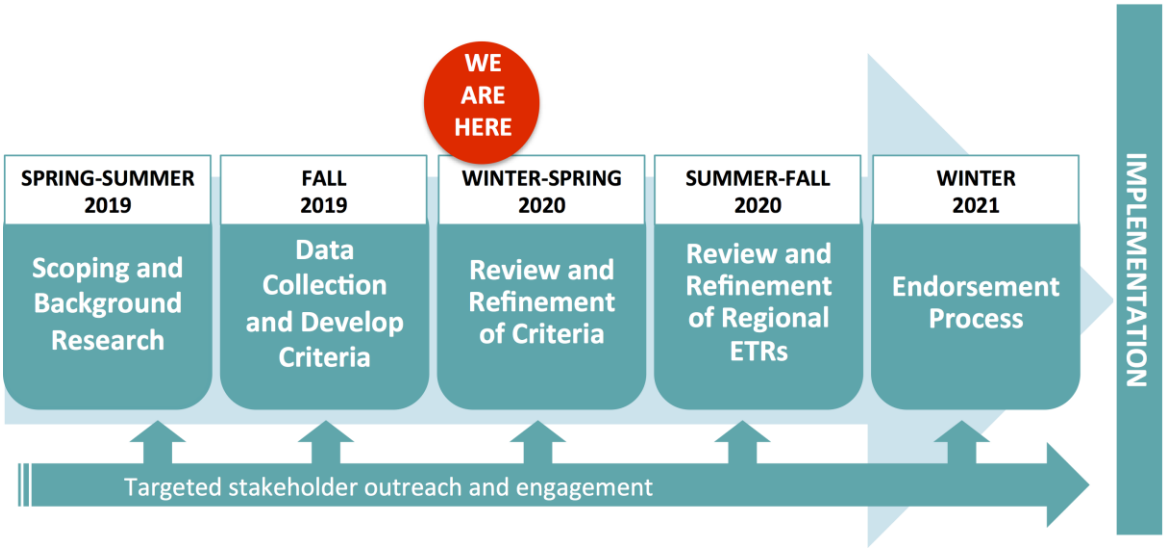
The ETR project will deliver an updated regional ETR map, a list of ETR corridors, collected data in ArcGIS platform and accompanying report and recommendations for use by state, regional and local entities in planning for resiliency, recovery and emergency response.

NEXT STEPS

The overall project timeline is provided in **Figure 1**. A schedule of planned policy and technical discussions is attached for reference. Engagement of policymakers, planners and other stakeholders is more extensive for this RETR update to better integrate transportation planning with planning for resiliency, recovery and emergency response as well as the investments that will be needed to make the region's transportation system more resilient.

This winter and spring is an opportunity for TPAC and MTAC and other stakeholders to provide feedback on the draft definitions and criteria proposed to update the RETRs this summer.

Figure 1. Timeline for updating regional emergency transportation routes



Next fall, staff will seek feedback on the draft updated RETR maps and recommendations for future planning work from TPAC, MTAC, the Joint Policy Advisory Committee on Transportation (JPACT), the Metro Policy Advisory Committee (MPAC), the Southwest Washington Regional Transportation Council (SW RTC), the Metro Council, the RDPO Steering Committee and the RDPO Policy Committee.

In early 2021, recommendations will be brought forward for review and consideration for endorsement by regional policymakers, including the RDPO Steering Committee, the RDPO Policy Committee, the Metro Council, JPACT and the SW RTC. A regional dissemination workshop is anticipated in February 2021 to more broadly share the updated maps, data and recommendations for future planning work.

/attachments

- Policy and Technical Discussions | 2020-2021 (2/11/2020)
- Regional Emergency Transportation Routes Update Factsheet (2/11/2020)
- Memorandum on Process and Proposed Evaluation Framework for Updating the Regional Emergency Transportation Routes (2/11/2020)

REGIONAL EMERGENCY TRANSPORTATION ROUTES UPDATE

POLICY AND TECHNICAL DISCUSSIONS | 2020 - 2021

Dates are subject to change. Briefings to occur as part of regular meetings. See reverse for meeting times and locations.

2020

Month	When	Who	What
January	1/23	ETR Working Group	• Project update • Seek feedback on draft definitions and criteria
February	2/19	TPAC/MTAC workshop; ETR Working Group members invited	
	TBD	RDPO work groups (e.g., public works, Fire/EMS, law enforcement, healthcare)	
March	3/6	REMTEC	
	3/10	Metro Council	
	3/11	MPAC	
	3/19	JPACT	
	3/20 *requested*	RTAC	
April	4/6	RDPO Steering Committee	
	4/7 *requested*	SW RTC	
	TBD	ETR Working Group	
May	5/8	RDPO Policy Committee	
June	Project team applies recommended criteria and methodology to update Regional ETRs.		
July			
August	TBD	ETR Working Group	Seek feedback on draft maps and report recommendations
October	10/2	REMTEC	
	TBD	Community Leaders' Forum	Report back draft maps and how previous feedback addressed
	10/16 *requested*	RTAC	Seek feedback on draft maps and report recommendations
	10/21	TPAC/MTAC workshop	
	Via RDPO email	RDPO work groups (e.g., public works, Fire/EMS, law enforcement, healthcare)	
November	11/2	RDPO Steering Committee	
	11/3 *requested*	SW RTC	
	11/11	MPAC	
	11/17	Metro Council	
	11/19	JPACT	
	TBD	RDPO Policy Committee	
December	TBD	ETR Working Group	Finalize recommendation

see reverse
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2021

Month	When	Who	What
January	1/5	SW RTC	Seek endorsement
	1/8	TPAC	Seek recommendation to JPACT
	1/8	REMTEC	Seek rec'd to RDPO Steering Committee and RDPO Policy Committee
	1/21	JPACT	Seek endorsement recommendation to the Metro Council
February	2/1	RDPO Steering Committee	Seek recommendation to the RDPO Policy Committee
	2/4	Metro Council	Seek endorsement
	TBD	RDPO Policy Committee	Seek endorsement
	TBD	Regional ETR Dissemination Workshop	Share final report and data

Policy and Technical Committee Information (listed in alphabetical order)

ETR Working Group – Regional Emergency Transportation Routes Working Group
Typically meets at the Metro Regional Center, 600 NE Grand Avenue, Portland OR 97232. Times vary.

JPACT – Joint Policy Advisory Committee on Transportation
Typically meets 7:30-9 AM at the Metro Regional Center, 600 NE Grand Avenue, Portland OR 97232.

Metro Council
Typically meets 2-4 PM at the Metro Regional Center, 600 NE Grand Avenue, Portland OR 97232.

MPAC – Metro Policy Advisory Committee
Typically meets 5-7 PM at the Metro Regional Center, 600 NE Grand Avenue, Portland OR 97232.

MTAC – Metro Technical Advisory Committee
Typically meets 10 AM-noon at the Metro Regional Center, 600 NE Grand Avenue, Portland OR 97232.

RDPO Policy Committee
Typically meets three times per year. Times and locations vary.

RDPO Steering Committee
Typically meets 1-3 PM. Locations vary.

REMTEC – RDPO's Emergency Management Work Group *(originally named Regional Emergency Management Technical Committee)*
Typically meets 9-11 AM at the Metro Regional Center, 600 NE Grand Avenue, Portland OR 97232.

RTAC – Regional Transportation Advisory Committee
Typically meets 9-11 AM at the Clark County Public Service Center, 6th Floor Training Room, 1300 Franklin Street, Vancouver, WA 98660.

SW RTC – Southwest Washington Regional Transportation Council
Typically meets 4-6 PM at the Clark County Public Service Center, 6th Floor Training Room, 1300 Franklin Street, Vancouver, WA 98660.

TPAC – Transportation Policy Alternatives Committee
Typically meets 9:30-noon at the Metro Regional Center, 600 NE Grand Avenue, Portland OR 97232.

TPAC/MTAC Workshop – Joint Workshop of TPAC and MTAC
Typically meets 10 AM-noon at the Metro Regional Center, 600 NE Grand Avenue, Portland OR 97232.

RDPO
Regional Disaster Preparedness Organization

Metro

Regional emergency transportation routes (RETR) update

Updating the region's emergency transportation routes

Natural disasters can happen anytime. The transportation system needs to withstand them to support life-saving and life-sustaining activities.

Project overview

The project is updating Regional Emergency Transportation Routes (RETRs) for the five-county Portland-Vancouver metropolitan region, which includes Clackamas, Columbia, Multnomah and Washington counties in Oregon and Clark County in Washington. RETRs are travel routes that, in the case of a major regional emergency or natural disaster, would be prioritized for rapid damage assessment and debris-clearance. These routes would support life-saving and life-sustaining response activities, such as transport of fuel, essential supplies, patients and first responders (e.g., police, fire and emergency medical services). Access to critical facilities and services, especially for vulnerable populations will also be considered.

The RETRs were first designated in 1996 and were most recently updated in 2006. The current RETRs were established in a memorandum of understanding between the Oregon Department of Transportation (ODOT), Washington State Department of Transportation (WSDOT), the Port of Portland, Clackamas, Columbia, Multnomah and Washington counties and the City of Portland in 2006.

Why now?

Since 2006, new technology, data and mapping have greatly expanded our understanding of hazard risks in the region. The RETR update will consider these risks and identify priority routes for emergency response during a major regional emergency or natural disaster.

Desired project outcomes

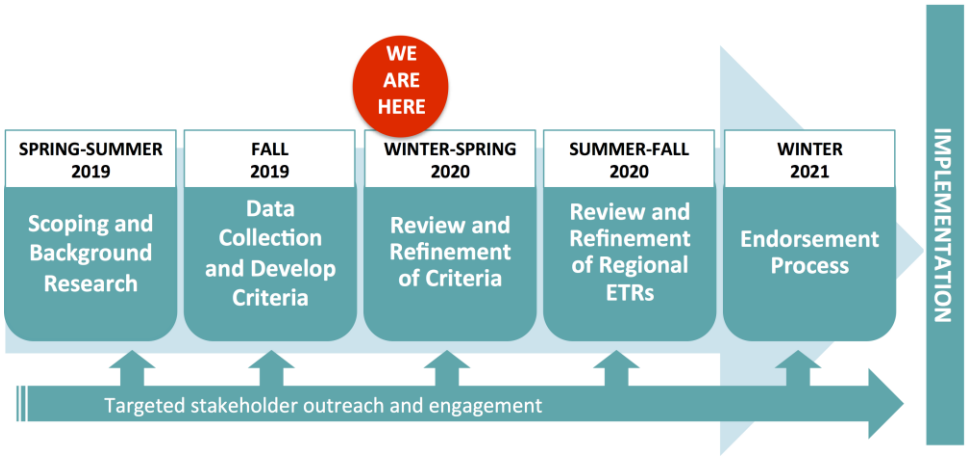
This project will result in an updated map of RETRs (including data in ArcGIS platform) that more accurately reflects current hazard risks (seismic, landslide and flood, in particular), new and/or improved transportation facilities and other updates to reflect current conditions.

In addition to the updated map, the RETR project will deliver a list of RETR corridors, a geodatabase of collected data and accompanying report that includes recommendations for use by state, regional and local entities in future planning for emergency response, recovery and resiliency.

The RETR update will also:

- Raise the level of visibility of ETRs in transportation planning for emergencies, disasters and significant events
- Improve understanding of how ETRs will withstand changing environments and what will be required to quickly restore normal operations
- Facilitate informed dialogs and planning between transportation and other key stakeholders involved in emergency planning
- Strengthen regional partnerships around resiliency, recovery and enhanced transportation networks

Regional emergency transportation routes update project timeline



Partnerships and collaboration

The RETR update project is co-led by the Regional Disaster Preparedness Organization (RDPO) and Metro, with a team of local consultants including a Geographical Information System (GIS) analyst, transportation planner, and geotechnical engineer. The project is supported by a work group comprised of local, regional and state partners, including Portland State University's Transportation Research and Education Center.

The project will engage and consult with RDPO and Metro technical and policy committees and working groups in a coordinated manner. This includes engaging and consulting with transportation, emergency management and public works departments of each county and the City of Portland.

Metro Council, the Joint Policy Advisory Committee on Transportation (JPACT), Southwest Washington Regional Transportation Council (SW RTC), ODOT, WSDOT, TriMet, South Metro Area Regional Transit (SMART), C-TRAN and Oregon Department of Geology and Mineral Industries (DOGAMI) will also play a key role in the update.

Other agencies and groups will be engaged and consulted to provide their expertise and experiences in emergency response, critical infrastructure and social services for vulnerable populations, including:

- Northwest Oregon Health Preparedness Organization (NWHPO)
- RDPO Fire/Emergency Medical Services work group
- RDPO Public Works work group
- law enforcement
- ports and other special districts
- water and utility providers, such as Portland General Electric (PGE), Pacific Power and NW Natural, among others.

Timeline and decision-making

The RETR update project started April 2019 and is expected to be completed in February 2021.

In early 2021, project recommendations will be brought forward for review and endorsement consideration by regional policymakers, including the RDPO Steering Committee, the RDPO Policy Committee, the Metro Council, JPACT and the SW RTC.

This project is a collaboration between public, private and non-profit stakeholders, co-led by the five-county, bi-state Regional Disaster Preparedness Organization (RDPO) and Metro, the metropolitan planning organization designated by the Governor of Oregon to serve the urban portions of Clackamas, Multnomah and Washington counties.

Funding for this project is provided by the Urban Areas Security Initiative (UASI) grant.

For more information, contact:

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Printed on recycled-content paper.

Feb. 12, 2020

MEMORANDUM – FINAL DRAFT

DATE: February 11, 2020

TO: Laura Hansen, RDPO
Kim Ellis, Metro

FROM: Thuy Tu, Thuy Tu Consulting, LLC
Allison Pyrch, PE, GE, Salus Resilience
Erica McCormick, GISP, RPA, Cascade GIS & Consulting, LLC

RE: **Process and Proposed Evaluation Framework for Updating the Regional Emergency Transportation Routes (RETR)**
Regional Disaster Preparedness Organization (RDPO)/Metro RETR Update
154-035-016

In partnership to update the designated regional Emergency Transportation Routes (ETRs) for the Portland-Vancouver metropolitan region, the Regional Disaster Preparedness Organization (RDPO) and Metro contracted with the Thuy Tu Consulting Team; consisting of Thuy Tu Consulting, LLC, Salus Resilience, and Cascade GIS & Consulting, LLC.

For this ETR update effort, the team assembled data, input, and participation from agencies within the region; established a methodology and evaluation criteria; and developed a process and proposed evaluation framework to update the existing Regional Emergency Transportation Routes. Once these updated routes are developed, the agencies within RDPO can regionally prioritize routes and emergency transportation response planning needs for resiliency, recovery, and emergency response for the Cascadia Subduction Zone level event. Coordinated planning and prioritization can then set the stage for agencies to seek funding for improvements to increase route resiliency to decrease response and recovery times within the region. Although this effort is primarily focused on a large seismic event, considerations for other natural hazards such as flooding, wildfire, and winter storms will be incorporated into the data set for future consideration.

This memorandum presents definitions of ETRs and the methodology and criteria that are proposed to update the Regional ETRs (RETRs). The proposed framework is based on background research provided by RDPO, Metro, and Portland State University (PSU); information considered during previous ETR updates; and ETR workgroup (EWRG) meetings and stakeholder input provided between October and December 2019. A research report prepared by the PSU Transportation Research and Education Center (TREC) was relied upon to develop the methodology for this study. A list of EWRG members is provided in ***Attachment A***. The PSU/TREC report is provided in ***Attachment B.***

The ETR definitions, proposed methodology and criteria included in this memorandum will be reviewed and refined in consultation with the regional EWRG and other stakeholders identified in the project stakeholder engagement plan from January to April 2020.

A database containing readily available geospatial data is also being developed as part of this project. Using this data, the project team intends to apply the methodology and criteria to help update the RETRs. This

All products of the Regional ETR Update were funded by the Department of Homeland Security Urban Areas Security Initiative (UASI), and are owned by the City of Portland.

database is expected to be a valuable resource for coordination with stakeholders for ongoing state, regional, and local emergency response planning and resilience efforts.

Background and Project Outcomes

First designated in 1996, the current RETRs are priority routes targeted for rapid damage assessment and debris removal during an emergency to facilitate life-saving and life-sustaining response activities. They were established in a memorandum of understanding (MOU) between the Oregon Department of Transportation (ODOT); Washington State Department of Transportation (WSDOT); the Port of Portland; Clackamas, Columbia, Multnomah, and Washington counties; and the City of Portland in 2006.

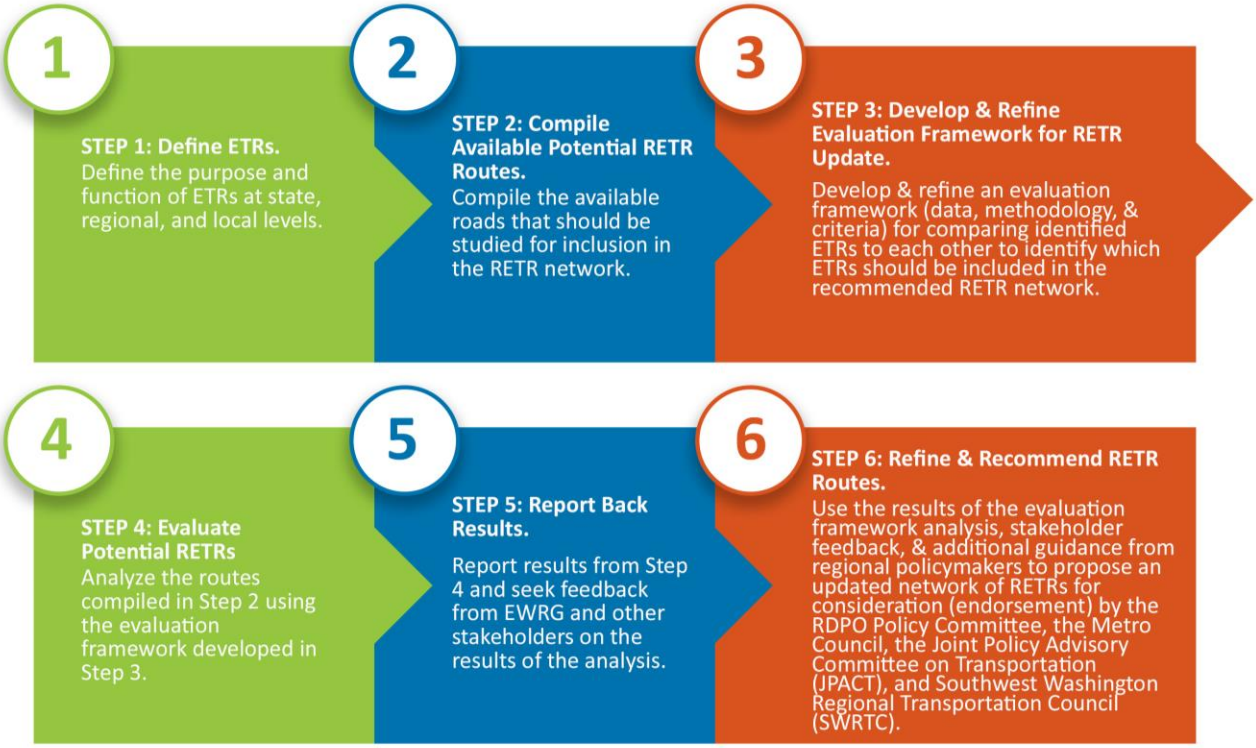
Since 2006, new technology, data, and mapping have greatly expanded our understanding of the effects of seismic hazards in the region. The project will consider these better-defined risks as well as priorities for emergency response, including debris removal and transport of first responders (police, fire, public works, emergency medical services, etc.), fuel, essential supplies, debris, and patients. Access to critical facilities and services, especially for vulnerable populations will also be considered.

The project's primary outcome is to deliver an updated map of regional ETRs that more accurately reflects our current seismic hazard risks (including landslides), new and/or improved transportation facilities, and map updates identified by state and local agencies during more recent individual reviews of ETR designations across the region. The ETR project will deliver an updated regional ETR map and data in ArcGIS (Geographic Information System) platform, a list of ETR corridors, and accompanying report, and recommendations for use by state, regional, and local entities in planning for resiliency, recovery, and emergency response. For the purposes of this project, the RETRs will be primarily evaluated using a seismic lens, specifically for a Cascadia Subduction Zone (CSZ) level event. Other hazards, such as flood and fire, will be considered; however, due to the limited scope and budget of this project, we recommend a future project that includes a more detailed evaluation for others hazards, such as flood, fire, snow, and climate change.

Deliverables

Approach

The project team established the following process for updating the RETRs.



This memorandum presents a discussion of Steps 1 through 3. Details regarding Steps 2 and 4 through 6 and the remaining steps will be discussed in future memoranda. The memoranda will then be complied into a final report.

Step 1: ETR Definitions

The first step in developing our methodology was to develop specific definitions of ETRs based on the PSU/TREC research on local, regional, and state emergency transportation routes planned in the region; best practices from other states and British Columbia, Canada; and discussions with the RDPO EWRG and other stakeholders. The results of this research and stakeholder discussions indicate that the levels and types of ETRs planned within the region have not been consistently defined to date and often overlap.

> ***Emergency Transportation Route (ETR):*** Routes used during and after a major regional emergency or disaster to move resources and materials including supplies, debris, equipment, and personnel. (transport of first responders (e.g., police, fire and emergency medical services), fuel, essential supplies and patients.

In order to simplify these definitions, we have defined an ETR as a route used to transport emergency resources and materials, including supplies, debris, equipment, and personnel. Critical infrastructure and essential facilities are grouped into three categories: State/Regional, County/City, and Community/Neighborhood. Critical infrastructure in this case includes lifelines other than the roadway transportation network, such as water, wastewater, electricity, fuel, communications, and intermodal transportation (e.g., transit, rail, air, and waterway). Essential facilities include hospitals and health care facilities; Emergency Operation Centers (EOCs); police and fire; public works facilities; state, regional, and local points of distribution (PODs); designated debris management sites;

and shelters and community centers. Table 1 below shows how critical infrastructure and essential facilities are grouped into the three categories based on what is typically accessed from each level of ETR.

Table 1 – Critical Infrastructure and Essential Facilities

Category	Critical Infrastructure Considered	Essential Facilities Considered
State/Regional	Airports, marine port terminals, rail yards, regional level lifeline facilities such as power and water transmission lines and state and regional fuel PODs	Hospitals, regional EOCs, state and regional PODs, state and county public works facilities and equipment stores, debris disposal sites
City/County	Local lifeline facilities such as local water and electrical transmission infrastructure, local river connections, transit hubs	Hospitals and health care facilities, police and fire stations, local EOCs and PODs, city and utility public works facilities, transit equipment facilities (bus barns), designated debris management sites
Community/Neighborhood	Lifeline distribution systems, isolated lifeline distribution infrastructure	Churches, schools, community centers, shelters, community PODs

Based on our understanding of the background research and stakeholder input, the project team identified five tiers of ETRs in the region.

- Federal Strategic Highway Network (STRAHNET)
- Statewide Seismic Lifeline Routes (SSLRs)
- Regional Emergency Transportation Routes (RETRs)
- Local Emergency Transportation Routes (LETRs)
- Local Emergency Response Routes (LERRs)

A discussion of each tier follows.

Federal Strategic Highway Network (STRAHNET) and Connectors
The STRAHNET is a national system of roads identified by the Department of Defense (DOD) in coordination with the Federal Highway Administration (FHWA) for the purposes of emergency mobilization and peacetime movement of heavy armor, fuel, ammunition, repair parts, food, and other commodities.

Statewide Seismic Lifeline Routes (SSLRs)
State-owned roadways pre-designated by the state as priority transportation routes in Oregon and Washington. SSLRs provide key emergency response connections between regions within Oregon and Washington. Their primary function is to provide "a network of streets, highways, and bridges to facilitate emergency services response and to support rapid economic recovery after a disaster." *Oregon has identified tiered levels of SSLRs that are prioritized by the desired time for routes to be open to vehicular traffic after an event (e.g., Tier 1 routes are most important and desired to be open first). The relevant section of the 2012 ODOT Seismic Lifelines Vulnerability Synthesis and Identification report is included in* ***Attachment C*** *and includes tier definitions and a map of Tier 1, 2, 3 routes*.

Regional Emergency Transportation Routes (RETRs)
A network of state- and locally owned (county and city) roadways pre-designated by the region as priority transportation routes that can best provide connectivity for emergency operations in the region in the event of a major disaster or earthquake. These routes are priorities targeted during an emergency for rapid

damage assessment and debris clearance and used to facilitate life-saving and life-sustaining response activities throughout the region.

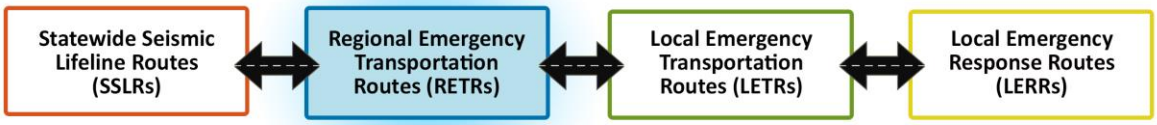
These routes often connect multiple jurisdictions in the region, providing key emergency response connections from SSLRs to State/Regional essential facilities and critical infrastructure, as well as to local ETRs in each county. While these routes may overlap with state or local routes, their primary function is to form a regional backbone of roads that connect regional population centers, essential facilities, and critical infrastructure and services of state and regional importance to the SSLRs.

Local Emergency Transportation Routes (LETRs)
Locally owned roadways, pre-designated by local agencies (county and city) as priority transportation routes intended to provide a local network of arterials, collector and local streets that will connect LERR (defined below) to RETRs. They are generally used to connect more City/County critical infrastructure and essential facilities either directly or via RETRs.

Local Emergency Response Routes (LERRs)
Locally owned roadways intended to provide a network of streets to facilitate prompt response to routine fire, police, and medical emergencies within a single jurisdiction. LERRs also provide a connection from LETRs to Community/Neighborhood facilities and services, such as shelters, medical facilities, and community PODs. These facilities are often not pre-designated and can be defined based on the community needs, scale of the disaster, and resulting damage.

If these streets are pre-designated, local agencies may implement specific design treatments, such as 12-foot travel lanes; larger curb radii; parking restrictions; pedestrian and bicycle access; and a lack of center medians, pedestrian islands, traffic circles, or speed bumps in order to ensure freedom of movement for emergency response vehicles.

Figure 1 – Emergency Transportation Route Hierarchy



Considerations for Further Discussion

Input from the ETR resources and workgroup indicates that these simplistic definitions do not fully encompass the broad range of issues that need to be addressed when defining and planning for emergency transportation route use and designation. Many of these items were discussed within the workgroup and we have documented them as things that can be looked at for future evaluation and projects. Recommendations for future work are included at the end of this memorandum. Some of these recommendations include the following.

- Definition of ETR uses, users, priorities, and responsibilities for rapid damage assessment, debris clearance, and repairing routes between jurisdictions
- Planning for both immediate emergency response purposes and longer-term response and recovery
- Public Education about ETRs and their proposed uses

- Planning for River connections
- Equity and Inclusion

Step 2: Compile Available Potential RETRs and Evaluation Data

The geographic scope of this project is the five-county Portland-Vancouver area, including Clackamas, Clark, Columbia, Multnomah, and Washington counties (Counties) and their cities. The team gathered available ArcGIS data that include the potential RETRs.

Collected RETRs and evaluation data used in our evaluation will be summarized in a memorandum and the final report of the project. Data collection is limited to readily available data provided by project stakeholders and available regional and state data sets. These data include locations of the following infrastructure information, as available.

- Federal Strategic Highway Network (STRAHNET)
- ODOT seismic lifeline routes
- County and Portland Bureau of Transportation (PBOT) local transportation route designations
- County alternative routes to ODOT seismic lifeline routes
- Essential facilities consisting of the following:
  - Hospitals and other medical facilities
  - Police stations and fire stations
  - Critical vehicle and equipment storage facilities
  - Universities, schools, parks, and churches
  - Government buildings
  - Emergency Operation Centers (EOCs)
  - Disaster debris management sites
- Critical infrastructure consisting of the following:
  - Routes and streets within the region
  - River ports, marine terminals, major shipping facilities, and airports
  - Transit locations and infrastructure
  - Utilities and fuel PODs
- Road and bridge condition and seismic vulnerability data
- Roadway characteristics data, including number of lanes, access control, and use/traffic data

Additional data that were collected included:

- Geologic hazard data as identified by Department of Geology and Mineral Industries (DOGAMI) and Clark County, Washington/Washington State Department of Natural Resources (WADNR)
- Regional growth distribution to identify future population centers (Metro)
- Demographic data to identify vulnerable populations in the region (U.S. Census data provided by Metro)

Step 3: Develop Evaluation Framework for RETR Designation

Based on the above definition of RETRs and the background research and stakeholder input received to date, the project team prepared the following recommendation for defining the methodology and criteria for evaluating and updating the RETRs.

The criteria used to establish the existing RETRs in 1996 and 2006 served as a starting point and included:

- State routes serving the metropolitan area were considered primary because of their high capacity and ability to handle oversized vehicles
- Relatively flat routes with few major gradients or potential landslide areas
- Routes serving major population centers
- At-grade level alternative routing at overpasses and underpasses

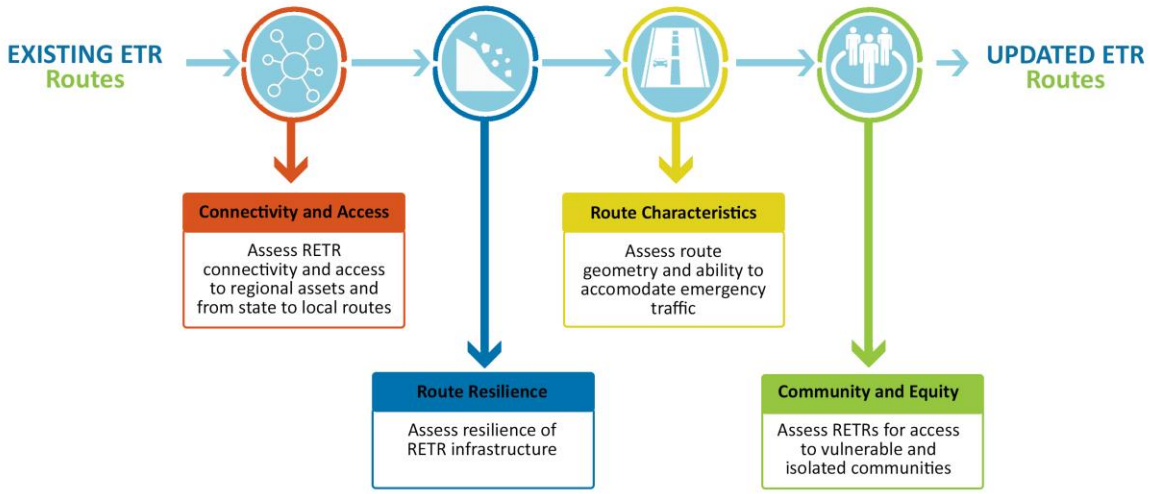
Additionally, the counties and the City of Portland included the following additional criteria during their more recent internal reviews of ETRs and participation in ODOT's recent Seismic Lifeline Triage work:

- Seismic resilience of routes, including bridge seismic vulnerability and landslide risk
- Width of street for access of larger vehicles and larger volumes of vehicles
- Access to airports, hospitals, and isolated communities

Evaluation Methodology

We developed the following methodology based on the research conducted and information collected from the RETR work group and additional stakeholders. Developing an entirely new set of RETRs is outside of the scope of this project; however, we will evaluate and update the existing RETRs and may suggest revisions where needed. In order to provide updated RETRs, the existing RETRs will be evaluated based on four key components; Connectivity/Access, Route Resilience, Route Characteristics, and Community and Equity considerations, in that particular order. Once evaluated, if alternatives are required, they will be developed based on these criteria. A more detailed evaluation framework criteria is included in ***Attachment E.***

Figure 2 – RETR Evaluation Framework Criteria



1) **Connectivity and Access** – The "Connectivity and Access" category includes all criteria relating to route proximity to key resources that are likely to be essential after a disaster/seismic event.
    a. Connectivity and Access from SSLRs to LETRs
    b. Connectivity and Access from SSLRs to critical infrastructure and essential facilities (tiered by level as summarized in Table 1)
        i. State/Regional – regional EOCs and PODs, hospitals, public works facilities
        ii. County/City – county EOCs and PODs, police and fire, health care facilities

iii. Community/Neighborhood – churches, parks, schools, correctional facilities, community PODs (generally accessed through LETRs and LERRs)

c. Connectivity and Access between local jurisdictions (counties/cities)
d. Connectivity and Access to intermodal resources
    i. Connectivity and Access to freight intermodal facilities
        1. SSLRs to Redmond Airport/Pendleton and other state staging areas
        2. Portland International Airport (PDX), Hillsboro and Troutdale Airports
        3. River port facilities and marine terminals (both sides of the Willamette and Columbia Rivers)
        4. Rail yards and rail lines (Union Pacific Railroad [UPRR])
    ii. Connectivity and Access to TriMet/CTRAN transit facilities (transfer hubs, bus barns, etc.)

2) **Route Resilience** – The "Route Resilience" category includes all criteria relating to the vulnerability of the route itself (including bridges and culverts) to seismic and other natural hazards.
    a. Liquefaction and landslide hazards (DOGAMI and WADNR)
    b. Relatively flat routes without major gradients and at level alternatives
    c. Vulnerable bridges/culverts including overpasses
    d. Potential sources of debris (unreinforced masonry (URM) districts)
    e. Condition of pavement
    f. Utility vulnerability

3) **Route Characteristics**– The "Route Characteristics" category includes all criteria relating to the characteristics of the route itself – pavement width, access control, and ability to accommodate large vehicles and freight vehicles. These criteria are important in the case of a disaster or seismic event because they can help determine route usability by large volumes of traffic, quick evacuation, walking and biking to critical destinations, moving emergency response vehicles, freight (including over-dimensional vehicles), and/or transit to and from populated areas.
    a. Pavement width and geometry (number of travel lanes, turning radius, etc.)
    b. Ability to control use/access (on/off ramps, signalized intersections, presence of medians, presence of multiple driveways, etc.)
    c. Functional classification and roadway designation
    d. Average daily traffic (ADT) and traffic flow characteristics
    e. Freight access (e.g., heavy and oversized vehicles, over-dimensional route designation)

4) **Community and Equity** – The "Community and Equity" category includes all criteria relating to route proximity to population centers, isolated populations and socially vulnerable populations after a disaster/seismic event for purposes of equitable rescue operations, emergency response or evacuation and providing equitable access to critical destinations (e.g., hospitals, temporary shelters, etc.). We will use the Metro data developed using the 2018 RTP EFA method.
    a. Connectivity and Access to populations centers (rural/suburban/urban)
    b. Connectivity and Access to isolated populations (rural/suburban/urban)
    c. Connectivity and Access to vulnerable populations (rural/suburban/urban)

Next Steps

The remaining steps of the RETR update process will be completed pending review and refinement of the definitions and evaluation framework by the RETR work group, key stakeholders identified in the project engagement plan, and regional policymakers (including the RDPO Steering Committee, the RDPO Policy Committee, the Metro Council, JPACT, and the SWRTC). A schedule for this review and refinement is under development and will be available in January 2020.

Recommendations for Future Work

Planning for Management of ETRs and Transition from Emergency Response to Recovery

Based on our understanding of emergency response and recovery after a large disaster and our discussions with local emergency management personnel, the ETRs will be used for both response and recovery phases after a disaster. Further, as the disaster response develops and progresses, the need and use of these routes may change and will have to adapt. Since items, such as use, users, priorities, and responsibilities for route maintenance, debris clearance, and repair vary across jurisdictions and will change after an event and during recovery, these elements were not included in the definitions above; however, these are important considerations in future emergency planning and route designation. A coordinated plan with a timeline and associated responsibilities for federal, state, regional, and local emergency responders would provide the framework for developing emergency response plans for varying levels of government.

Understandably, the use of ETRs immediately after the disaster will be dependent on the event specific damage and needs, and with the acknowledgment that it will be difficult to limit access to ETRs in the event of a large-scale disaster before federal and state aid and personnel are able to supplement local law enforcement. Currently, there are no plans to limit or restrict use of ETRs by law enforcement. Based on our research and discussions, it would be prudent to incorporate planning for management and use of ETRs during future preparedness exercises and emergency planning.

A logical follow-up to this project is to use these routes to develop more detailed emergency plans and response procedures that better define concepts, such as ETR use, users, priorities and responsibilities for route maintenance, debris clearance, and repair. Plans should include a timeline that details how the use of these routes will vary across jurisdictions and change after an event and during the recovery phase. Further, better definition of federal, state, regional, and local responsibilities for recovery and repair of the routes is warranted. It would be prudent to incorporate planning for management and use of ETRs during future preparedness exercises and emergency planning.

Develop Coordinated Procedures and Prioritization for Clearing ETRs

We anticipate that all levels of ETRs will need to be accessed, cleared of debris and potential obstructions, and damaged bridges, bridge approaches, or slope and embankment failures will have to be repaired and functional. ETRs should be cleared according to order of importance from SSLRs to LERRs. ODOT's tiered system for their SSLRs is based on a desired time required to get the routes open. As shown in Attachment C, Tier 1 routes are prioritized to be cleared and repaired first, then Tier 2 and so forth. We anticipate that, due to equipment and personnel availability, local agencies will likely be responsible for clearing select ODOT routes and will have full responsibility for clearing regional and local routes.

We recommend the regional partners develop an updated agreement (MOU, other type of agreement, etc.) between agencies, including ODOT, which defines a plan for clearing debris and repairing RETRs based on importance.

Consideration for All Natural Hazards

ETRs should be evaluated for all regional hazards, including snow and ice events, landslide or flooding events, and wildfire. Different disasters may require activating different routes suited to unique events and/or type of hazards. Future evaluation efforts should consider other hazards due to the effects of climate change, such as increased landslides and wildfires, damages to bridges and culverts due to washouts and flash flood events, and flooding and water level rise.

Integrate in Future Planning and Investments

RETRs and the local routes that serve the regional routes should be incorporated into all future planning efforts, including emergency response plans and exercises, natural hazards mitigation planning, master planning, and capital improvement planning. These routes should be prioritized for resilience upgrades as projects are planned within the region and local agencies. Resilience goals should be balanced with community traffic, transportation and transit needs, availability, connectivity, and accessibility. Based on our understanding of upcoming federal grant opportunities, including the need for transportation resilience upgrades in these planning efforts will help demonstrate the urgency and necessity when applying for mitigation grants.

Public Education Initiative

Develop an educational program that helps communicate ETRs and their uses prior to the event. An example would be to include education about walking, biking, or using alternative methods of transportation in lieu of single occupancy vehicular driving to keep roads clear and promote public responsibility to keep ETRs available for emergency services.

Plan for Bike and Pedestrian Access Needs

Future emergency planning should also consider bike and pedestrian access to LETRs and LERRs. An option could include isolated lanes on main ETRs or separate facilities that are provided specifically for non-motorized uses and transit vehicles.

Coordination Between Jurisdictions

Evaluate LETRs and LERRs at jurisdictional boundaries to evaluate where they cross into a neighboring jurisdiction, district and/or community. In such instances, it is prudent to coordinate with the neighboring jurisdiction to ensure the road's designation as a local or regional ETR is consistent across jurisdictional boundaries.

Evaluate River Routes

The definitions in this study are related to ground transportation routes and do not include river routes. While the ETR project will consider access to ports and shipping facilities, based on the numerous rivers in the region and the general expectation of large-scale bridge damage, we recommend that RDPO and Metro consider a follow-up project that examines the potential use of river routes, including how river debris will be managed and what options are available for using water craft for supply and freight distribution and public evacuation from damaged areas.

If a major earthquake occurs during daytime hours when most of the population is at their place of work or school, then a major issue for the immediate response phase is to help the public return home and/or reunite with family after an event, especially in the case where they are across a river from home and/or family. It would be prudent to develop a plan to facilitate public crossings of both the Willamette and the Columbia rivers after an event assuming that neither the I-5 or I-205 bridges are functional.

Address Socially Vulnerable Communities in more Detailed Planning

This project evaluates districts and neighborhoods where ETRs intersect with vulnerable communities that may be disproportionately affected by an earthquake or other disaster (e.g., more heavily damaged areas or limited access to medical care facilities). Future planning will need to acknowledge where the inequities in emergency preparedness and response would occur, and therefore, specifically address diversity, equity, education, and inclusion in emergency response and recovery planning.

Input from community leaders[1] identified the need to ensure this body of work is relevant to community disaster preparedness activities, and that there are clear lines of communication about how ETRs are implemented in the overall disaster planning at the regional and local levels. Though most leaders understand the need for the RETR project, many emphasized that there are infrastructure improvement needs in communities currently that need to be addressed; and future infrastructure improvement plans should balance the local needs of these emergency routes with helping local communities to prepare for disasters. This is an opportunity to consider current community needs when improving the resilience of RETRs.

The overarching concern brought up by community leaders was to adequately evaluate who would be served by these prioritized ETRs and ensuring that future planning prioritizes serving those with less access to resources in a disaster. Further, pursuing equity on this topic means establishing clear communication with communities about how to prepare for a disaster, where ETRs are, and how improving ETRs would impact their community. This also includes communication in different languages and longer planning timeframes to incorporate voices less familiar with these planning processes. Future planning work should provide opportunities for community outreach and education; including people of different language groups, age range, socio-economic class, communities of color, and abilities to ensure that a broad cross section of community voices are represented.

Future efforts to better determine where ETRs intersect with vulnerable communities that may be disproportionately affected by an earthquake or other disaster (more heavily damaged areas or limited access to medical care facilities, etc.). Future planning will need to acknowledge where the inequities in emergency response would occur and, therefore, specifically address diversity, equity and inclusion in emergency response and recovery planning.

Continuous Update of all Natural Hazards and Route Resilience (every 5-10 years)

Continuous monitoring and assessment of natural hazards such as earthquakes, volcanic eruptions, landslides, tsunamis and other natural disasters in an annual, 3- to 5- year basis is critical to the livelihood of our communities and infrastructure. Collaboration with project partners and targeted research on a wide

[1] A Community Leaders' Forum was held on August 2, 2019 to seek feedback on the Regional ETR project. The forum summary is contained in Attachment D.

range of natural hazards can assist the region understand the need to enhance preparedness, response, and resilience for all stakeholders and community members.

As roadway and capital improvement programs progress and infrastructure ages, routes should be updated to reflect the current state of infrastructure resilience against the design disasters. Further, improvements to route corridors or new roadway corridors should be included in any route program updates on a regular basis.

Attachments

Attachment A – Emergency Routes Work Group (EWRG) Members
Attachment B – TREC at PSU Metropolitan Regional ETR Report
Attachment C – 2012 ODOT Seismic Lifeline Vulnerability Synthesis and Identification Report
Attachment D – Community Leaders' Technical Briefing and Discussion, August 2, 2019
Attachment E – RETR Evaluation Criteria Framework

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Glossary of Terms

Accessibility : The ability or ease to reach desired goods, services, activities and destinations with relative ease, within a reasonable time, at a reasonable cost and with reasonable choices.

Arterial: Arterials provide direct, relatively high-speed service for longer trips and large traffic volumes. Mobility is emphasized, and access is limited. These facilities form the primary connections between the central city, regional centers, industrial areas and intermodal facilities, as well as between neighboring cities and the metro region. Arterials generally span several jurisdictions and often are designated to be of statewide importance and serve as major freight routes.

Capacity : A transportation facility's ability to accommodate a moving stream of people or vehicles in a given place during a given time period.

Climate Change: Any significant change in the measures of climate lasting for an extended period of time. Climate change includes major variations in temperature, precipitation or wind patterns, among other environmental conditions, that occur over several decades or longer. Changes in climate may manifest as a rise in sea level, as well as increase the frequency and magnitude of extreme weather events now and in the future. (2018 RTP definition)

Collector : Collectors provide a bridge between arterials and local roads. Collectors link small towns to arterials as well as collect traffic from local roads.

Community Assets: Properties, structures, facilities and systems that have value to the community.

Community Centers: Key local destinations such as schools, libraries, grocery stores, pharmacies, hospitals and other medical facilities, general stores, and other places, which provide key services and/ or daily needs.

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

Critical Infrastructure : Lifelines other than the roadway transportation network such as water, wastewater, electricity, fuel, communications, and intermodal transportation such as transit, rail, air, and waterway. Critical infrastructure and services of state and regional importance during a disaster include intermodal port facilities, such as river ports, airports and marine terminals, and transfer points.

Debris Clearance: Debris removal is defined as the clearance, removal, and/or disposal of items such as trees, sand, gravel, building components, wreckage, vehicles, and personal property.

Essential Facilities : Hospitals and health care facilities, Emergency Operation Centers, police and fire, public works facilities, state, regional, and local points of distribution, designated debris management sites, and shelters and community centers.

Emergency: Any human-made or natural event or circumstance causing or threatening loss of life, injury to person or property, and includes, but is not limited to, fire, explosion, flood, severe weather, drought earthquake, volcanic activity, spills or releases of oil or hazardous material, contamination, utility or transportation disruptions, and disease. (2018 RTP definition)

Emergency Operations Center : An emergency operations center (EOC) is a central command and control facility responsible for carrying out the principles of emergency preparedness and emergency management, or disaster management functions at a strategic level during an emergency, and ensuring the continuity of operation of a company, political subdivision or other organization.

Emergency Transportation Route (ETR): Routes used during and after a major regional emergency or disaster to move resources and materials including supplies, debris, equipment, and personnel. (transport of first responders (e.g., police, fire and emergency medical services), fuel, essential supplies and patients.

Environmental Justice : The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. (EPA definition)

Environmental Justice Populations : People living in poverty, people with low-income as determined annually by the U.S. Department of Health and Human Services Low-Income Index, people of color, elderly, children, people with disabilities, and other populations protected by Title VI and related nondiscrimination statutes. (2018 RTP definition)

Equity: Just and fair inclusion into a society in which all can participate, prosper, and reach their full potential. In transportation, a normative measure of fairness among transportation system users.

Equity Focus Areas: Census tracts higher than regional average concentrations and double the density of one or more of the following: people of color, English language learners, and/or people with lower income. Most of these areas also include higher than regional average concentrations of other historically marginalized communities, including young people, older adults and people living with disabilities. (2018 RTP definition)

Extreme Weather Events: Significant anomalies in temperature, precipitation and winds and can manifest as heavy precipitation and flooding, heatwaves, drought, wildfires and windstorms (including tornadoes). Consequences of extreme weather events can include safety concerns, damage, destruction and/or economic loss. Climate change can also cause or influence extreme weather events. (2018 RTP definition)

Facility: The fixed physical assets (structures) enabling a transportation mode to operate (including travel, as well as the loading and unloading of passengers). This includes streets, throughways, bridges, sidewalks, bikeways, transit stations, bus stops, ports, air and marine terminals and rail lines. (2018 RTP definition)

Freight Intermodal Facility: An intercity facility where freight is transferred between two or more freight modes (e.g., truck to rail, rail to ship, truck to air). (2018 RTP definition)

Functional Classification : Functional classification is the process by which streets and highways are grouped in classes (systems) according the character of service provided. There are three main functional classes as defined by the United States Federal Highway Administration: arterial, collector, and local. Throughways and freeways fall under arterial in the federal classification system.

Geospatial Data: Geographic information it is the data or information that identifies the geographic location of features and boundaries on Earth, such as natural or constructed features, oceans, and more. Spatial data is usually stored as coordinates and topology, and is data that can be mapped.

Hazard: Any situation that has the potential of causing damage to people, property, or the environment. (2015 Oregon Natural Hazards Mitigation Plan)

Impact: The consequences or effects of a hazard on the community and its assets.

Intermodal Connector: A road that provides connections between major rail yards, marine terminals, airports, and other freight intermodal facilities; and the freeway and highway system (the National Highway System). (2018 RTP definition)

Intermodal Facilities : A transportation element that allows passenger and/or freight connections between modes of transportation. Examples include airports, rail stations, marine terminals, and rail yards that facilitate the transfer of containers or trailers.

Isolated Population: Any individual, group, or community who experience geographic, social or cultural isolation. See also Social vulnerability and Socially vulnerable population.

Local Streets or Roads: Local streets primarily provide direct access to adjacent land. Streets are designed as multi–modal facilities that accommodate bicycles, pedestrians and transit, with an emphasis on vehicle mobility and special pedestrian infrastructure on transit streets.

Lower Income: Lower income is defined as households with incomes below 200 percent of the federal poverty level, adjusted for household size (i.e., with incomes up to twice the level of poverty), as defined by the U.S. Census Bureau for 2016. The 2016 federal poverty level for a two-person household was $16,020. (2018 RTP definition)

Major Disaster: Any natural catastrophe including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm or drought, or, regardless of cause, any fire, flood, or explosion in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance to supplement the efforts and available resources of states, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby. (44 CFR 206.2)

Marine Facilities: A facility where freight is transferred between water–based and land–based modes. (2018 RTP definition)

Metropolitan Planning Organization (MPO): A federally-required policy body responsible for the transportation planning, project selection and scheduling the use of federal transportation funds in its region. Governed by policy board, MPOs are required in urbanized areas with populations more than 50,000 and are designated by the governor of the state. Metro is the designated MPO for the Portland metropolitan area in Oregon and the Southwest Regional Transportation Council (SW RTC) is the designated MPO for the Vancouver metropolitan area in Clark County, Washington. (adapted from 2018 RTP definition)

Natural Hazard : Source of harm or difficulty created by an environmental, geological or meteorological event.

Network: Connected routes forming a cohesive system.

Point of Distribution: The location where the public goes to pick up emergency supplies following a disaster.

Population Centers: In demographics, the center of population (or population center) of a region is a geographical point that describes a centerpoint of the region's population.

Preparedness: This term refers to actions taken to plan, organize, equip, train, and exercise to build, apply, and sustain the capabilities necessary to prevent, protect against, ameliorate the effects of, respond to, and recover from climate change related damages to life, health, property, livelihoods, ecosystems, and national security. (2018 RTP definition)

Rapid Damage Assessment: Damage Assessment is a preliminary onsite evaluation of damage or loss caused by an accident or natural event. Damage assessments record the extent of damage, what can be replaced, restored or salvaged. It may also estimate the time required for repair, replacement and recovery. Rapid Damage Assessment is critical during the response phase of a natural or man-made disaster. This

information is used to measure the amount of damage, the area of damage, and to determine the resources necessary to mitigate and recover from a disaster.

Regional Disaster Preparedness Organization: A partnership of government agencies and private and non-profit organizations in the five-county Portland metropolitan region (PMR) working together to build and maintain regional all-hazards disaster preparedness capabilities. The PMR encompasses the four counties of Clackamas, Columbia, Multnomah and Washington in Oregon and Clark County in Washington, along with the city of Portland.

Resilience or Resiliency: The ability to anticipate, prepare for and adapt to changing conditions; and withstand, respond to and recover rapidly from chronic stresses and acute shocks. (modified from 2018 RTP definition)

Risk: The estimated impact that a hazard would have on people, services, facilities, and structures in a community. (FEMA)

Risk Assessment: A process that collects information about hazards and vulnerabilities, then evaluates risks to inform priorities, develop or compare courses of action, and inform decision-making. (Department of Homeland Security)

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

Route Maintenance: Route Maintenance or road maintenance involves remedying defects such as potholes that occur in the carriageway from time to time (corrective maintenance) and providing treatments such as crack sealing which will slow the rate of deterioration (preventative maintenance).

Single Occupancy Vehicle (SOV): A privately-operated passenger vehicle carrying one occupant. The drivers of SOVs use their vehicles primarily for personal travel, daily commuting and for running errands.

Slope and/or embankment failures: A slope failure is when a slope collapses abruptly due to weakened self-retainability of the earth under the influence of a rainfall or an earthquake. Embankments are constructed by placing and compacting successive layers of a fill material onto a foundation soil. Steeper slopes have greater risks for instability, hence more prone for slope failure. Excessive water in slopes is never good as it destabilizes the slope by adding weight, destroying cohesion between grains, and reducing friction.

Social Vulnerability: A characteristic or characteristics of a person or group relating to their capacity to anticipate, cope with, resist, and recover from the impact of a discrete and identifiable disaster in nature or society. (2015 Planning for an Emergency: Strategies for Identifying and Engaging At-Risk Groups. A guidance document for Emergency Managers, Centers for Disease Control and Prevention)

Socially Vulnerable Population: Any individual, group, or community whose characteristics affect "their capacity to anticipate, cope with, resist, and recover from the impact" of a discrete and identifiable disaster in nature or society. A person's vulnerability to disaster is influenced by many factors. The following six categories are among the most commonly accepted: socioeconomic status, age, gender, race and ethnicity, English language proficiency, and medical issues and disability. (2015 Planning for an Emergency: Strategies

for Identifying and Engaging At-Risk Groups. A guidance document for Emergency Managers, Centers for Disease Control and Prevention)

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

Transportation Disadvantaged/ Persons Potentially Underserved by the Transportation System: Individuals who have difficulty in obtaining important transportation services because of their age, income, physical or mental disability. (2018 RTP definition)

Transportation Equity: The removal of barriers to eliminate transportation-related disparities faced by and improve equitable outcomes for historically marginalized communities, especially communities of color. (2018 RTP definition)

Users: A motorist, passenger, public transportation operator or user, truck driver, bicyclist, motorcyclist, or pedestrian, including a person with disabilities.

Vulnerability: The susceptibility of life, property, or the environment to damage if a hazard manifests to potential. (2015 Oregon Natural Hazards Mitigation Plan)

Vulnerable Populations: Vulnerable populations are groups and communities who are more susceptible to effects of a given hazard and at a higher risk for poor health as a result of the barriers they experience to social, economic, political and environmental resources, as well as access and functional needs due to illness or disability. For the purpose of this analysis, this includes people of color, people with limited English proficiency, people with lower income, youth, older adults and people living with disability.

Acronyms

ADT – Average Daily Traffic

CSZ – Cascadia Subduction Zone

DOD – Department of Defense

DOGAMI –Department of Geology and Mineral Industries

EOC – Emergency Operations Center

ETR – Emergency Transportation Route

EWRG -– ETR Work Group

FEMA – Federal Emergency Management Agency

FHWA – Federal Highway Administration

GIS – Geographic Information System

JPACT – Joint Policy Advisory Committee on Transportation

LERR – Local Emergency Response Route

LETR – Local Emergency Transportation Route

MOU – Memorandum of Understanding

MPA – Metropolitan Planning Area

MPO – Metropolitan Planning Organization

MTAC – Metro Technical Advisory Committee

ODOT – Oregon Department of Transportation

PBOT – Portland Bureau of Transportation

PDX – Portland International Airport

POD – Point of Distribution

PSU – Portland State University

RDPO – Regional Disaster Preparedness Organization

RETR – Regional Emergency Transportation Route

STRAHNET – Federal Strategic Highway Network

SSLR – State Seismic Lifeline Route

SWRTC – Southwest Washington Regional Transportation Council

TPAC – Transportation Policy Alternatives Committee

TREC – Transportation Research and Education Center

TriMet – Tri-County Metropolitan Transportation District of Oregon

UPRR – Union Pacific Railroad

URM – Unreinforced Masonry

WADNR – Washington State Department of Natural Resources

WSDOT – Washington Department of Transportation

ATTACHMENT A
ETR Work Group Members

The following agencies and individuals have participated in the Regional ETR Work Group from 2018 to present:

Count	Agency	Participants	Count
1	Regional Disaster Preparedness Organization (RDPO)	Laura Hanson Courtney Yan	2
2	Metro	Kim Ellis Matthew Hampton Zac Christensen Jake Lovell Molly Vogt Daniel Nibouar	6
3	Tri-County Metropolitan Transportation District of Oregon (TriMet)	Alex Ubiadas	1
4	C-TRAN	Bob Medcraft	1
5	Oregon Department of Transportation (ODOT)	Albert Nako Talia Jacobson Bruce Johnson (retired) Tom Braibish Geoff Bowyer Michael Zimmerman Glen Bolen	7
6	Washington Department of Transportation (WSDOT)	Monique Rabideau John Himmel	2
7	Oregon Department of Geology and Mineral Industries (DOGAMI)	John Bauer (retired)	1
8	Oregon Counties Association	Brian Worley	1
9	Portland State University (PSU) Transportation Research and Education Center (TREC)	John MacArthur	1
10	Port of Portland (PDX)	Art Spillman Alex Howard Greg Theisen	3
11	Clackamas County Disaster Management	Nancy Bush	1
12	Washington County Emergency Management	Ken Schlegel John Wheeler	2
13	Washington County Operations and Maintenance	Todd Watkins	1
14	Multnomah County Emergency Management	Lisa Corbly David Lentzner	2

15	Multnomah County Transportation Division	Megan Neill Allison Boyd Tina LeFebvre Jay Cromwell	4
16	Portland Bureau of Emergency Management (PBEM)	Jonna Papaefthimiou	1
17	Portland Bureau of Transportation (PBOT)	Mauricio Leclerc Emily Tritsch Michael Serritella	3
18	Clark Regional Emergency Services Agency	Anthony Vendetti Cindy Stanley	2
19	Columbia County Emergency Management	Shaun Brown Steve Pegram	2
20	Columbia County Public Works	Mike Russell Lonny Welter (retired)	2
21	Gresham Transportation Manager	Chris Strong	1
22	City of Wilsonville Public Works	Martin Montalvo	1
	TOTAL WG MEMBERS		**47**

ATTACHMENT B
TREC at PSU Metropolitan Regional ETR Report

Background and Considerations for Updating the Regional Emergency Transportation Routes in the Portland-Vancouver Metropolitan Region

Baxter Shandobil

John MacArthur

Transportation Research and Education Center
Portland State University

August 2019

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Section I: Project Background

Natural disasters can happen any time and the Pacific Northwest is in a highly seismically active region. In addition to the risk posed by the three shallow, crustal fault lines that intersect Portland, geologists believe that there is a 24 percent chance of a magnitude 8.0 or greater earthquake occurring in the Cascadia Subduction Zone within the next 50 years.[2, 3] Landslides, wildfires, flooding, volcanic activity, and extreme snow and ice events pose additional threats, and when they strike, the transportation system must be resilient in order to facilitate emergency response and recovery activities.

In 1996, the Portland Metro region first designated Emergency Transportation Routes (ETRs), to be used after a major regional disaster to move emergency resources such as personnel, supplies and equipment to designated staging areas and subsequent deployment to heavily damaged areas. The 1996 report of the Metro Regional Emergency Transportation Routes Task Force identified several factors that influence the designation of routes as emergency transportation corridors, including:

- The response phase lasts a relatively short time, so the focus of the task force was on primary ETRs for use during the first 72 hours following an event.

- In past earthquakes, injured people generally found ways to access medical care and were not transported by ambulance to a hospital. The task force identified distributing patients from overloaded or out-of-action medical centers to underutilized ones, perhaps outside of the major impact area, as a primary concern.

- Utilities tend to congregate on major arterials. Downed wires or collapsed water or sewer mains may render these roads impassable. Freeways are less likely to be impacted by damaged utility facilities.

[2] Monahan, R. (2019). "When the Big One Hits, Hundreds of Portland's Buildings Could Crumble. Is it Fair to Make Property Owners Prepare?" *Willamette Week.* Retrieved from https://www.wweek.com/news/city/2019/03/06/when-the-big-one-hits-hundreds-of-portlands-buildings-could-crumble-is-it-fair-to-make-property-owners-prepare/ on 3/14/19/

[3] Read, R (2015). "Oregon State earthquake, tsunami expert Chris Goldfinger: 'It's not hopeless.'" *The Oregonian*. Retrieved from https://www.oregonlive.com/pacific-northwest-news/2015/07/tsunami_earthquake_cascadia_ch.html on 3/14/19.

- Airport facilities and air traffic control systems could be damaged by the event. Alternatives for access to airlift locations should be conisdered for ETR selection.

The task force used four criteria for selecting specific routes:

1. State routes serving the metropolitan area were considered primary because of their high capacity and ability to handle oversized vehicles. Additionally, local emergency corridors are often only accessible via a state route.

2. Relatively flat routes with few major gradients or potential slide areas.

3. Routes should serve major population centers.

4. At-grade level alternative routing at overpasses and underpasses.

While the criteria established in the 1996 Report of the Metro Regional Emergency Transportation Routes Task Force are important, there are other additional criteria that are worth considering (see Sections V through VII).

In 2006, the current regional ETRs were established in a Memorandum of Understanding between Oregon Department of Transportation (ODOT), Washington State Department of Transportation (WSDOT), Metro and local jurisdictions in the Portland-Vancouver metropolitan region.

The MOU describes after-event procedures such as the chain of reporting and jurisdictional responsibility for each road and bridge segment of the ETR network. It also specifies basic assessment procedures, establishes standards on the reporting of route status, and designates the Richter scale magnitude earthquakes for which different response levels are activated. However, the MOU offers minimal guidance on how routes are established and updated.

Since 2006, the ETRs have not been updated thru the MOU and the current designations are not being maintained at a regional level. Recently, some local jurisdictions have identified changes to the local ETRs but these changes have not been shared or updated regionally.

ODOT is currently evaluating the seismic resilience of the state-designated Lifeline Routes in the Portland-Vancouver region portion of Oregon. Overall, ODOT is working with each county in Oregon to further assess the state designated lifeline routes and locally designated ETRs to anticipate seismic impacts to bridge and overpass infrastructure on the state's designated lifeline arterial streets and throughways. The ODOT analysis includes an evaluation of the cost-benefit to seismically update bridge and overpass facilities along state-owned routes compared to the cost-benefit to seismically update adjacent county routes. In addition, each county in Oregon is recommending changes to the ETRs within their respective jurisdiction based on this analysis and local information, when available.

In 2018, Clackamas County updated their routes while evaluating bridge and overpass facilities on the Statewide Lifeline Routes for ODOT. In 2019, Washington County, Columbia County and Multnomah County will complete a similar analysis of their ETRs in partnership with ODOT. Clark County, in Washington State, will complete a similar analysis of their ETRs using DOGAMI data and analysis. Independent of ODOT's work with the counties, the City of Portland conducted an update of their ETRs in 2018, which will be brought into this planning effort.

Given the above work, the designation of current ETRs need to be re-evaluated to reflect updates recommended by the City of Portland and each of the five counties.

The Regional Disaster Preparedness Organization (RDPO) and Metro are coordinating efforts with transportation, emergency management and public works departments of each county and the City of Portland, ODOT and Washington Department of Transportation (WSDOT), as well as the Metro Council, the Joint Policy Advisory Committee on Transportation (JPACT), Southwest Regional Transportation Council (RTC), TriMet, SMART, C-TRAN and DOGAMI.

The Regional Emergency Transportation Routes (ETRs) update project will update the existing regional ETRs for the 5-county Portland-Vancouver metropolitan region by updating the regional ETR map. The project will also make recommendations on elements to be included in an updated memorandum of understanding (MOU), mutual aid or other written agreements needed to implement ETRs, and provide information to support future planning work related to regional transportation recovery, resiliency and emergency management.

The regional project will update existing designated regional routes using the latest DOGAMI seismic data, ODOT Lifeline analysis and subsequent county-level bridges and ETR analysis. This will also ensure the updated ETRs are responsive to local and state knowledge and priorities in our rapidly growing and changing region. Planning and updates to infrastructure within the region since 2006 will also inform the ETR update; particularly the now seismically-resilient Sellwood and Tilikum Crossing bridges owned by Multnomah County and TriMet, and recommendations identified in the 2018 Earthquake Ready Burnside Project Feasibility Report.

Given the limited time and funding available, this report is not intended to be an exhaustive literature review, nor make authoritative recommendations. Rather, it will serve as a resource document for the contracted consultants leading a longer regional ETR refinement process by providing a general knowledge base, cataloging relevant documents, and describing considerations and lessons learned from other regions that have been reviewed

Between March and June of 2019, Metro and RDPO partnered with a Portland State University's (PSU) Transportation Research and Education Center (TREC) to perform desk research to evaluate the policy framework in which ETRs currently operate in the Portland-Vancouver metropolitan region, as well as best practices from other regions with similar vulnerabilities.

Section II: Report Organization

Throughout the research process, we reviewed dozens of planning, policy, emergency management, and technical documents, and solicited feedback from representatives at Portland Bureau of Transportation (PBOT) and ODOT, as well as Multnomah, Washington, Clackamas, Columbia and Clark counties. Additionally, we had a phone conversation with Mike Andrews from North Shore Emergency Management in British Columbia about their current emergency transportation management policies and future plans in a region with similar vulnerabilities. **Appendix B** contains a table of all parties consulted during this process.

One of the initial key findings was a lack of consistency in how ETRs are both named and defined between jurisdictions. In **Section III**, seen below, we identify the four types of emergency transportation routes discussed in local, regional, and statewide planning, engineering, and emergency management documents. Additionally the degree to which ETRs are identified in planning documents between local and regional governments varies widely. ETRs are discussed in multiple sections of Metro's 2018 Regional Transportation Plan (RTP), while the Transportation System Plans (TSP) of the cities and counties in the Portland-Vancouver region hardly mention them at all. The table in **Appendix A**, identifies all local, regional, and statewide documents reviewed during the research process, their publication date and agency, how ETRs are defined within the document, relevant content on emergency transportation.

In addition to local, regional, and state emergency management memos, documents from other regions that have similar vulnerabilities as Oregon, or that have other natural disasters that would warrant established emergency transportation routes as an important disaster planning measure were reviewed. Given the limited time and budget of this project, only selected documents were reviewed. Among those documents, the majority identified transportation as crucial to recovery after a disaster. Some point out that routes may be impassable following an event, and others discuss the use of evacuation routes in the event of an emergency, however none established criteria or a process for identifying emergency transportation routes. While not particularly helpful for establishing best practices, they are included in the table in **Appendix D** so that the contractors hired to lead the larger regional ETR update project can focus their energy elsewhere and be advised on which documents are *not* pertinent.

Several of the emergency management documents from other regions that were reviewed *did* have pertinent discussion of emergency transportation routes, and other considerations that may be useful when updating the Portland-Vancouver region's existing ETRs (**Appendix C**). Sections **V, VI, and VII** synthesize the insights gained from this best practices research (**Section IV**) along with local, regional and statewide planning, technical, and emergency management documents, conversations with planners and disaster management experts into considerations for the regional ETR update.

Section III: ETR Types

We have identified four distinct types of emergency transportation routes within Oregon and in particular the Portland-–Vancouver region, all of which serve different purposes/have different functions. The four types of emergency transportation routes are:

1. **Local Emergency Response Streets (Routes)** are intended to provide a network of streets to facilitate prompt response to routine fire, police, and medical emergencies within a single jurisdiction. These streets, which are often identified by first responders and local and regional emergency managers with some input from transportation planners and policymakers, may receive specific design treatments such as wide streets and lanes, large curb radii, parking restrictions, and a lack of center medians, pedestrian islands, traffic circles, or speed bumps in order to ensure freedom of movement for emergency response vehicles. (This term originated from the City of Portland, and the authors believe is an applicable to term to include in this update project.)

2. During a large-scale event, seismic or otherwise, **Local Emergency Transportation Routes (ETRs)** are used both during the initial response phase and early recovery phase to both transport first responders and supplies such as fuel, food, and medical equipment that aid with recovery and therefore must connect with**,** staging areas, essential infrastructure (power generation, fuel, water mains, etc.) and intermodal transfer points either directly or via **Regional Emergency Transportation Routes** (defined below)**.** These routes are pre-designated by local jurisdictions with input from neighboring jurisdictions, Metro, and the Regional Disaster Preparedness Organization (RDPO), as they must connect with the Regional ETR network. Locally designated ETRs may also cross into a neighboring jurisdiction. In such instances, it is prudent to coordinate with the neighboring jurisdiction to ensure the road's designation as an ETR is consistent across jurisdictional boundaries.

   Prioritization of local ETRs in terms of retrofitting prior to an event, or inspection and debris clearance after an event is at the discretion of the local government but should be coordinated with local, regional and state partner governments. Given limited resources, prioritization of routes could be used to inform funding priorities for seismic retrofitting and hardening of assets (for example ODOT and Metro could use for future funding criteria).

   Locally designated ETRs also serve as detours for segments of **Statewide Lifeline Routes** that have been identified as Tier 2 or Tier 3 (defined below and in Appendix E).

Often, ETRs are focused on the movement of emergency vehicles, cars, trucks, and buses. However, after an emergency in many metropolitan/urban, many people may not have access to public or private transportation. Alternative routes for pedestrians and bicycles should be considered in some areas to enhance mobility while also maintaining the right of way for emergency responders on the primary ETRs. For example, some pedestrians and bikes may use unimproved, spontaneous pathways, but in some instances we may want to include bridges for bike/pedestrian use, and connections of pathways to the ETRs; during recovery it may become prudent to designate certain streets/routes for bike/pedestrian and others for cars.

As an example of how municipalities can expand their own ETRs for non-motorized use as a subset of the larger regional ETR network, the City of Portland is incorporating active transportation into the city's emergency response plans through a process called Bike ETRs (BETRs).

3. **Regional Emergency Transportation Routes** are pre-designated routes critical to the movement of emergency responders and supplies between *regional* nodes in Multnomah County, Washington County, Clackamas County, Columbia County in Oregon, and Clark County in the state of Washington. Because the regional ETRs connect across jurisdictions and connect with local ETRs and Statewide Lifeline Routes, the authors suggest that Metro and RDPO to facilitate the process for updating designated Regional ETRs, with input from and in coordination with local jurisdictions, ODOT and WSDOT. These routes may overlap with local ETRs, however their primary function is to form a backbone of roads connecting population centers as well as critical infrastructure and services of regional importance. Routes within the regional system may be tiered, so that the most critical links receive prioritization for retrofitting, maintenance, inspection or debris clearance and management.

   As an example, an East-West regional ETR may connect a fuel supply depot in Portland to a staging area in Beaverton. Local ETRs in Beaverton and Washington County distribute supplies to local distribution areas and population centers.

   Regional routes may overlap with locally designated ETRs in some instances. For example, at present, segments of SE Foster Road are identified as both local Multnomah County ETRs and as regional ETRs.

   In accordance with the 2006 Memorandum of Understanding, cities, counties, and state transportation departments prioritize the damage assessment and debris clearance of ETRs over other local streets.

4. **Statewide Lifeline Routes** are state-owned roadways considered critical to emergency response and recovery activity at the statewide level in Oregon and Washington. Defined in Policy 1E of the Oregon Highway Plan, the Lifeline Routes are intended to facilitate immediate emergency services and disaster response as well as support rapid statewide economic recovery. While local and regional ETRs support the movement of emergency responders within a region, Lifeline Routes allow for the movement of both emergency responders and freight to transport goods needed for recovery between regions within Oregon. The OHP states that in planning for lifeline routes, focus on susceptibility of the route and improvements on it (bridges and other structures) to disasters such as earthquakes, landslides, and flooding and to consider the presence of designated lifeline routes in system investment and management decisions and in coordination efforts with local land use and transportation planning activities.

   For example, the Redmond Municipal Airport in Deschutes County is thought to be more seismically resilient than Portland International Airport and is designated as the main airport for airlifting emergency response and recovery supplies. Lifeline Routes connect Redmond Municipal Airport with population centers across the state of Oregon.

   The term **Lifeline Corridors** is used to denote the combination of Lifeline Route highways, and Local ETRs identified as Lifeline detours as not to imply that Lifeline Routes are to be used at the exclusion of other parallel roads if necessary.

   While the focus of this report is Regional ETRs, there is more substantial documentation on the process of designating statewide Lifeline Routes and prioritizing them for seismic retrofitting. Although Lifeline Routes are functionally different than regional ETRs, many of the designation criteria are the same, and, as a result, the methodology used by ODOT can help inform the Regional ETR update process. Therefore, Lifeline Routes are discussed in greater detail in this section and in Appendix E.

   Lifeline Routes have three main goals which capture needs during three distinct periods following a seismic event: short, medium, and long-term response and recovery. Within each goal is a series of specific actionable objectives to achieve each goal, and a series of criteria to evaluate how well each Lifeline segment can achieve the related objectives and goals. A cost-benefit analysis based on these criteria is used to categorize Lifeline Routes into a 3-tiered system for prioritizing seismic retrofits. Critical linkages necessary to serve the greatest number of residents at the lowest investment of time and money are given top priority. The specific goals, objectives, criteria and tiers used to designate Lifeline Routes are detailed in Appendix E.

It is useful to think of Lifelines, regional ETRs, and local ETRs as a street hierarchy (Figure 1). Lifelines connect regions of statewide importance and are limited to a few key north-south and east-west routes.

Regional ETRs connect nodes of population and critical infrastructure within a region (i.e. Burnside connects Portland Metro east to west), and local ETRs connect regional nodes to destinations of local importance (populated areas, distribution centers, medical facilities, fire stations, etc.) As an example, Figure 2, seen below, depicts selected Lifelines, Regional ETRs and Local ETRs.

Figure 1. Emergency Transportation Route Hierarchy

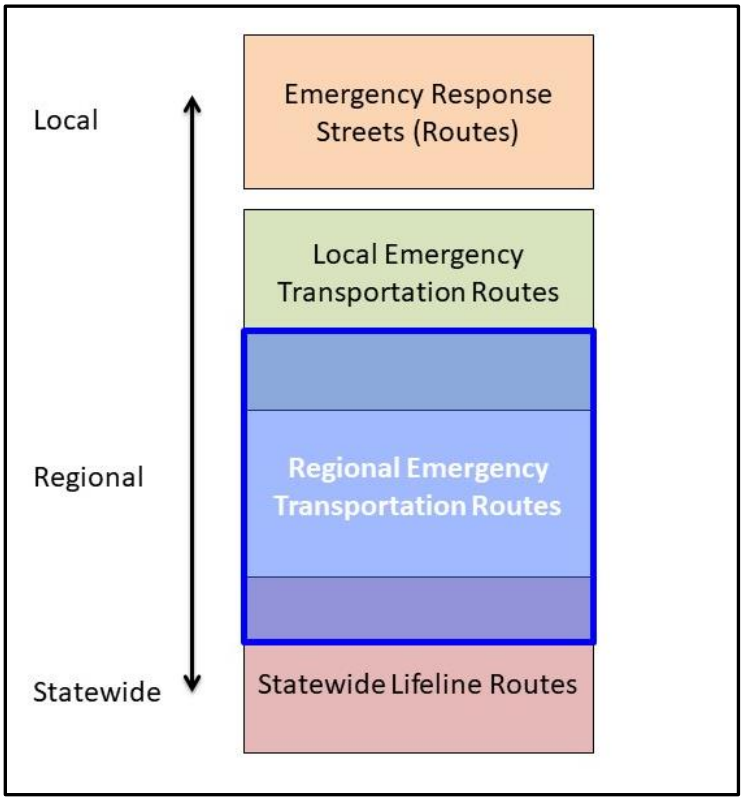
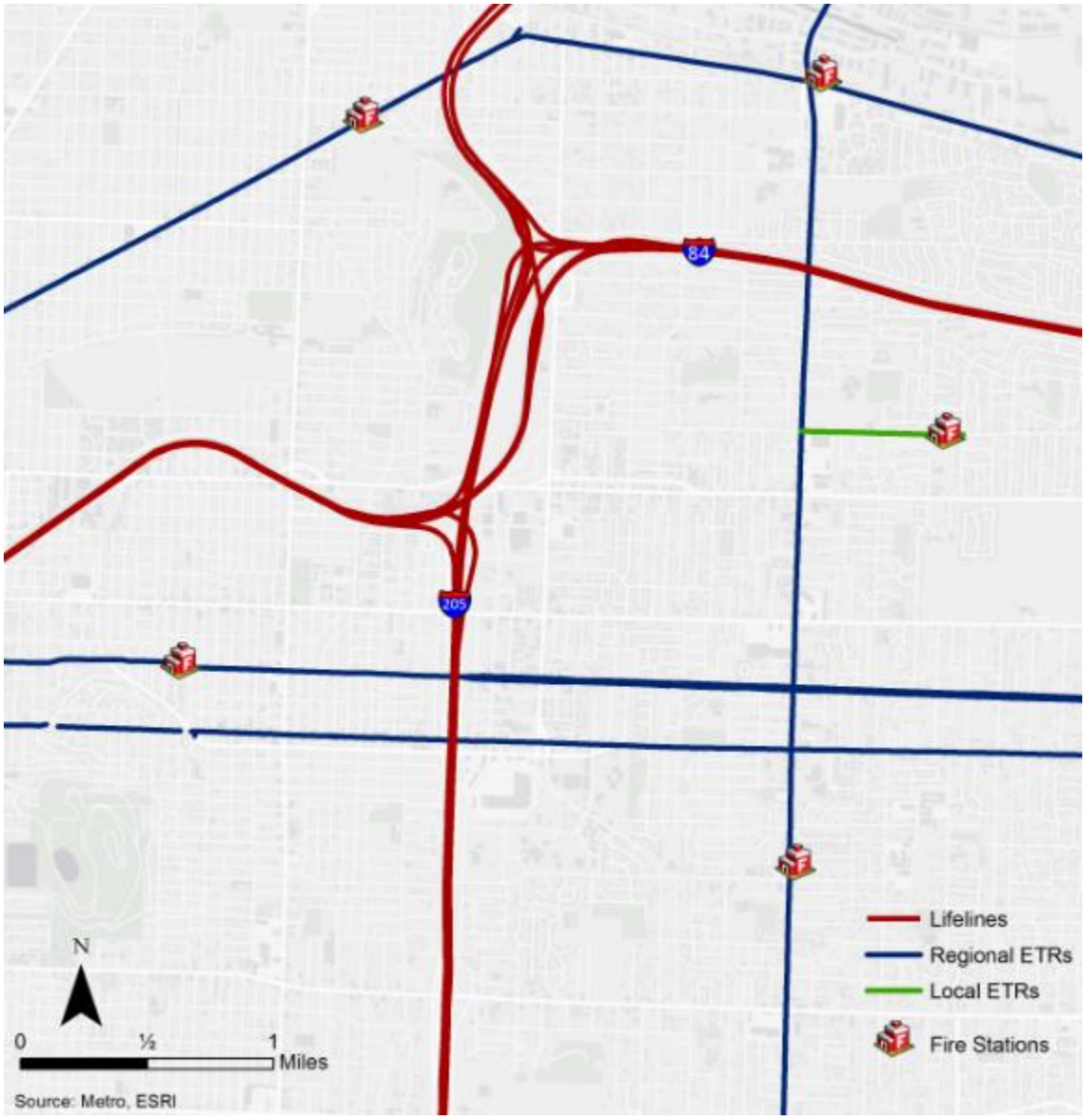


Figure 2. Selected Lifelines, Regional ETRs, and Local ETRs*



*Not all routes and key destinations are depicted. Rather, the map serves as an example of the hierarchy of emergency transportation routes.

Section IV - Literature Review

Our literature review of planning and emergency management documents from regions outside of Oregon proved largely unfruitful chiefly because most MPOs do not have established ETRs in the same way that Metro does. Pre-established evacuation routes in areas prone to hurricanes and flooding are common, however, these are functionally different than ETRs as they are designed to quickly move people out of an area, rather than bring emergency responders and supplies to an area.

West Coast Cities

Several emergency management documents from regions with similar hazards as Oregon were reviewed, including the State of California Emergency Plan, the Bay Area Earthquake Plan, the City and County of San Francisco Emergency Response Plan, and the City of Seattle Comprehensive Emergency Management Plan (See appendices C and D for a full list). While they all acknowledge the importance of a resilient transportation network, there is no discussion of a predetermined emergency transportation network, let alone a methodology for creating one.

Seattle prioritizes snow and ice routes to be plowed first during extreme winter weather events. These routes tend to be on major arterials and transit routes, but the Seattle Comprehensive Emergency Management Plan offers little detail on other criteria used.

British Columbia

Of all documents reviewed from regions outside of Oregon, the British Columbia Disaster Response Primer, and the British Columbia Disaster Response Transportation Planning Guide for Road Transportation were most relevant to the regional ETR update. Similar to ETRs, British Columbia establishes a network of regional and provincial routes "vital to the functioning of the transportation network in the impact area and movement of emergency resources cross-jurisdictionally." While these so called "Critical Routes" are pre-designated with the latest information regarding resiliency, BC disaster management experts recognize that these routes may fail given the unpredictable nature of disasters. In the event that a Critical Route is impassable, or does not provide sufficient access to the affected area, a separate system of Disaster Response Routes (DRRs) are activated post-event. DRRs are for the exclusive use of emergency response vehicles, or critical personnel with valid identification (exclusively for their use, as a separate system). The report further differentiates between short, medium, and long-term DRRs, which utilize different levels of traffic control and access restrictions.

Sections V through VII describe some considerations for updating Metro's regional ETRs organized by access considerations, roadway considerations, and policy and jurisdictional considerations.

Section V: Access Considerations

There are a wide range of locations that need to be accessible following a major earthquake. Table 1, seen below, contains a list of critical assets organized by regional importance (local, regional, statewide). This list is neither comprehensive nor prescriptive, rather it summarizes key destinations identified during the literature review for this project. Assuredly, there are additional locations of importance not identified here.

Table 1. Critical Assets by Regional Importance

Locations	Regional Importance		
	Local	**Regional**	**Statewide**
Major Hospitals	X	X	X
Urgent Care, Clinics, Medical Centers	X		
Fire, Police, and Ambulance	X	X	
National Guard			X
Airports		X	X
Marine Ports		X	X
Rail Yard		X	X
Fuel Depots		X	X
Fueling Stations	X		
Utilities: Electricity, Natural Gas	X	X	
Staging Areas	X	X	X
Community Points of Distribution	X		
Mass Shelter	X	X	
Transit Garages	X	X	
Drinking Water	X	X	

Food Sources	X	X	
Sewage Treatment Sites	X		
Disaster Debris Management Sites	X	X	
City Halls	X		
Emergency Operations Centers	X	X	
Community Centers	X		
Childcare Facilities	X		
Homeless Shelters	X		
Jails	X		
Residential Care Facilities	X		
Schools	X		

Additional Access Considerations:

- **Lifelines and critical infrastructure and services are interdependent:** Swift emergency response depends not only on the road itself, but the availability of other critical services such as radio, cellular, and broadband internet connections for communications, electricity or fuel for generators at hospitals, and water to suppress fires and support life-saving efforts. ETRs should connect with access points to other critical infrastructure so that services can be resumed as quickly as possible following an event. Due to security concerns, utility providers are often apprehensive about sharing the locations of critical assets and will only do so on a "need to know basis." However, there is a strong case that emergency preparedness planners need to know. One approach could be to share initial mapping and data with utility providers with a request to identify issues or network gaps.

- **Emergency vehicle energy sources may change:** Today, the majority of emergency response vehicles and heavy trucks and machinery are propelled by internal combustion engines fueled by gasoline, diesel, biodiesel, or compressed natural gas. Thus, connecting to fuel depots is crucial to keep vehicles in service. However, as electric vehicles continue to mainstream and models for light-duty use, such as pickups and vans, fueling needs may change such that charging stations, and power generation and transmission sites become more relevant.

- **Public access to ETRs:** The primary function of ETRs is to facilitate the movement of emergency responders, supplies, and other personnel that aid with immediate response and life-saving activities and the initial transition to recovery. Consideration should be given as to whether regional ETRs will be accessible to the general public (and in what timeframe, and in light of access needs including access to shelters, points-of-distribution, hospitals, etc).

  The most likely disaster scenario (major earthquakes) generally do not trigger large-scale evacuations. Unlike a hurricane, where people generally have advanced warning, and vacate the area prior to the event, earthquakes are usually "shelter-in-place" events. However, depending on when the earthquake occurs, there may be a significant number of people that need to travel home or an agreed upon meeting place to reconnect with family. According to the Transportation Technical Memorandum in the City of Portland's Evacuation Plan, a full-scale evacuation would cause congestion greater than a typical peak travel period. While a full-scale evacuation is unlikely, general traffic, perhaps worsened by panic, could impede emergency response. Mass relocation out of the region may occur during the recovery period, and likely warrants more consideration as part of transportation recovery planning.

  Emergency management documents from British Columbia explicitly state that first responders will either receive police escort on their "Disaster Response Routes," or routes will be closed to the public entirely.

- **Public outreach about ETRs:** If ETRs are for the exclusive use of emergency responders, it still may be valuable for the public to be educated about their location through public outreach plan, so that they know where they should avoid in order to relieve congestion for re-supply operations, but give information on Commodity/Community Points of Distribution (C-POD) sites where they can expect to find help. However, during the literature review no instances of public engagement in the ETR planning process were identified; typically, outreach includes first responder agencies. ETRs generally do not extend into local neighborhood streets, and people may have to travel to receive medical care, so an understanding of where responders will be able to access may be beneficial. One of the public comments from the Portland Mitigation Action Plan that all jurisdictions can benefit from called for "Culture and language-appropriate webpage for new Portlanders [ergo all citizens] to access emergency information, videos, and events in their preferred language" - it is important that however public messaging about ETRs

occurs it adheres to best practices about universally accessible formats, particularly in light of the fact that telecommunications may be down for a period of time following a seismic event.

- **Getting emergency responders and support staff to staging areas or rallying points:** While it is impossible to account for all of the dispersed residential locations of essential employees (i.e., employees needed to operate the sites and services listed in Table 1) when establishing ETRs, it is important to consider that they will need safe passage to their designated rallying point in order to perform their duties.

- **Consider the locations of isolated, marginalized or underserved communities:** Considerations need to be made for isolated, marginalized and underserved community areas. Often these communities lack access to public or private transportation and include higher proportions of people with low-incomes, people of color, older adults, people living with disabilities, houseless individuals and families, and be immigrant communities where English is not the primary language.

- **Alternate modes of transportation (i.e., helipads and makeshift aircraft landing zones, rail or marine terminals):** Despite the best efforts of emergency planners, key surface transportation links may fail in a large earthquake. Alternate transportation landing zones on both sides of the Columbia and Willamette rivers would provide first responders access to areas that cannot be reached otherwise.

- **Consider the movement of bicycles and pedestrians:** Following a disaster or major emergency, travel by foot or by bicycle (and scooters) may be the best option for a many people to move around the region. However, there are many people with mobility challenges or who need accommodation (i.e., wheelchairs or strollers) that should be considered. Many roads may be impassable, and ETRs may be reserved for the movement of disaster responders. Fuel may also be reserved for the exclusive use of vehicles leading the response and recovery effort and not provided to the general public for an extended length of time. Moreover, walking or cycling may be the only option for residents without access to public or private transportation, which is a solution that does not work for many people due to mobility challenges. In order to keep ETRs clear for emergency response, planning processes to identify and manage alternative routes for other traffic at the time of need may need to be established.

- **Access to debris management areas:** There is a need to be prepared for a debris generating incident that overwhelms the existing solid waste infrastructure and to ensure the efficient, orderly and timely removal and disposal of debris. For example, Metro's Disaster Debris Management Plan provides guidance for Metro on how to manage and coordinate debris operations and system disruptions and identifies potential disaster debris management sites.

Similarly, the Multnomah County Disaster Debris Management Plan outlines how debris will be cleared from roadways in two phases. During the immediate response, debris is pushed to the side so that traffic may pass, but no effort is made to remove the debris until short-term recovery. During short-term recovery, crews will need access to debris management sites in order to make roads fully operational again.

- **Critical Energy Infrastructure (CEI) Hub:** The CEI Hub is a six-mile stretch along the western bank of the Willamette in Portland's NW Industrial area that contains the majority of Oregon's energy infrastructure for petroleum, natural gas, liquefied natural gas, and electricity. DOGAMI data and analysis indicate that there is significant liquefaction and seismic risk within the CEI Hub. While it is critical the ETR network connects with the CEI hub so that damage can be assessed and operations restored after a non-seismic disaster, the CEI is in a liquefaction zone and will likely be destroyed or inaccessible. Additionally, ETRs in a liquefaction zone are at risk of significant damage themselves.

- **Connects to major population and economic centers as well as isolated, marginalized and underserved communities:** It is important to connect major population and economic centers both for emergency responses but also with the intention for recovery. These locations will be important for people to have access to services and jobs in post disaster recovery.

- **Intermodal transfer points:** Supplies needed to aid recovery could be sent to the region via rail, air, or marine vessel. ETRs must connect to resilient marine ports, marine terminals, airports, and rail yards.

- **Public transit:** In the event of an emergency, TriMet, C-Tran and other publicly-owned buses could be used to shuttle response and recovery personnel and supplies between areas of need. Buses can also be used to shuttle the public out of hazard areas and to/from mass shelters and community points of distribution, for example. Access to bus garages and maintenance sites is necessary in order to make use of these vehicles.

Section VI: Roadway Considerations

- **Consider infrastructure constructed since the last ETR update:** Seismic upgrades to existing routes, as well as new bridges and roadways can improve the reach and survivability of emergency transportation routes. For example, since the last ETR update in 2006 two existing bridges have become more resilient and one new bridge has been constructed. The Sellwood Bridge and Sauvie Island Bridges have been replaced and are multimodal. In addition, the new Tilikum Crossing has opened for city buses, the Portland Streetcar, bicycles, pedestrians, and

emergency vehicles. The Regional ETRs network may make use of these three resilient Willamette crossings. It is also worth noting development patterns in comprehensive plans to understand the projected transportation demands/flows.

- **Bicycle and pedestrian bridges:** If bollards are removable, and the path is wide enough, crossings typically reserved for bicycles and pedestrians could be used for emergency vehicles.

- **Debris management can impact movement for other modes.** During the first phase of debris clearance impedances are pushed to the side of the right of way before being removed later. This may allow for emergency vehicles to pass, while also creating an impediment for people using wheelchairs, strollers, others with mobility challenges, pedestrians, scooters and bicycles. If forced to use the vehicle lanes, may slow emergency responders.

- **Utilities may also share the right of way with ETRs:** Utilities may need to be accessed on these roads following an earthquake. Utility repair efforts could impede the path of first responders. Moreover, the utilities themselves pose a threat in the form of gas leaks, downed power lines, and broken water mains.

- **Consider the network as a whole, not just specific links:** The relative elevation of roads and bridges should be considered to ensure that connections can actually be made between existing routes. For example, on the current regional ETR map, Naito Parkway appears to intersect with the Burnside Bridge, when in fact, there is no road access between the two.

- **Flat routes, with few major gradients or potential slide areas.**

- **At-grade alternative routing at overpasses and underpasses.**

- **Intrinsic seismic resilience:** When Portland Metro's ETRs were first established in 1996, the Burnside Bridge was originally chosen as the key Willamette River crossing because bascule bridge types were considered less vulnerable and cheaper to seismically retrofit. Single span bridges are considered to be resilient during earthquakes and are more easily replaced if damaged.

- **Wide right of way:** Wide roads that can accommodate oversized support vehicles with wide turning radii are preferable.

- **Limited use of traffic calming devices:** design treatments like speed bumps and traffic calming circles can hinder the movement of emergency response vehicles.

- **ETRs may still be impassible after an event** While ETRs are chosen with the latest information on seismic and landslide risk, in an emergency, they may still fail or be impassable. Authorities must be prepared to designate alternate routes following an earthquake.

- **Automated vehicles:** While emergency response vehicles will likely still require a driver behind the wheel for the foreseeable future, automated emergency response vehicles and semi-trucks carrying recovery supplies are a real possibility in the coming decades. Debris in the right of way, or damaged roads may hamper their ability to operate as designed.

Section VII: Policy and Management Considerations

- **Defined roles and responsibilities prior to an event and for periodic updates to designated routes:** While the current MOU assigns responsibilities for the inspection and debris clearance of ETRs in the immediate aftermath of an event, there is little documentation on which entities should be involved is establishing, managing, and updating ETRs. As regional conveners, Metro is the logical choice to catalog existing Lifelines, local ETRs, and regional ETRs and RDPO and Metro together to facilitate regional ETR mapping updates with input from partner jurisdictions.

- **GIS Data Management and Mapping:** A single recognized dataset that contains all Lifeline Routes, Local ETRs, and Regional ETRs within the region would facilitate the coordination of local routes between jurisdictions, and with the larger system of regional routes, as well as serve as a resource for first responders, inspectors, debris managers and transportation planners. Metro is a logical candidate for managing the ETR dataset within the Regional Land Information System (RLIS) for all local Emergency Response Streets (ERS), local and regional ETRs, and Statewide Lifeline Routes (defined in Section III). Metro's RLIS is a compilation of more than 100 GIS data layers that serve as the spatial data infrastructure for the Portland metropolitan area. Since the inception of RLIS in the late 1980s, Metro's Data Resource Center staff have worked with regional partners to collect and combine a wide array of data into a seamless dataset for use in region-wide decision-making.

- **Tiered regional ETRs:** While all roads within the regional ETR network are considered vital to disaster response and recovery, inevitably there will have to be a choice made about which segments should be prioritized for retrofitting (if needed) prior to an event, and which should be inspected, cleared, or repaired following an event. "Tier 1" regional ETRs could indicate the routes that absolutely must be passable in the event of a disaster, and should thus be placed at

the top of the project list for seismic upgrades, and in disaster response plans. While Tiers 2 and 3 are still vital to recovery, they should be upgraded, repaired, or inspected only after Tier 1 routes are restored or deemed safe for emergency vehicles.

During the literature review no examples were found to guide best practice on ETR tiering/prioritization. The only useful input is found in the criteria development of state lifeline routes. This region will therefore need to develop criteria for prioritization and/or tiering routes.

- **Set restoration targets and timelines:** Establishing restoration timelines helps set expectations for other agencies, and the users of the ETRs. Additionally, restoration timelines may dictate design or engineering considerations of the roadway itself.

- **Differentiation between response and recovery:** The immediate response to a crisis requires access to different destinations, requires different skills, and has different time horizons than the recovery phase.

Documented criteria and methodology for selecting and prioritizing ETRs: Sections V and VI describe some considerations for the physical characteristics of roadways used as ETRs, as well as locations that may need to be accessible in the event of an emergency (ie. depending on time of day a school or community center may not need to be opened immediately). However, a system of prioritizing access to these locations is needed. Clearly defined and prioritized criteria will help identify the most important routes and interdependencies.

- **Regular Updates:** While the upcoming regional ETR update is the first since 2006, the current MOU outlines responsibility for the RDPO Emergency Management working group (REMTEC) to coordinate updates on a 5-year cycle. Updates aligned with the RTP update cycle (currently every five years) could help ritualize the process and prevent future lapses. An update cycle for regional ETRs deserves further discussion.

- **Integrate ETRs into Local and Regional Transportation Plans and Capital Improvement Plans:** If resiliency is part of the rubric for project funding, statewide Lifeline Routes, local and regional ETRs should be identified in city and county TSPs and the RTP so that facilities in need of retrofitting can be prioritized for seismic upgrades, and design treatments that adequately accommodate emergency response vehicles can be included. They can also be included in CIPs and in grant criteria.

- **Enhance communication and coordination between relevant stakeholders:** Effective communication and coordination helps build understanding of the importance of these routes and broad support for needed investments.

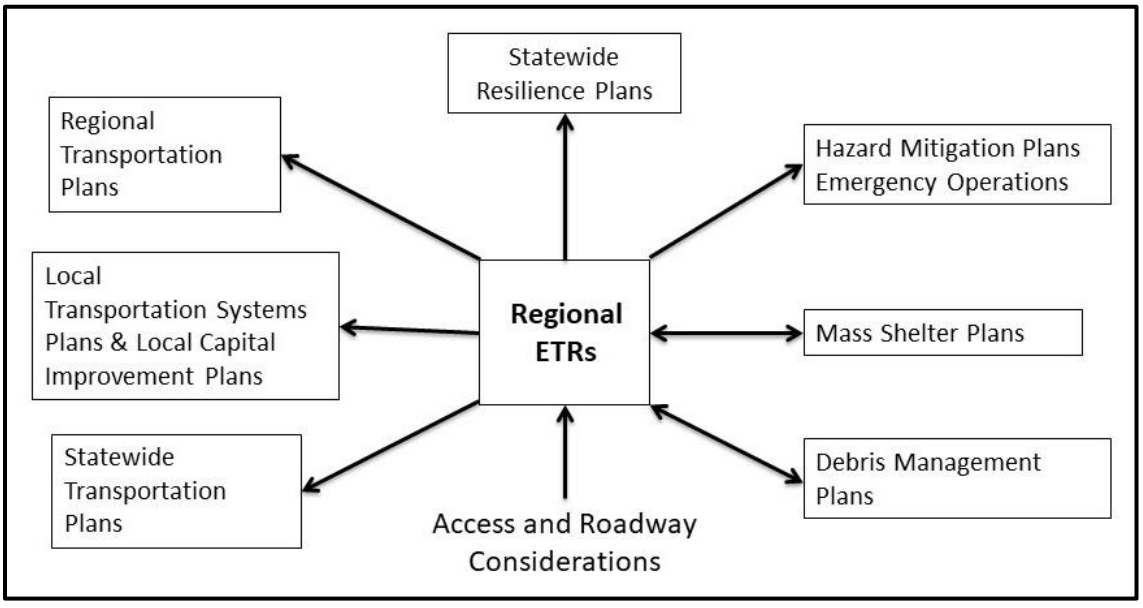
- **Consider all interdependent variables when designating and updating ETRs:** ETR designation is influenced by many factors including (but not limited to) existing infrastructure and its resiliency, the location of crucial assets and emergency services, and the latest science on seismic, landslide, and liquefaction risk. A change to any one of these variables has implications for all of the others.

  As a hypothetical example, new DOGAMI landslide risk data may show that a link previously thought to be resilient will likely be impassable after a large earthquake. In response, a parallel route is identified as a replacement. However, a close-by hospital is not accessible from the parallel route.

  Alternatively, a municipality constructs a new neighborhood fire station and alters their locally designated ETRs to ensure access for emergency responders, which in turn affects how Regional ETRs connect to local ETRs.

  Figure 3 below diagrams some (but certainly not all) of the interactions between the aforementioned variables.

Figure 3. Regional ETR relationship to local, regional and state plans



Appendix A: Local, Regional and National Planning, Policy and Disaster Management Documents Reviewed

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
Federal Documents					
Highway Evacuations in Selected Metropolitan Areas: Assessment of Impediments	U.S. Department of Transportation Federal Highway Administration	April 2010	No formal definition. This document is more focused on evacuating people out of a disaster zone than facilitating movement of emergency responders.	-Assess mass evacuation plans for the country's high-threat, high-density areas (including Portland) and identify and prioritize deficiencies on those routes that could impede evacuations. **-Portland no-notice event Vulnerabilities:** Earthquakes, wildland/urban interface fires, landslides, volcanoes. -None would trigger full scale evacuation, rather most residents would shelter in pace. Some **Top Highway Impediments** include**:** -Bridge Vulnerabilities (2 of 4 highway bridges have been retrofitted, and all sit in liquefiable soil). -157 city-owned overpasses and bridges could fall onto major thruways. **Capacity and Infrastructure Limitations:** Highways operate at capacity during peak periods. Chokepoints would cause problematic congestion during an evacuation.	Federal and National

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
Statewide Documents					
Seismic Lifelines Evaluation, Vulnerability Synthesis, and Identification CH2M Hill prepared for ODOT	ODOT / CH2M Hill	May 2012	No definition for ETRs. **3 main goals of Lifeline routes:** -Support survivability and Emergency response efforts immediately following event -Provide transportation to facilities that are critical to life support functions for interim period following event. -Support Statewide economic recovery (Document lists objectives and criteria to support each goal) **Lifeline Route vs Corridor:** Refers to lifeline corridors as	Purpose: Facilitate implementation of Lifeline Routes. IDs specific highways/bridge retrofits key to Lifeline routes. Focused on routes of statewide importance, not local ETRs IDs Lifeline Corridors in Portland area (page 6-9) Establishes 3 tier system for prioritizing retrofits of lifeline segments. Most critical linkages necessary to serve greatest number of residents at the lowest investment of time and money get top priority.	Oregon

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
			such because it is not intended that lifeline routes are used at the exclusion of other alternatives in the same vicinity…."Future seismic vulnerability evaluation and remediation prioritization are likely to ID least cost alternatives for providing a seismically resilient route that include detours off of the ID'd roadway to bypass critical seismic vulnerabilities...Corridor is used to denote ID'd highway, along with easily accessed adjacent roadways as necessary."		
ODOT Seismic Plus	ODOT	October 2014	No Formal Definition of Lifeline route given. Discusess seismic vulnerabilities of highways in more general terms.	-Discusses phased seismic investment in Oregon state highways, in more general terms not just "Lifeline" routes. -Offers cost estimates for retrofitting infrastructure in each phase (Appendix A) -Appendix B discusses hazards at statewide-level and diagrams common vulnerabilities and hazard mitigation techniques (similar to Oregon Resilience Plan). -Refers back to CH2M Hill Seismic Lifelines Evaluation (End Appendix B) and identifies **stakeholders consulted during that process:**	Oregon

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
				-Oregon Seismic Safety Policy Advisory Commission -DOGAMI During Resilient Oregon Plan development, Oregon Ports Association, Department of Aviation, Rail Advisory Committee, Oregon Freight Advisory Committee, Portland State University, and Oregon State University consulted. **-Appendix C: Lifeline Selection Summary Report** is a summary of the Lifeline route selection process found in Oregon Seismic Lifeline Report from CH2M Hill	
Oregon Resilience Plan Transportation Chapter (Page 105)	Oregon Seismic Safety Policy Advisory Commission	February 2013	No formal definition. Instead, states that resilience **Goal** for transportation network is to first facilitate immediate emergency response, including permitting personnel to access critical areas and allowing the delivery of supplies, and second to restore general mobility within specified time periods for various areas of the state.	-Describes and diagrams some **common vulnerabilities of highway bridges and common slope failure models.** Includes possible mitigation strategies for both. -Breaks down vulnerabilities (in general terms) by state zone): -Willamette -Central Oregon -Tsunami induction zone (per DOGAMI) -Coastal Zone (outside tsunami zone)	Oregon

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
			Priorities highways into 3 tiers: **Tier 1:** Small backbone system that allows access to vulnerable regions, major population centers, and areas considered to vital to rescue operations **Tier 2:**. Larger network that provides access to most urban areas and restores major commercial operations. **Tier 3:** More complete transportation network. **Reliance targets established at 3 levels:** **Minimal:** A minimum level of service is restored, primarily for the use of emergency responders, repair crews, and vehicles transporting food and other critical supplies	...and by Mode: Highway, rail, air, ports, transit -Chart describing current state of Oregon's transportation systems and the anticipated time to restore service after a CSZ event. Includes targets for relative time needed to restore service if the system were strengthened or retrofitted. **Page 141** -**Makes recommendations by mode (Page 146)**. Mostly calls for further study, but includes relevant points on highways, local roads, and transit: **Highways:** The longer investment in bridge and slope strengthening is delayed, the greater the cost and potential adverse effects of an earthquake will have on the state economy. **Public Transit:** -Plan, collaborate with local and regional emergency planners. -Inventory Assets (rolling stock and facilities) -Assess locations of vulnerable, transit-dependent populations -Assess routes, noting vulnerabilities of both current and alternate routes. -ID alternate routes ahead of event. -Potential tactical hardening or relocation of assets	

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
			Functional: Although service is not yet restored to full capacity, it is sufficient to get the economy moving again--for example, ome truck/freight traffic can be accommodated. **Operational:** Restoration is up to 90 % of capacity: A full level of service has been restored and is sufficient to allow people to commute to school and work.	**Local Roads:** One observation made after the recent subduction zone earthquake in Chile: Local road/bridge system survived better than the state system because local roads tended to be straighter and wider, which resulted in larger roadway cuts and fills which make them more susceptible to damage. As a result, many local roads used as detours for damaged state highways/bridges. On the other hand, because many local roads and streets are narrow, with sharp curves, they cannot safely handle high volumes of traffic.	
Washington State Comprehensive Emergency Management Plan	Washington Military Department Emergency Management Division	June 2016	No Definition for ETR/Lifeline Route	Little discussion of emergency routes. Under "Responsibilities" section, the Department of Transportation "Reconstructs, repairs, and maintains the state transportation system including designation of alternate routes in coordination with counties, cities, and ports."	Washington
Washington State Transportation System Plan	WSDOT	2007	No Definition for ETR/Lifeline Route	Under "Safety" subheading: Goal C: Encourage Inter-Agency Collaboration on Emergency Preparedness and Response Recommended Actions:	Washington

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
				-Accelerate efforts for interagency and cross-jurisdictional disaster responses, such as communications systems that work with each other and **agreed-to strategies and routes** for evacuation of injured persons, and provision of emergency shelter, food, and medical supplies. -Continue to develop plans to facilitate the movement of goods and supplies in the event of a disaster that affects transportation infrastructure. -Recognize and supports transit's role in emergency response efforts, such as evacuating large numbers of people or transporting those with special needs.	
Washington State Highway Plan	WSDOT	2007	No Formal ETR/Lifeline Definition	Emergency Preparedness (P.36): "For immediate response purposes, the **designation of alternate routes and the development of evacuation plans** are important issues. For long-term planning, any **substandard structures on evacuation routes should be identified and targeted for improvements.** Mitigation measures defined through the vulnerability assessment process should also be implemented to protect critical infrastructure across the highway system." Seismic Retrofits Needs (P. 19): The seismic program **priorizes bridge projects based on essential lifelines** that need to remain in service following a seismic event, and where the bridges are located in the seismic risk zones. All bridges within the highest risk zone and those on interstates in the moderate risk zone will have a higher priority and will be retrofitted first. Those bridges with single columns located in the low-moderate range will also be retrofitted after the higher risk areas have been completed."	Washington

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
Regional Documents					
Memoranda of Understanding (MOU) Resolution 03-3352	-ODOT -WSDOT -PBOT -Metro DRC -REMTEC -Clark County -Tri-Met -Port of Portland -Clackamas County -Columbia County -Multnomah County -Washington County -State EOC/ECC	Adopted October 2003	"Road authorities and other local officials in the Portland metropolitan area have identified those **roadways in the region that they consider critical to the movement of response resources** and designated them as Emergency Transportation Routes (ETRs)"	The MOU describes after-event procedures such as the chain of reporting and jurisdictional responsibility for each road and bridge segment of the ETR network. It also specifies basic assessment procedures, establishes standards on the reporting of route status, and designates the Richter scale magnitude earthquakes for which different response levels are activated.	Metro and other Regional Partners -> Agreements
Metro Regional Transportation Plan 2018	Metro	December 2018	"priority routes targeted during an emergency for debris-clearance and transportation corridors to	**Ch 8:** **(8.2.3.10 - page 8.32 - 8.35)**	Metro and other Regional Partners -> 2018 RTP -

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
			facilitate life-saving and sustaining response activities." -Section 8.2.3.10	Describes (this) process of updating the Emergency Transportation Routes. Includes a map of current ETRs as designated in 2006. **Expected Outcomes:** -ID Criteria by which to evaluate and refine existing ETRs and any alternates that are considered in this work. ODOT considered seismic resiliency in establishment of their **lifeline routes** to which the ETRs **must connect** -Recommendations for new MOU. Define reasonable time frame for periodic updates. -Recommendations on updated ETRs for consideration by JPACT and the MEtro Council in the next update to the next RTP and other relevant regional plans, policies and strategies. -Recommendations for future planning work related to regional transportation recovery, resiliency, and emergency mgmt. **Ch 2:** **Objective 5.3 - Preparedness and Resiliency:**	Relevant Chapters

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
				Reduce the vulnerability of regional transportation infrastructure to natural disasters, climate change and hazardous incidents Falls under **Goal 5 - Safety and Security** **Ch 3: System Policies to achieve our vision:** **Sub-section 3.2.3 Climate Leadership Policies → Sub-heading 3.2.3.5 Transportation Preparedness and resilience:** Discuss need to respond to natural disasters quickly, collaboratively, and equitably, in order to be able to transport fuel, essential supplies, and medical transport. Discusses need for transportation system that is resilient in event of extreme weather events, flooding, and fires, not just earthquakes. Lists potential opportunities for future regional collaboration in support of transportation preparedness and resilience:	
Memo from Multnomah County Willamette River Bridges Capital Improvement Project	Multnomah County	March 2014	No Definition	Discusses how Burnside Street and Bridge were selected by ODOT as a **Lifeline** route. -Mentions that it was made part of the regional ETRs in March 1996.	Metro and other Regional Partners

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
				Metro and ODOT team selected Burnside bridge because of **Intrinsic seismic resiliency** (bascule bridge type considered less vulnerable / cheaper to seismically retrofit) **- Streets with least amount of seismic vulnerabilities. (**Less bridges, less failure points than adjacent routes) **Belief that only one route over Willamette required** because emergency services available on both sides of river.	
Regional Emergency Transportation Routes: Report of the Metro Regional Emergency Routes Task Force	Metro Regional Emergency Transportation Routes Task Force	March 1996	"A Primary Emergency Transportation Route is a route use after a major regional disaster to move emergency resources such as personnel, supplies, and equipment to designated staging areas and subsequent deployment to heavily damaged areas."	-Includes a short "recommendations" section. **-Describes initial efforts and the conceptual framework for ETRs:** -Major arterials may be blocked because of downed wires or collapsed water/sewer mains. -Response phase lasts a short time. The task force focused on primary ETRs for use during the initial response period (first 72 hours after an event) -Most victims are not transported by ambulance to a hospital. Injured people will generally find medical care, and a primary medical concern is getting patients distributed from overloaded or out-of-action medical centers to underutilized ones. Includes need to move patients out of the impacted area to less affected areas.	Metro and Other Regional Partners

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
				-Airport's facilities or traffic control systems may be damaged. Alternatives for airlift should be factored into emergency transportation corridor selection.. **-Includes Primary Route Selection Criteria:** 1. State routes servicing metro area considered primary because of high capacity and ability to handle oversized vehicles. Local emergency corridors often accessible via state route only. 2. Relatively flat with few gradients or potential slide areas. 3. Serve major population center 4. Routes should offer at-grade level alternative routing at overpasses and underpasses. -Includes map of ETRs as established in 1996. **-Describes Steps for Implementing ETRs:** 1. Regional emergency transportation plan in relation to ETR designation. 2. Method for testing plan through ETR exercise.	

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
				3. Plan describing operating procedures/responsibility assignment. 4. Establish MOU between participating jurisdictions 5. Standardized maps for response, recovery, mitigation activities. -Task force calls for permanent committee to develop standard operating procedures -Includes example MOU from Los Angeles County.	
RIPE Report (Report from multi-agency disaster preparedness exercise)	BES, BDS, BIBS, BPS, CBO, OMF, PBEM, PBOT, PF&R, PP&R, PWB -Bureau of Revenue and Financial Services, -Bureau of Technology Services, -Office of Mayor	June 2018	No Formal Definition	-Failure of other assets (natural gas, water mains, etc.) could compromise important roads and bridges -Many assets ID'd as critical by BES, Parks and Water likely inaccessible. -Transportation's top priority: Clean/repair **ETRs** to meet needs of emergency responders/hospitals. However, many of those **ETRs** are not near critical assets that other infrastructure bureaus will need immediate access to (drinking water/sewage). -Many **ETRs** intersect water, sewer, storm pipes, which, if broken, would result in washed out ETRs and sinkholes.	Metro and Other Regional Partners

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
	Ted Wheeler, -Multnomah County Bridges				
Local Documents					
Designing a Methodology for Portland's Emergency Transportation Routes	PBOT	August 2018	**Emergency Response Routes** are focused on the ***response*** phase of a disaster – the days and possibly weeks after an event. They include restrictions on the treatments that can applied to the street and are designated as routes for emergency responders such as fire, ambulance, and police services. -"comes from Portland's TSP. These are the roads utilized by emergency responders for access around the city." **Emergency Transportation Routes** are regionally-defined, updated on an ad hoc basis, and are used to prioritize major thoroughfare traffic after a disaster or significant disruption to transportation	Report that proposes what redesigned ETRs could look like/makes suggestions for considerations/methodology for updating ETRs. -Suggested routes designed to augment, not replace, current ETRs -Sought input from various Portland agencies. -Concern about Kerby Facility given its vulnerability to nearby infrastructure collapse, liquefaction, and East Bank Fault. Suggested distributing resources to maintenance sites on both sides of Willamette. -Adding resilience as qualifying attribute for TSP projects, or a separate program specifically for addressing most pressing resilience needs in transportation infrastructure. -In several cases, ETRs overlap but are not actually connected: for example, West Burnside and Southwest Naito Parkway appear to connect, but are actually at separate elevations. In these cases, minor routes are proposed to eliminate the gaps and provide connectivity between two major routes.	Local -> Portland

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
			services. ETRs are focused on the ***recovery*** phase – the weeks and months after an event. -part of an intergovernmental agreement signed in 2006 by municipal governments within the Portland region. These routes provide prioritization for which roads are repaired first after a disaster.	-Worth considering obligation to maintain each additional lane mile of ETR and repair after a seismic event.	
Multnomah County Multi-Jurisdictional Hazard Mitigation Plan	Multnomah County Emergency Management	July 2017	Seismic Lifeline: State highways identified as most able to serve response and rescue operations, reaching the most people and best supporting economic recovery. No ETR Definition	**-IDs and Maps critical facilities (2.7) in 3 categories** **Emergency:** Fire, Ambulance, Hospitals, Licensed Medical Facilities, Urgent Care, Law Enforcement **Administrative:** Airports, City Halls, Community Centers, County Assets, Libraries **Special Population:**	Local -> Multnomah County

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
				Childcare Facilities, Homeless Shelters, Jails, Residential Care Facilities, Schools. -Table IDs key transportation system elements (Section 2.5.1) -References Bridge Capital Improvement Program (2.5.2) -References 2012 ODOT Seismic Lifeline Report and Oregon Resilience Plan. -Six-mile stretch along Willamette in Portland's NW Industrial area identified as "Critical Energy Infrastructure (CEI) Hub" contains the majority of Oregon's energy infrastructure for petroleum, natural gas, liquefied natural gas, and electricity. There is significant liquefaction and seismic risk within the CEI Hub. (Section 3.1).	
Gresham TSP	City of Gresham Transportation	?	No Definition	Little mention of emergency preparedness. The city's emergency preparedness page links to the Multnomah County Multi-Jurisdictional Hazard Mitigation Page.	Left out of folder (no discussion of ETRs)
Clackamas County TSP	Clackamas County Transportation	December 2013	No Definition	Essentially no discussion of the transportation system's role in emergency response. **Section 5.A. Compliance and Coordination Policies** "Work with the Oregon Office of Emergency MGMT to ensure that the TSP supports effective responses to natural and human-caused disasters and emergencies and other incidents, and access during these incidents."	Left out of folder (no discussion of ETRs)

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
Beaverton TSP	City of Beaverton	September 2010	No Definition	Only discussion of emergency response: "Ensure that adequate access for emergency services vehicles is provided throughout the city: Actions: -Work cooperatively with Tualatin Valley Fire and Rescue and other Washington County emergency service providers to designate and periodically update Primary and Secondary **Emergency Response Routes.** Continue to work with these agencies to establish acceptable traffic calming strategies for these routes. -Recognize the route designations and associated acceptable traffic calming strategies in the City's Traffic Calming Program.	Left out of folder (no discussion of ETRs)
Washington County TSP	Washington County	Nov. 2018	No Definition	Mentions of providing emergency access to responders.	Left out of folder (no discussion of ETRs)
Tualatin TSP	City of Tualatin	Updated February 2014	No Definition	None	Left out of folder (no discussion of ETRs)
Portland TSP	PBOT	2018	**"Emergency Response *Streets*** are intended to provide a network of streets to facilitate prompt emergency response." (P 99 - street	**Modal Policy:** **"Emergency Response:** Maintain a network of accessible **emergency response streets** to facilitate safe and expedient emergency response and evacuation. Ensure	

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
			classification descriptions). Classifies emergency response streets into Major, Secondary, and Minor Response streets. Describes appropriate design treatments (in general terms) for each class of emergency response street (Balance of emergency vehicle mobility vs. traffic calming)	that police, fire, ambulance, and other emergency providers can reach their destinations in a timely fashion, without negatively impacting traffic calming and other measures intended to reduce crashes and improve safety." (P. 24)	
Post-Earthquake Bridge Inspection Response Plan	PBOT	2015	No Definition of Emergency Transportation Route or Lifeline Route. The prioritization tiers differentiate between Lifeline routes and Emergency Response Routes. However, it is unclear if ERRs and ETRs have been conflated with the term 'Emergency Response Streets" used in Portland's TSP. The introduction says "this plan is intended to be in compliance with the MOU Emergency Transportation	-Determines the inspection response by PBOT bridge personnel for a given earthquake magnitude, and prioritizes structures into 3 groups: **Priority 1 (High):** -Bridges based on Seismic Lifeline Route -Bridges on Emergency Response Routes (ERRs) classified as more vulnerable, vulnerable or less vulnerable. -Other bridges over I-84 not included above.	Local -> Portland

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
			Route, Post-Earthquake Damage Assessment and Coordination (No. 21,273) and with the City of Portland Ordinance No. 180656."	**Priority 2 (Medium):** -Pedestrian bridges over ERRs or Seismic Lifeline Routes classified as more vulnerable and vulnerable. -Bridges on ERRs classified as less vulnerable and resilient. -Bridges on Freight Routes (all classifications) -Bridges on Transit Routes (all classifications) **Priority 3 (Lowest):** -All other bridges -Includes several maps with priority 1, 2, and 3 bridge locations, as well as routes inspectors should follow. -Include procedures and forms for the inspections.	
Basic Emergency Operations Plan	Portland Bureau of Emergency	2016	No Definition	-Discuses ETRs only as they pertain to PBOT (damage assessment, debris clearance) under "Responsibilities" section. PPB/PF&R tasked with "coordinating with PBOT and ECC (if activated) to define immediate routes and destinations for evacuees," and to	Local -> Portland

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
2016	Management			"direct and control traffic, secure and prevent unauthorized access to damaged or impassable roadways. -Discusses the vulnerabilities of transportation and other critical infrastructure in general terms. -Maps Critical Facilities by *Emergency Services:* (Emergency Coordination Centers, Medical Care Facilities, Police/Fire Stations). *High Potential Loss Facilities:* (Dams, Military, Nuclear Power Plants, Hazards Materials, Schools, *Other Assets:* [zoo, jaul, nursing/assisted living facilities])	
Portland Mitigation Action Plan	Portland Bureau of Emergency Management	2016	No Definition	Minimal discussion of ETRs. Comments from Portlanders in the public engagement section(3.7): -Prioritize clearing bike paths so that non-automobile traffic can flow safely and develop plans to locate aid stations along these routes. -Prioritize road access to grocery stores, medical offices, and hospitals. Consider isolated communities in establishing road-clearing priorities.	Local -> Portland

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
				-Pre-Established detour routes for access in and out of known landslide risk areas. -Culture and language-appropriate webpage for new Portlanders to access emergency information, videos, and events in their preferred language.	
Multnomah County Disaster Debris Management Plan	Multnomah County Department of Community Services & Emergency Management	September 2016	No Definition	Priority roads are divided into Emergency Transportation Routes and secondary Emergency Transportation Routes for east Multnomah County. A list of all priority roads for clearance can be found in in Attachment A: Emergency Transportation Routes.	Local->Multnomah County
Clackamas County Lifeline Seismic Bridge Priority Detour Recommendations	Clackamas County Disaster Management	November 2018	No Formal Definition	**Objective:** -'Re-evaluate county's **ETRs** by taking into consideration and establishing connections from critical facilities and the County's populated areas to the ODOT's **lifeline routes**. Prioritize the findings for seismic bridge retrofit or replacement, considering unstable slopes, landslides and other data available to inform decisions.' -'Review ODOT's lifeline routes and locations of vulnerable or potentially vulnerable bridges. Identify alternative routes on local roads that may be more cost effective to seismically retrofit or replace local bridges, considering unstable slopes and landslides as information is available' -ETR criteria expressed only in general terms -'Capitalize on current efforts and data to update and prioritize the County's ETRs.'	Local -> Clackamas County

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
				-References Oregon Resilience plan's recommendations for retrofitting Lifeline routes. -Single-span bridges not considered because they are expected to perform well during an earthquake, and If damaged, they are more easily repaired. -Discusses outreach process. - Provides detour recommendations to ODOT Lifelines -Prioritizes and gives cost estimate to bridge retrofits on ETRs -Maps state and county bridge vulnerabilities as well as landslide risk around the routes	
Clackamas County Emergency Operations Plan - Transportation Annex	Clackamas County	2017	No Formals Definition	Discuss how transportation infrastructure may be damaged and that there are ETRs in place.	Local -> Clackamas County
ODOT/Multnomah County Triage Project Kick Off Meeting	Multnomah Department of Community Services - Transportation	2019	No Formal Definition	**Project Objectives:**	

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
PowerPoint	Division			*Review existing ETRs:* •Re-evaluate the county's Emergency Transportation Routes (ETR) by taking into consideration connections from critical facilities and populated areas to the ODOT's lifeline routes. •Prioritize the findings for seismic bridge retrofit or replacement, considering unstable slopes, landslides and other data available to inform decisions. *Identify Detour Routes:* •Review ODOT's lifeline routes and locations of vulnerable or potentially vulnerable bridges. •Identify alternative routes on local roads that may be more cost effective to seismically retrofit or replace local bridges, considering unstable slopes and landslides as information is available.	
City of Portland's Evacuation Plan: Attachment 1 - Transportation Technical Memorandum	Portland Office of Emergency Management (Prepared by CH2M Hill)	December 2008	**Emergency Transportation Routes** are intended for primary inspection and also used by emergency vehicles after an earthquake. They generally share the same roadways as the evacuation routes. City has ID'd primary and secondary **Evacuation Routes.**	-Modified travel demand model used to determine if evacuation routes could handle. -Divides city into 5 analysis zones. -During an evacuation all zones would experience congestion greater than typical PM peak. However, some arterials identified as evacuation routes may still have excess capacity. -Maps evacuations routes, which usually share roads with ETRs.	Local - > Portland

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
			Primary routes generally follow major roadways and would typically evacuated before secondary routes.	-Maps projected congestion on evacuation routes during an evacuation event. -Maps proposed revisions to evacuation routes	

Appendix B: City, county, and state planners and emergency transportation personnel consulted

Name	Agency	Position	Contact
Jake Davis	Portland State University / PBOT	Master of Urban Planning Student / Intern	Jake.Davis@portlandoregon.gov
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Anthony Vendetti	Clark Regional Emergency Services Agency	Emergency Management Coordinator	anthony.vendetti@clark.wa.gov
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Mike Andrews	North Shore Emergency Management (British Columbia)	Deputy Director	mandrews@nsem.info

Appendix C: Pertinent Planning and Disaster Management Documents from Other Regions

Document	Agency	Date	ETR as defined in Document	Contents pertaining to Emergency Transportation	Folder Location
City of Seattle Comprehensive Emergency Management Plan Emergency Support Function #1 - Transportation CEMP - Annex IV Documentation	Office of Emergency Management	August 2018	The City's interdependent **lifeline** systems include transportation, power, water, sewer, natural gas, liquid fuel, telephone services, fiber-optic networks, cellular services, and cable services. This complex system of infrastructure is comprised of a mix of public and private sector assets and resources.	Identifies emergency support functions of Seattle Department of Transportation. Some include: -Update SDOT Snow and Ice Readiness Plan annually. -Designate snow and ice routes by service levels. -Coordinate with Metro transit to align snow and ice routes with us routes where possible. -Develop and maintain procedures to assign a liaison from Metro Transit and SPD to the Operations Center -Oversee damage assessments of city roadway and bridge structures. (Includes other post-event duties)	Other States and MPOs
CALTRANS Transit Emergency Planning Guidance	California Department of Transportation - Division of Mass Transportation	July 2007	None	"Plans should be established for alternative facilities, equipment, personnel, and other resources necessary to maintaining service during crisis, or resume service as quickly as possible following disaster. Typically, organizations will ID and pre-contract for alternate facilities in the event of catastrophic infrastructure loss. Facilities should meet accessibility standards to ensure an employee or contractor with a disability can effectively perform their duties."	Other States and MPOs

British Columbia Disaster Response Primer	Government of British Columbia	June 2018	**Critical Routes:** Regional and provincial routes vital to the functioning of the transportation network in the impact area and movement of emergency resources cross- jurisdictionally at the regional level. Also essential for movement of emergency resources at the local level. Critical Routes are to be established before an event. **Disaster Response Routes (DRRS)** are used to expedite movement for official purposes to achieve emergency response or recovery objectives. DRRs are not designated pre-event. They are determined at the time of the event based on the needs of response and recovery and available options. **DRRs may or may not coincide with Critical Routes.** DRRs are coordinated regionally and/or provincially. **Short term DRRs** consist of coordinated convoys for emergency personnel and resources. When short term	-Establishes common understanding of disaster response transportation strategies and terminology. -"While critical routes are chosen with the latest intelligence regarding resiliency, the possibility still exists of actual routes post-disaster deviating from pre-designated critical routes dues to the unpredictable nature of disasters" **Transportation Node:** any designated location within a transportation route or network where resources, personnel or vehicles (and/or vessels, aircraft, etc) can enter or change route. Potential transportation nodes should be identified in the preparedness phase. **Transportation Node Types:** *Staging Areas:* Movement control points where resources are received, prioritized and organized prior to deployment (provincial, regional, local). *Community points of distribution:* Locations where emergency supplies are disseminated to the public following a disaster. *Transfer Points:* Locations or facilities where the transfer of resources and/or personnel can occur between one mode of transport to another.	Other States and MPOs

			DRRs are utilized, police officer escort will be used to move the convoy. **Medium term DRRs** are established during a local and/or provincial state of emergency when the power to control or prohibit travel to or from any area of BC is in effect. For road transportation, *the general public will be restricted from DRRs with the use of traffic control devices and mechanisms*. DRRs may utilize both directions of travel, or specific lanes of travel. **Long term DRRs** may be required after the state of emergency has expired. Would require municipal/statewide resolution restricting use of roadway. The General public would be excluded.	-Discusses strategies for recovery, steps for DRR activation, who gets transportation priority, and with what sort of identification.	
British Columbia Disaster Response Transportation Planning Guide for Road Transportation	Government of British Columbia	June 2018	See British Columbia Disaster Response Primer Above	-Provides guidance on selecting **Critical Routes, Disaster Response Routes, Staging Areas,** and **signage.** -Also includes guidance on changing pre-established critical routes.	Other States and MPOs
Lifelines: Lessons from Natural Hazards in Canterbury (New	Centre for Advanced Engineering	December 2012	No Formal Definition	-Need for coordinated approach when reinstating utilities as roads often form the top layer.	Other States and MPOs

Zealand)				-Establish relationships with helicopter services. Useful for determining status of transportation links if cell/radio network lost. Useful for moving people and supplies until link is repaired. **3 Aspects of Infrastructure Resilience:** -Robust physical assets with key network routes and facilities having appropriate redundancy. -Effective coordination arrangements (pre and post-event). -Realistic end-user expectations and appropriate measures of back-up arrangements.	
Post Hurricane Sandy Transportation Resilience Study in New York, New Jersey, and Connecticut	Federal Highway Administration	October 2017	No Formal Definition	Some damage done from storm not detected for months after the storm. **Barriers to effective adaptation of transportation resiliency measures:** -Cross-agency coordination and jurisdictional issues can create delays and obstacles. -Legal and regulatory hurdles can hinder adaptation responses. (ROW acquisition, lawsuits from impacted landowners, environmental and community impact studies). -Limited sources of funding for transportation adaptation projects, and those that do exist are highly competitive, or can be only accessed after a disaster. Proactive adaptation needs to be folded into projects in the development pipeline, or there needs to be a strong case to implement	Federal and National

				standalone projects.	
Best Practices: Emergency Access in Healthy Streets	Ryan Snyder Associates and County of Los Angeles Public Health	March 2013	No Definition	Discusses street design considerations to accommodate emergency vehicles	Other States and MPOs

Appendix D: Non-pertinent planning and emergency documents from other jurisdictions that were reviewed

Document	Agency	Date Published
State of California Emergency Plan	State of California	October 2017
City and County of San Francisco Emergency Response Plan	San Francisco Department of Emergency Management	May 2017
MTC Regional Transportation Emergency Security Planning Report	San Francisco Bay Area Metropolitan Planning Organization	December 2008
Bay Area Earthquake Plan	California Governor's Office of Emergency Services / FEMA Region IX	July 2016
Move Seattle	Seattle Department of Transportation	Spring 2015
Vancouver Transportation 2040	City of Vancouver Streets and Transportation	
Catastrophic Hurricane Evacuation Plan Evaluation: A Report to Congress	U.S. Department of Transportation and U.S. Department of Homeland Security	2006
New Jersey Transportation System Plan	New Jersey Department of Transportation	2008
New Jersey Transit Corporation Comprehensive Emergency Management Plan	New Jersey Transit Corporation	2010
Plan 2045 Connecting North Jersey	North Jersey Transportation Planning Authority	2017

Appendix E: Details on Lifeline Goals, Objectives, Criteria, and Tiers

Section III describes how Statewide Lifeline Routes have three main goals, which capture needs during three distinct periods following a seismic event: short, medium, and long-term response and recovery. Within each goal is a series of specific actionable objectives to achieve each goal, and a series of criteria to evaluate how well each Lifeline segment can achieve the related objectives and goals. These goals, objectives and actions are as follows:

Goal 1 (Short-term): Support survivability and emergency response efforts immediately following the event.

Objective 1A: Retain routes necessary to bring emergency responders to the emergency location.

Criteria:

- Bridge and roadway seismic resilience
- Critical non-redundant access to a major area
- Access to fire stations and hospitals
- Access to ODOT maintenance facilities
- Ability to control access during response and recovery
- Dam safety
- Roadway width
- Access to ports and airports
- Access to population centers

Objective 1B: Retain routes necessary to transport injured people from the damaged area to hospitals and other care facilities.

Objective 1C: Retain routes necessary to transport emergency response personnel, equipment and materials to damaged area.

Criteria:

- Bridge and roadway seismic resilience
- Critical non-redundant access to a major area
- Access to emergency response staging areas
- Dam safety
- Roadway width
- Freight access
- Access to hospitals

Goal 2 (Medium-term): Provide transportation facilities that are critical to life support functions for an interim period following the event.

Objective 2A: Retain routes critical to bring life support resources (food, water, sanitation, communications, energy, and personnel) to the emergency location.

Criteria:

- Bridge seismic resilience *after* short-term repair
- Access to ODOT maintenance facilities
- Access to fire stations and hospitals
- Access to critical utility components (fuel depots and communication facilities)
- Dam safety
- Freight access
- Access to ports and airports
- Roadway seismic resilience

Objective 2B: Retain regional routes to hospitals.

Criteria:

- Access to hospitals

Objective 2C: Retain evacuation routes out of the affected region.

Criteria:

- Access to central Oregon.
- Importance of route to freight movement
- Access to ports and airports

<u>Goal 3 (Long-term):</u> Support statewide economic recovery.

Objective 3A: Retain designated critical freight corridors.

Criteria:

- Critical non-redundant access to major area
- Bridge and roadway seismic resilience *after* short-term repair
- Access to ports, airports, and railroads
- Freight access

Objective 3B: Support statewide mobility for connections outside of the affected region.

Criteria:

- Access to central Oregon.
- Access to ports, airports, and railroads

Objective 3C: Retain transportation facilities that allow travel between large metro areas.

Criteria:

- Critical non-redundant access to major area
- Connection to centers of commerce

Tiers:

A cost-benefit analysis based on these criteria is used to categorize Lifeline Routes into a 3-tiered system for prioritizing seismic retrofits. Critical linkages necessary to serve the greatest number of residents at the lowest investment of time and money are given top priority. The 3 tiers of Lifeline Routes are:

Tier 1: A small backbone system that allows access to vulnerable regions, major population centers, and areas are considered to be vital to rescue operations while minimizing retrofit costs. Other characteristics of a Tier 1 network include:

- A contiguous network (no isolated Tier 1 segments).
- Penetration to each geographic region.
- Redundant Willamette River crossings in Portland.
- Access to the eastern (less seismically vulnerable) part of the state.

Tier 2: A larger network that provides access to most urban areas and restores major commercial operations. Tier 2 routes add additional redundancy to allow for increased traffic volumes and alternate routes in high-population areas.

Tier 3: A more complete transportation network.

ATTACHMENT C
2012 ODOT Seismic Lifelines Vulnerability Synthesis and Identification Report

6.0 Seismic Lifeline Routes

6.1 Overview and Definitions of the Tiers

Given the existing vulnerabilities of our built environment in Oregon, the many seismic hazards in the natural environment, and the geographic spread of the population, it is quite likely that nearly every roadway in the western half of the state would be needed to serve as a lifeline following a major CSZ event. As the years go by and the effects of age and use require the rehabilitation or replacement of our existing transportation infrastructure, the system will become more seismically resilient as those rehabilitations and replacements are accomplished according to design standards that take into account these recently identified seismic hazards. However, if a CSZ Mw 9.0 were to occur today, it is possible that nearly every state highway in Western Oregon would be impassible, possibly severely limiting ground transportation for many months. A program to immediately (within the next few years) retrofit all seismic lifeline routes in western Oregon to current design standards is likely beyond our means as a society to accomplish. Even if the State were to embark on a program of rapid seismic strengthening of the entire transportation system, it would be prudent to begin where the most benefit is accomplished in the least time for the least cost.

After a catastrophic earthquake, it is anticipated that ground transportation will be supplemented by air and water transport as necessary to address the most-critical needs. Air and water transportation services are much more limited in capacity and availability than ground transportation; consequently, the shorter the distance from a functioning ground transportation system to the area of need, and the fewer numbers of people in need, the more likely it is that the available air and water transportation vehicles and infrastructure will be able to meet all needs.

A prioritized seismic lifeline system should attempt to provide the following three functions:

1. First and foremost, it should provide access to and through the state, allowing access to the seismically vulnerable areas of the state (study area) for emergency responders and economic recovery.
2. Secondly, it should attempt to provide access into each region of the state.
3. Lastly, it should serve as a transportation network that provides redundant access throughout the state.

The PMT used the results of the evaluation framework and a review of system connectivity and key geographic features to identify a three-tiered seismic lifeline system—Tier 1 being the highest priority roadway segment, Tier 2 being the next highest, and Tier 3 being the third highest priority grouping. It is intended that seismically resilient infrastructure along each lifeline route tier would accomplish the three goals listed above and would consist of the following:

- Tier 1: A system that provides access to and through the study area from Central Oregon, Washington, and California, and provides access to each region within the study area
- Tier 2: Additional roadway segments that extend the reach of the Tier 1 system throughout seismically vulnerable areas of the state and that provide lifeline route redundancy in the Portland Metro Area and Willamette Valley
- Tier 3: Roadway segments that, together with Tier 1 and Tier 2, provide an interconnected network (with redundant paths) to serve all of the study area

The purpose of having three tiers of lifeline routes is to establish guidelines for prioritizing seismic retrofits of highways and bridges with the highest priority roadways being those that provide the most critical linkages necessary to serve the greatest number of residents in the study area, at the lowest investment of time and money. Ideally, as discussed previously, vulnerabilities along all three tiers of lifeline routes (as well as the remainder of public transportation facilities statewide) should be addressed. Recognizing potential cost restrictions, use of this tiered system is intended to provide the State of Oregon with guidance for identifying project priorities. It should be noted that this lifeline system is intended to serve statewide transportation needs, not to directly access all locations in the state. Planning for the needs of individuals and local communities is the responsibility of statewide, regional, and local agencies, whose core mission is emergency planning and response. As local response and recovery plans are developed, it is recommended that local earthquake preparation efforts include recognition of the state lifeline routes and could include evaluation of local roadways with a methodology similar to that used here.

The following sections define each tier and describe the recommended tier system within six geographic areas.

6.1.1 Tier 1

The routes identified as Tier 1 are considered the most significant and necessary to provide a functioning statewide transportation system. A functioning Tier 1 lifeline system will allow traffic to flow through the study area and to each region. Required characteristics of the Tier 1 system are as follows:

- Contiguous (all segments connected, with no isolated segments or groups of segments) connection to each geographic region of the study area with access to the most populous areas in those regions
- Access to the most-critical utilities required for statewide response and recovery (in particular fuel depots)
- Access from the east to the most-seismically vulnerable regions of the state
- Redundant crossings of the Willamette River in Portland
- Minimization of cost of retrofit and/or repair (fewest number of routes with least vulnerabilities that provide characteristics in the preceding bullets)

6.1.2 Tier 2

The Tier 2 lifeline routes provide additional connectivity and redundancy to the Tier 1 lifeline system. The Tier 2 system would allow for direct access to more locations, fewer miles to travel between some locations, increased traffic volume capacity, and alternate routes in high-population regions in the event of outages on the Tier 1 system. Requirements for this tier include the following:

- Contiguous (all segments connected, with no isolated segments or groups of segments)
- Redundant routes to provide circulation within the Portland Metro Geographic Zone and north-south movement within the Willamette Valley
- Minimization of cost of retrofit and/or repair (fewest number of routes with least vulnerabilities that provide characteristics in the preceding bullets)

6.1.3 Tier 3

The Tier 3 lifeline routes provide additional connectivity and redundancy to the lifeline systems provided by Tiers 1 and 2.

Together, the Tiers 1, 2, and 3 lifelines will comprise the Oregon Seismic Lifeline System and will accomplish the following:

- Include all of US 101 to provide access to all of the Oregon coast (the most-seismically vulnerable regions of the state)
- Include routes that have been identified as providing access to the most-critical utilities (the final seismic lifeline system includes all segments identified as providing access to critical utilities, except those providing access to power generation facilities on the Santiam and McKenzie rivers).
- Include all routes that have been identified as providing access to emergency response staging areas
- Include all routes that have been designated as strategic freight corridors or freight facilities
- Provide alternate routes between any two nodes that connect two or more segments (any node that is not a dead end)
- Minimize cost of retrofit and/or repair (fewest number of routes with least vulnerabilities that provide characteristics in the preceding bullets)

6.1.4 Study Routes Not Identified as Seismic Lifeline Routes

Several routes included in the study, as listed in Section 2.1, have not been identified as seismic lifeline routes on the statewide Seismic Lifeline Route System. Although these routes may be important for local circulation during a seismic event, they are not likely to function as key corridors on a statewide level. Several of these routes have more-significant and extensive vulnerabilities than do adjacent routes that can serve the same purpose in a statewide system. All of these routes are less favorable than routes included in the Seismic Lifeline Route System with respect to a variety of evaluation framework criteria.

6.2 Proposed Oregon Seismic Lifeline Routes

6.2.1 Seismic Lifeline Tier Designations

Figure 6-1 shows the proposed seismic lifeline routes with tier designations.

The proposed Tier 1 lifeline network shown provides roadway access to within about 50 air miles of all locations in western Oregon. Significant factors in the designation of each study route are discussed as follows by geographic zone. Total roadway miles for each tier are as follows:

- Tier 1: 1,146 miles
- Tier 2: 705 miles
- Tier 3: 422 miles

This provides a total of 2,273 miles of designated lifeline route. Study routes not identified as a seismic lifeline total 298 miles.

Figure 6-2 presents an overlay of the lifeline system on the peak ground acceleration coefficients used for the evaluation of bridge resilience in this study.

FIGURE 6-1
Oregon Seismic Lifeline Routes

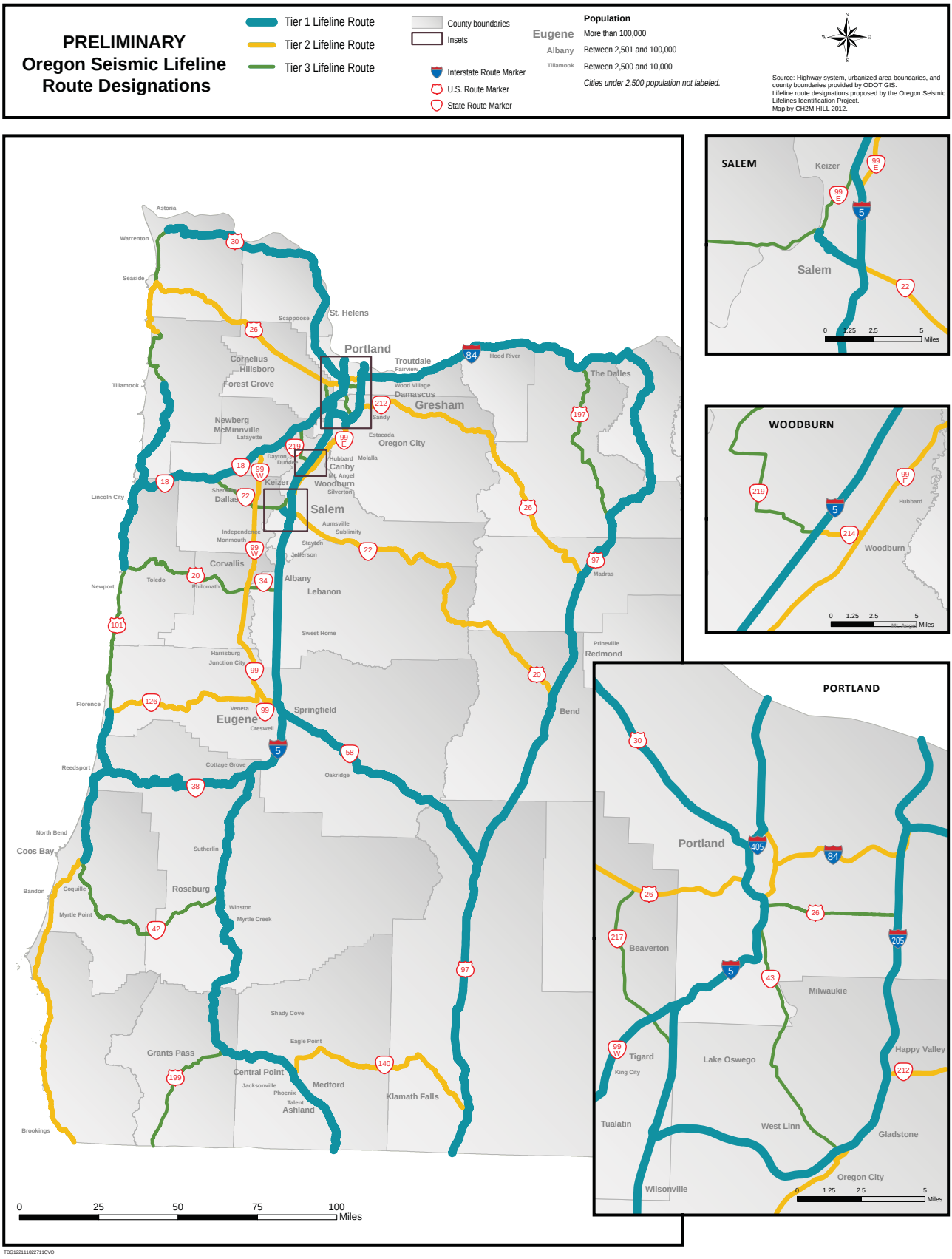


FIGURE 6-2
Lifeline Routes and Seismic Risk

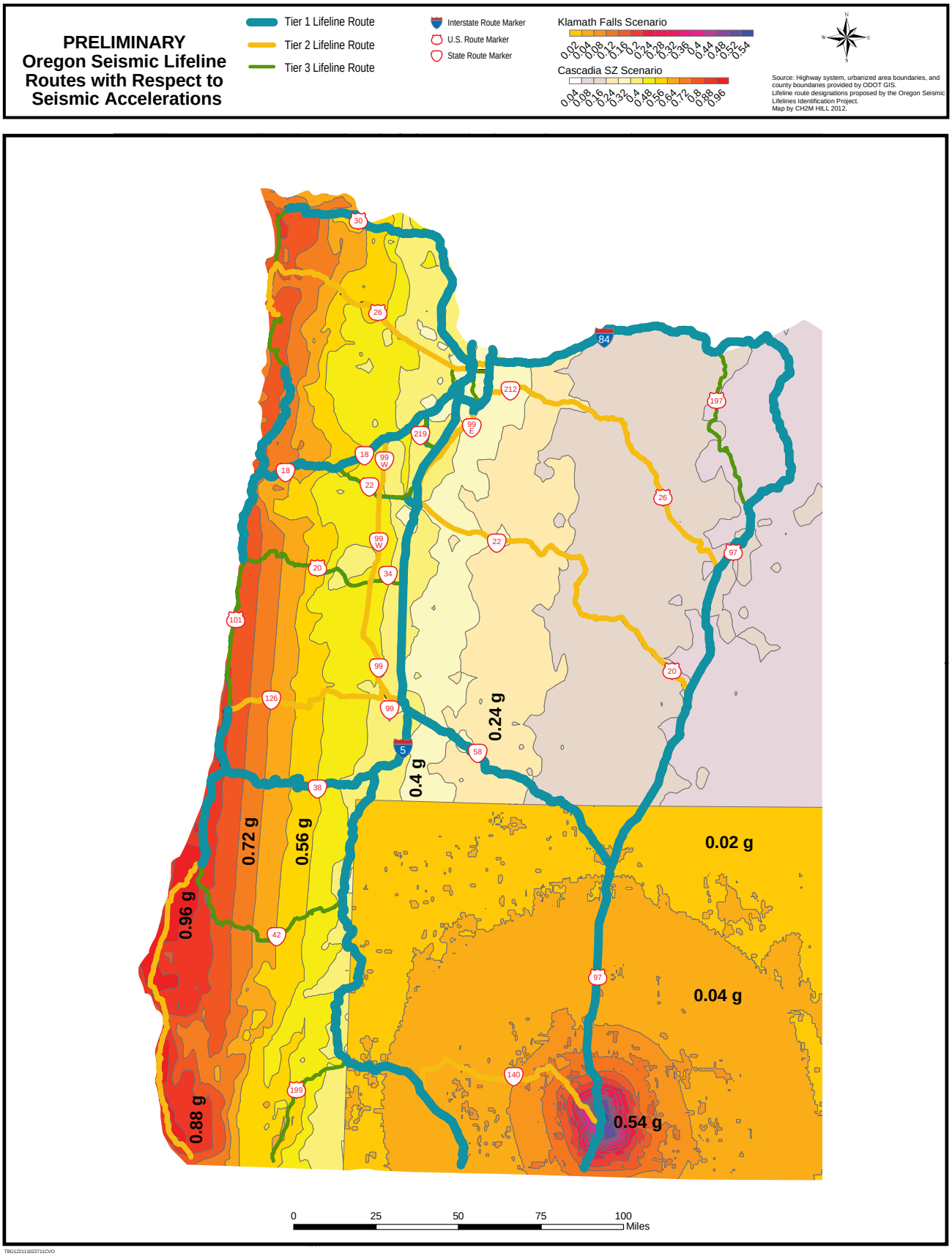


Table 6-1 contains a tabulation of lifeline roadway miles within three classifications of peak ground acceleration (PGA) coefficients, by tier for the CSZ seismic event. These CSZ PGA zones generally correlate to geographic areas with the high acceleration zone being the coast and Coast Range mountains, the moderate acceleration zone the inland valleys, and low acceleration zone the Cascades and central Oregon.

TABLE 6-1
Lifeline Roadway Length by CSZ Seismic Acceleration Zone and Tier (Miles)

CSZ PGA Zone	Approximate PGA (g)	Tier 1	Tier 2	Tier 3	Total
High	0.56 – 0.96	217	211	236	664
Moderate	0.24 – 0.48	540	313	127	979
Low	0.08 – 0.16	389	181	59	630
Total		1,146	705	422	2,273

6.2.2 Lifeline Corridor Definition

In the following discussion, the roadways selected to serve as lifeline routes are referred to as corridors since it is not intended that the identified state highways be used as seismic lifeline routes to the exclusion of other alternatives in the same vicinity. Future seismic vulnerability evaluation and remediation prioritization efforts are likely to identify least cost alternatives for providing a seismically resilient route that include detours off of the identified roadway to bypass critical seismic vulnerabilities. Therefore, the term “corridor” is used to denote that the identified highway, along with easily accessed adjacent roadways as necessary, are intended to serve as the seismic lifeline route.

Future efforts to identify possible detours around seismic vulnerabilities should take advantage of the information available in emergency closure response plans such as the “Pre-Identified Detour Routes for I-5” documents that are available in District Manager offices. Once this information has been reviewed and detailed seismic vulnerability assessments have been conducted, the exact route along specific roadways can be identified within the designated lifeline route corridors and the seismic retrofit needs can be prioritized. However, it is assumed that the final seismic lifeline routes will consist primarily of the roadways identified in this study.

6.2.3 Coast Geographic Zone

The Coast Geographic Zone is the most-seismically vulnerable geographic zone and is the most difficult to access because of geographic constraints. Although it could be argued that the critical post-earthquake needs of the region should dictate that all routes be Tier 1, this is not necessary to meet the statewide transportation goals (listed previously) that govern the identification of Tier 1 routes. Specifically, the conditions of US 101, the extent of the area being studied and limited resources make it infeasible to plan on being able to drive the full length of US 101 or being able to cross the Coast Range on all of the east-west study routes in this zone, nor is this necessary to accomplish the goals and provide the characteristics of the Tier 1 lifeline system. The reality is that the vulnerabilities are so extensive on these routes that the majority of the cost of making the entire lifeline system acceptably resilient is associated with this region. Because of the high vulnerability of the zone, it is paramount that emergency services and recovery resources can reach this zone from other zones. Consequently, the

consensus of the PMT and SC was that all needs are best served with a Tier 1 backbone system selected according to the criteria described in Section 6.1.

Tier 1

The Tier 1 system in the Coast Geographic Zone consists of the following three separate access corridors:

- OR 30 from Portland to Astoria
- OR 18 from the Valley to US 101 and north and south on US 101 from Tillamook to Newport
- OR 38 from I-5 to US 101 and north and south on US 101 from Florence to Coos Bay

Tier 2

The Tier 2 system in the Coast Geographic Zone consists of the following three access corridors:

- US 26 from Portland to US 101 and north and south on US 101 from Seaside to Nehalem
- OR 126 from the Valley to US 101 at Florence
- US 101 from Coos Bay to the California border

Tier 3

The Tier 3 system in the Coast Geographic Zone consists of the following corridors:

- US 101 from Astoria to Seaside
- US 101 from Nehalem to Tillamook
- OR 22 from its junction with OR 18 to the Valley
- OR 20 from Corvallis to Newport
- OR 42 from I-5 to US 101
- US 199 from I-5 to the California border

Segments Considered but Not Designated as Lifelines

The only state highways in the Coast Geographic Zone not designated a seismic lifeline are OR 103 and OR 202 from US 26 to Astoria. In spite of significant vulnerabilities on many of the routes, all other segments in the Coast Geographic Zone have been selected to be seismic lifelines because of their wide geographic distribution and the at-risk populations they serve.

Tier Designation Discussion

North Coast (Astoria to Tillamook). A special evaluation of the three possible routes from Portland to Astoria was performed by using the evaluation framework. In this evaluation, the parameters for each segment along each alternate route were summed, and then the evaluation framework methodology was applied to each alternate route composed of the combined segments. Because this analysis showed OR 30 was preferable by most measures, this highway was designated Tier 1.

US 101 from Astoria to Seaside has significant vulnerabilities in the areas of the bay crossing at Astoria and the low-lying area in downtown Seaside; therefore, it was designated Tier 3.

The system of US 26 to US 101 down to Nehalem was designated Tier 2. US 101 from Nehalem to Tillamook was designated Tier 3 because of extensive vulnerabilities in the low-lying areas of Nehalem and Tillamook Bays.

OR 102 and OR 202 were included in the study to evaluate alternate access to Astoria, but were found to not provide significant overall benefit compared to the other routes; therefore, these highways were not designated as lifelines.

Central Coast (Tillamook to Coos Bay). Five state highways were evaluated as east-west lifelines through this section of the Coast Geographic Zone. The project team preferred that the Tier 1 lifelines not be adjacent routes.

Of these five east-west highways, OR 42 was rated lower on most measures and significantly lower for bridge and roadway seismic resilience. This is a case where the segment rated marginally better on several criteria and therefore rated well on the PMT Weighted Evaluation Framework, but rated much worse on resilience criteria. This means that significantly more investment would be required to provide adequate seismic resilience on this route than on other alternatives, with little added benefit. Therefore, this highway was identified as a Tier 3 lifeline.

Of the four routes remaining as candidates to serve as Tier 1 lifelines, two serve the northern portion and two serve the southern portion of this central coast area. Of the two northern routes, OR 18 and OR 20, OR 18 has much better resilience ratings. The southern two routes, OR 126 and OR 38, are comparable on most measures. The best-rated sections of US 101 are between Florence and Coos Bay. OR 126 provides access to the north end and OR 38 provides access to the middle of this section of US 101. It is preferable to access the midpoint of a transportation corridor because this location is most beneficial for emergency response and recovery. A midpoint corridor location allows road and bridge repair crews to start in the middle of this section of US 101 and work both ways away from the center, rather than starting at one end and working the length toward the other end. Selection of OR 38 as a Tier 1 lifeline also provides access to the center of this higher-population area (from Florence to Coos Bay), whereas selection of OR 126 would provide access at the northern end of this area, much farther from Coos Bay. Therefore, OR 38 and US 101 north to Florence and south to Coos Bay were designated Tier 1.

Similarly, because of their central position with respect to more resilient portions of US 101, central location between population centers, and higher resilience ratings, OR 18 and the segments of US 101 north to Tillamook and south to Newport were identified as Tier 1 lifelines. OR 18 did not rate well with the PMT Weight Evaluation Framework; however, this is primarily due to the fact that the segment joins US 101 slightly north of Lincoln City and therefore does not rate well on a number of connections criteria, which are not pertinent to its selection as a Tier 1 route given the function it serves and the close proximity of the connection criteria parameters. OR 18 rates better with respect to the criteria rating and the alternative resilience emphasis rating.

Of the remaining two east-west lifelines, OR 26 has the superior seismic resilience; therefore, this highway was designated Tier 2. OR 20 was then designated Tier 3. US 101 between Newport and Florence also was designated Tier 3.

Southern Coast (Coos Bay to California). The only segments in this area are US 101 from Coos Bay to the Oregon/California border and US 199 from I-5 to the California border. The Tier 1 lifeline network extends to the north end of the southern US 101 segment, which rates in the middle range of the coastal segments, and the roadway serves a highly vulnerable and isolated region; therefore, it was identified as a Tier 2 lifeline. US 199 provides a third connection to the California border and has been designated Tier 3 since the I-5 connection is Tier 1 and US 101 is Tier 2.

6.2.4 Portland Metro Geographic Zone

In addition to encompassing the largest population concentration in the state, the Portland Metro Geographic Zone contains many facilities (such as transportation, communication, and fuel depots) that are critical to statewide earthquake response and long-term economic recovery. For these reasons, this

zone has a higher concentration of lifeline routes than do the other geographic zones and has redundant Tier 1 crossings of the Willamette River.

Tier 1

The Tier 1 system in the Portland Metro Geographic Zone consists of the following corridors:

- I-5, excluding the section between the northern and southern I-405 interchangesI-405
- I-205
- OR 99W from I-5 to OR 217

Tier 2

The Tier 2 system in the Portland Metro Geographic Zone consists of the following three access corridors:

- I-84
- I-5 between the northern and southern I-405 interchanges

US 26 from OR 217 to I-405Tier 3

The Tier 3 system in the Portland Metro Geographic Zone consists of the following corridors:

- OR 217
- US 26 from I-5 to I-205
- OR 43

Segments Considered but Not Designated as Lifelines

The following segments were considered but were not designated as lifelines:

- OR 224
- OR 99E from US 26 to Oregon City

Tier Designation Discussion

The single-most significant criteria for lifeline tier designations in the Portland Metro Geographic Zone were the known seismic vulnerabilities of the Willamette River crossings and key interchange structures. For these structures, more-comprehensive seismic vulnerability assessments have been performed than those performed within the REDARS2 evaluation. Since these structures are very large, they represent a significant percentage of the lifeline system bridge deck area and, therefore, potential seismic retrofit cost.

The Willamette River crossings evaluated for this study are the I-405 Fremont Bridge, the I-5 Marquam Bridge, the US 26 Ross Island Bridge, and the I-205 Abernathy Bridge. The US 26 route is not a prime candidate for a variety of reasons other than seismic resilience issues, so this leaves the other three routes as potential candidates for the desired two Tier 1 Willamette River Crossings. Of these three, the Marquam Bridge is the most-seismically vulnerable. In addition, the segment of I-5 north of the Marquam Bridge along with the I-5/I-84 interchange includes several structures that have been determined to have severe seismic vulnerabilities. Therefore, the Tier 1 Willamette River crossings are I-405 and I-205. This also provides one crossing in the downtown area and one on the outer edge of the geographic zone.

I-5, with the exception of the segment between the end points of I-405, is designated Tier 1 because it is arguably the most-important transportation corridor in the state and does not have significantly more identified vulnerabilities than any alternate routes.

I-205 is also Tier 1 for its Willamette River crossing discussed previously and since it serves a significant role—providing access to the Portland International Airport, connecting I-5, to the I-84 and OR 212/ US 26 corridors to the east, and connecting to the Washington state border.

I-405 serves the important function of connecting I-5 to OR 30 and the important fuel and communications facilities in that area, as well as containing the Willamette River crossing discussed previously. Therefore, I-405 has been designated Tier 1.

The final Tier 1 segment in the Portland Metro Geographic Zone is a short piece of OR 99W that provides connection from I-5 to the Tier 1 OR 99W segment in the Valley Geographic Zone.

In spite of the critical seismic vulnerabilities, I-5 between I-405 intersections, and I-84 between I-5 and I-205 have been designated Tier 2 due to the critical function they serve in the statewide transportation network.

US 26 in the Coast Geographic Zone was designated Tier 2 and must be connected to the Portland Metro Geographic Zone by a Tier 1 or 2 segment. The two alternatives for this connection are US 26 to I-405 and OR 217 to OR 99W. US 26 rates better on almost every measure and provides a more direct connection to the Tier 1 lifelines and supporting facilities. Therefore, US 26 was designated Tier 1. OR 217 was designated Tier 3 because it provides significant extra capacity through and around the Portland Metro area.

The remaining routes (US 26 from I-5 to I-205, OR 99E, OR 224, and OR 43) pass through the south and east portions of the city. Of these routes, US 26 from I-5 to I-205 and OR 43 rate the best. Because US 26 provides access to some critical facilities, serves as an alternate route to I-84, and provides a fourth Willamette River crossing, it was designated Tier 3. OR 43 provides an alternative to I-5 south on the west side of the Willamette River and was designated Tier 3, with the exception of the short segment of OR 43 from I-205 to OR 99E.

The short segment of OR 43 from I-205 to OR 99E has not been designated a seismic lifeline route because it would be the fifth Willamette River crossing in the Portland Metro Geographic Zone and is adjacent to the I-205 Tier 2 crossing of the Willamette. OR 224 and OR 99E from US 26 to I-205 would not serve significant functions in the statewide transportation network beyond those already provided by other seismic lifelines in the area and therefore have not been designated as seismic lifeline routes.

The short segment of OR 99E from I-205 to OR 43 was designated Tier 2 to connect with the Tier 2 segment of OR 99E in the Valley Geographic Zone.

6.2.5 Valley Geographic Zone

The Valley Geographic Zone generally consists of two or three north-south routes through the Willamette Valley and a variety of east-west connectors between those routes, intended to provide for redundant routes for north-south movement.

Tier 1

The Tier 1 system in the Valley Geographic Zone consists of the following corridors:

- I-5
- OR 99W from I-5 to OR 18 near Dayton
- OR 18 from OR 99W near Dayton to McMinnville
- OR 22 from I-5 to OR 99E in Salem

Tier 2

The Tier 2 system in the Valley Geographic Zone consists of the following corridors:

- US 26 from OR 47 to OR 217
- OR 99W from McMinnville to Junction City
- OR 99 from Junction City to I-5 in Eugene
- OR 99E from Oregon City to I-5 in Salem
- OR 214 in Woodburn from I-5 to OR 99E

Tier 3

The Tier 3 system in the Valley Geographic Zone consists of the following corridors:

- OR 219 from Newberg to Woodburn
- OR 99E in Salem from I-5 to OR 22
- OR 22 from OR 99W to Salem
- OR 34 from Corvallis to I-5

Segments Considered but Not Designated as Lifelines

The following segments were considered but were not designated as lifelines:

- OR 47
- OR 99W from north of Dayton to the south side of McMinnville
- OR 99E from Albany to Junction City
- OR 569 in Eugene

Tier Designation Discussion

Most segments of I-5 in the Valley Geographic Zone rate as well or better than the alternatives. These ratings, as well as the capacity and importance of I-5, justifies a Tier 1 designation for all of I-5 through this zone.

In the McMinnville area, OR 99W and OR 18 were included as alternate routes. The evaluation framework rating was slightly better for OR 18; therefore, OR 18 through McMinnville and OR 99W from near Dayton to I-5 in Tigard were designated Tier 1 to join to the Tier 1-designated OR 18 in the Coast Geographic Zone. With OR 18 through McMinnville designated Tier 1, the adjacent segments of OR 99W do not serve a significant function; therefore, they are not designated as seismic lifeline routes.

The last route in this zone designated Tier 1 is a piece of OR 22 in Salem that connects the state government offices to I-5.

Routes available to serve as north-south travel alternatives to I-5 are OR 99E, OR 99W, and OR 47. OR 99E, from Oregon City to Woodburn, is very significant because it provides a route from the Portland Metro area to points south without a Willamette River crossing. Large river crossings have some level of

seismic vulnerability even when constructed to current code requirement. They also do not generally have many alternatives. Because inclusion of routes that do not require large river crossings is preferred in the seismic lifeline system, OR 99E from Oregon City to Salem was designated Tier 2.

On the other side of the valley, OR 99W provides a route from the Portland Metro area to the south valley without large river crossings. Therefore, it was designated Tier 2 from McMinnville to I-5 in Eugene. In the south Valley, OR 99E was included in the study between Albany and Junction City. However, this route has very low seismic resilience and does not serve a statewide transportation function already served by I-5 and OR 99W. Therefore, OR 99E from Albany to Junction City was not designated a seismic lifeline route.

OR 47 could provide additional north-south travel redundancy; however, it did not rate well with respect to many criteria and therefore was not designated as a seismic lifeline.

US 26 from OR 47 to OR 217 was designated Tier 2 to provide a connection to the Tier 2 segment of US 26 in the Coast Geographic Zone.

OR 214 in Woodburn from I-5 to OR 99E was designated Tier 2 because it provides valuable connectivity between those routes in a short distance.

The following routes, which were rated reasonably well and serve to provide additional connectivity between the north-south routes, were designated Tier 3: OR 219 from Newberg to Woodburn, OR 99E in Salem from I-5 to OR 22, OR 22 from OR 99W to Salem, and OR 34 from Corvallis to I-5.

OR 569 in Eugene has very low seismic resilience and was rated lower than the adjacent alternate segment of OR 99; therefore, OR 569 was not designated as a seismic lifeline route.

6.2.6 South I-5 Geographic Zone

The only roadway in this zone is I-5 from Eugene to the California border. All of I-5 in this zone was designated Tier 1 because of the regional importance of I-5, the connection to California, and the lack of alternate corridors.

6.2.7 Cascades Geographic Zone

The Cascades Geographic Zone lifeline routes consist of five crossings of the Cascade Mountains from western to central Oregon. These routes serve to connect the highly seismically affected western portion of the state to the central portion of the state, which is expected to be far less affected by a CSZ event. In addition, the southernmost route can serve as a connection from Medford to the Klamath Falls area in the event of a seismic event in the Klamath Falls area.

Tier 1

The Tier 1 system in the Cascades Geographic Zone consists of the following corridors:

- I-84OR 58

Tier 2

The Tier 2 system in the Cascades Geographic Zone consists of three corridors:

- OR 212 and US 26
- OR 22 from Salem to Santiam Junction and US 20 from Santiam Junction to Bend
- OR 140 and OR 62

Tier 3

No corridors are designated as Tier 3 in the Cascades Geographic Zone.

Segments Considered but Not Designated as Lifelines

The following segments were considered but were not designated as lifelines:

- OR 34 from I-5 to Lebanon and US 20 from Lebanon to Santiam Junction
- OR 126 from I-5 to Santiam Junction
- OR 126 from US 20 to US 97

Tier Designation Discussion

I-84 serves a critical transportation function for the state and rated well; therefore, it was designated Tier 1. The other route that rated well is the OR 212 to US 26 route from Portland to Madras; however, since it is adjacent to I-84 and less significant as a freight corridor and in providing access to critical utilities, it is also designated Tier 2.

The second Cascades Geographic Zone route designated Tier 1 is OR 58. This selection was intended to provide a Tier 1 route from the southern end of the Willamette Valley to central Oregon. OR 58 was preferred over other routes for the Tier 1 designation because of its importance as a freight route and its central location.

The southernmost Cascades route, OR 140 and OR 62, was designated Tier 2 for the access it provides between Medford and Klamath Falls.

The remaining three routes through the Cascades Geographic Zone begin in Salem, Corvallis, and Eugene and converge at Santiam Junction, then continue to Bend on US 20. Because of their relative ratings, in particular their importance to freight, OR 22 was designated Tier 2. OR 34/US 20 was not designated as a seismic lifeline primarily due to its limited capacity to carry freight traffic. OR 126 was not designated a lifeline because it did not provide significant statewide transportation function beyond that already provided by OR 22 and OR 58. US 20 from Santiam Junction to Bend was designated Tier 2 as a continuation of OR 22. Because OR 126 from Sisters to Redmond rated lower than US 20 and US 97, provided no additional function, and there are few seismic vulnerabilities in this area that would warrant alternate routes, it was not designated as a lifeline.

6.2.8 Central Geographic Zone

Tier 1

The Tier 1 system in the Central Geographic Zone consists of the following corridors:

- I-84 from The Dalles to Biggs Junction
- US 97

Tier 2

No Tier 2 corridors are located in the Central Geographic Zone

Tier 3

The one Tier 3 corridor in the Central Geographic Zone is US 197.

Segments Considered but Not Designated as Lifelines

All segments considered in this zone were designated as lifelines.

Tier Designation Discussion

Because the ground shaking levels in the Central Geographic Zone (east of the Cascades) from a CSZ seismic event are much lower than for the zones to the west, damage in the area is expected to be minimal. US 97 will serve as a critical transportation corridor for the response to and recovery from such an event. Consequently, it is important that all vulnerabilities that do exist are taken care of. Furthermore, US 97 will be an important lifeline in the event of a Klamath Falls area seismic event. For these reasons, US 97 was designated Tier 1.

Two alternate routes connect US 97 north of Madras to I-84 in The Dalles—US 197 and US 97 from US 197 to I-84 at Biggs Junction and then west on to I-84 to The Dalles. The US 97 and I-84 route rated better on most criteria and therefore was designated Tier 1. Because the US 197 route provides access to critical utilities, it was designated Tier 3 rather than being dropped from the system.

Table 6-2 lists each segment studied in the project, its tier designation (or lack thereof) and a brief description of the justification for inclusion or exclusion as a seismic lifeline routes.

TABLE 6-2
Tier Designation by Segment

Seg.	Highway	Geographic Zone	ODOT Hwy No.	Description (Point to Point)	Tier	Tier Designation Justification Notes
1	I-5	Portland Metro	1	Washington border to I-405	1	I-5
2	I-5	Portland Metro	1	I-405 to I-84	2	Significant known vulnerabilities on this segment at I-84 interchange
3	I-5	Portland Metro	1	I-84 to I-405/OR 43/ US 26	2	Significant known vulnerabilities on this segment at I-84 interchange and Marquam Bridge (I-5 over Willamette River), Fremont (I-405) and Abernathy (I-205) bridges selected as Tier 1
4	I-5	Portland Metro	1	I-405/OR 43/US 26 to OR 99W	1	I-5
5	I-5	Portland Metro	1	OR 99W to OR 217	1	I-5
6	I-5	Portland Metro	1	OR 217 to I-205	1	I-5
7	I-5	Valley	1	I-205 to OR 214	1	I-5
8	I-5	Valley	1	OR 214 to OR 99E Bus.	1	I-5

TABLE 6-2
Tier Designation by Segment

Seg.	Highway	Geographic Zone	ODOT Hwy No.	Description (Point to Point)	Tier	Tier Designation Justification Notes
9	I-5	Valley	1	OR 99E Bus. to OR 99E	1	I-5
10	I-5	Valley	1	OR 99E to OR 22	1	I-5
11	I-5	Valley	1	OR 22 to OR 99E	1	I-5
12	I-5	Valley	1	OR 99E to OR 34	1	I-5
13	I-5	Valley	1	OR 34 to OR 569	1	I-5
14	I-5	Valley	1	OR 569 to OR 126/OR 99	1	I-5
15	I-5	South I-5	1	OR 126 to OR 58	1	I-5
16	I-5	South I-5	1	OR 58 to OR 38	1	I-5
17	I-5	South I-5	1	OR 38 to OR 42	1	I-5
18	I-5	South I-5	1	OR 42 to OR 199	1	I-5
19	I-5	South I-5	1	OR 199 to OR 140	1	I-5
20	I-5	South I-5	1	OR 140 to California border	1	I-5
21	I-84	Portland Metro	2	I-5 to I-205	2	Provides connection to east from Tier 2 portion of I-5
22	I-84	Cascades	2	I-205 to US 197	1	Interstate connection to east
23	I-84	Central	2	US 197 to US 97	1	Interstate connection to east
24	I-205	Portland Metro	64	Washington border to I-84	1	Access to airport
25	I-205	Portland Metro	64	I-84 to US 26	1	Connection between other Tier 1 lifelines
26	I-205	Portland Metro	64	US 26 to OR 224	1	Connection between other Tier 1 lifelines
27	I-205	Portland Metro	64	OR 224 to OR 212	1	Connection between other Tier 1 lifelines
28	I-205	Portland Metro	64	OR 212 to OR 99E	1	Connection between other Tier 1 lifelines
29	I-205	Portland Metro	64	OR 99E to OR 43	1	One of two Tier 1 Willamette River crossing in Portland Metro Geographic Zone
30	I-205	Portland Metro	64	OR 43 to I-5	1	Connection between other Tier 1 lifelines

TABLE 6-2
Tier Designation by Segment

Seg.	Highway	Geographic Zone	ODOT Hwy No.	Description (Point to Point)	Tier	Tier Designation Justification Notes
31	I-405	Portland Metro	61	I-5 to US 30	1	Connection between other Tier 1 lifelines, access to fuel, and Portland circulation, one of two Tier 1Willamette River crossings
32	I-405	Portland Metro	61	US 30 to US 26	1	Connection between other Tier 1 lifelines, access to fuel, and Portland circulation
33	I-405	Portland Metro	61	US 26 to I-5/OR 43/US 26	1	Connection between other Tier 1 lifelines, access to fuel, and Portland circulation
34	OR 217	Portland Metro	144	US 26 to OR 99W	3	Low resilience
35	OR 217	Portland Metro	144	OR 99W to I-5	3	Low resilience
36	OR 99W	Portland Metro	91	I-5 to OR 217	1	Connection to Tier 1 route to coast
37	OR 99W	Valley	91	OR 217 to OR 219	1	Connection to Tier 1 route to coast
38	OR 99W	Valley	91	OR 219 to OR 18	1	Connection to Tier 1 route to coast
39	OR 99W	Valley	91	OR 18 to OR 47	0	Redundant to OR 18
40	OR 99W	Valley	91	OR 47 to OR 18	0	Redundant to OR 18
41	OR 99W	Valley	91	OR 18 to OR 22	2	Alternate to I-5
42	OR 99W	Valley	91	OR 22 to US 20	2	Alternate to I-5
43	OR 99W	Valley	91	US 20 to 99E/99W merge	2	Alternate to I-5
44	OR 99	Valley	91	99E/99W merge to OR 569/126	2	Alternate to I-5
45	OR 99	Valley	91	OR 569/126 to I-5	2	Alternate to I-5
46	OR 99E	Portland Metro	81	US 26 to OR 224	0	Redundant to OR 43 and US 26
47	OR 99E	Portland Metro	81	OR 224 to I-205	0	Redundant to OR 43 and US 26
48	OR 99E	Portland Metro	81	I-205 to OR 43	2	Alternate to I-5
49	OR 99E	Valley	81	OR 43 to OR 214	2	Alternate to I-5
50	OR 99E	Valley	81	OR 214 to I-5	2	Alternate to I-5
51	OR 99E	Valley	81	I-5 in Albany to OR 34	0	Redundant to I-5 and OR 99W

TABLE 6-2
Tier Designation by Segment

Seg.	Highway	Geographic Zone	ODOT Hwy No.	Description (Point to Point)	Tier	Tier Designation Justification Notes
52	OR 99E	Valley	81	OR 34 to 99E/99W merge	0	Redundant to I-5 and OR 99W
53	OR 47	Valley	29	OR 26 to OR 99W	0	Redundant to I-5 and OR 99W
54	OR 212	Cascades	174	I-205 to US 26	2	Redundant connection to Central Oregon, less critical to freight than I-84 route to east
55	OR 224	Portland Metro	171	OR 99E to I-205	0	Redundant to OR 43 and US 26
56	OR 18	Valley	39	OR 99W to OR 99W	1	Connection to Tier 1 route to coast
57	OR 18	Coast	39	OR 99W to OR 22	1	Central Tier 1 route to coast
58	OR 18	Coast	39	OR 22 to US 101	1	Central Tier 1 route to coast
59	OR 43	Portland Metro	3	US 26 to I-205	3	Additional capacity in Portland
60	OR 43	Portland Metro	3	I-205 to OR 99E	0	Redundant crossing of Willamette
61	US 30	Coast	92	US 101 to I-405	1	Northern Tier 1 route to coast
62	OR 202	Coast	102	US 101 to OR 103	0	Redundant route to Astoria
63	OR 103	Coast	103	OR 103 to US 26	0	Redundant route to Astoria
64	US 101	Coast	9	OR 202 to US 26	3	Low resilience
65	US 101	Coast	9	US 26 to OR 18	1, 2, 3	Tier 2 access to Nehalem, Tier 3 due to low resilience Nehalem to Tillamook, Tier 1 access from OR 18 to Tillamook
66	US 101	Coast	9	OR 18 to US 20	1	Tier 1 access from OR 18 to Newport
67	US 101	Coast	9	US 20 to OR 126	3	Low resilience
68	US 101	Coast	9	OR 126 to OR 38	1	Tier 1 access from OR 38 to Florence
69	US 101	Coast	9	OR 38 to OR 42	1	Tier 1 access from OR 38 to Coos Bay
70	US 101	Coast	9	OR 42 to California border	2	Access to south coast
71	US 197	Central	4	I-84 to US 97	3	Redundant to US 97 and I-84 but provides access to critical utilities
72	US 97	Central	42	I-84 to US 197	1	North-south lifeline outside of highly CSZ event affected zone
73	US 97	Central	4	US 197 to US 26	1	North-south lifeline outside of highly CSZ event affected zone

TABLE 6-2
Tier Designation by Segment

Seg.	Highway	Geographic Zone	ODOT Hwy No.	Description (Point to Point)	Tier	Tier Designation Justification Notes
74	US 97	Central	4	US 26 to OR 126	1	North-south lifeline outside of highly CSZ event affected zone
75	US 97	Central	4	OR 126 to US 20	1	North-south lifeline outside of highly CSZ event affected zone
76	US 97	Central	4	US 20 to OR 58	1	North-south lifeline outside of highly CSZ event affected zone
77	US 97	Central	4	OR 58 to OR 140	1	North-south lifeline outside of highly CSZ event affected zone and access to Klamath Falls
78	US 97	Central	4	OR 140 to California border	1	North-south lifeline outside of highly CSZ event affected zone and access to Klamath Falls
79	US 26	Coast	47	US 101 to OR 103	2	Intermediate route to coast
80	US 26	Coast	47	OR 103 to OR 47	2	Intermediate route to coast
81	US 26	Valley	47	OR 47 to OR 217	2	Intermediate route to coast
82	US 26	Portland Metro	47	OR 217 to I-405	2	Intermediate route to coast
83	US 26	Portland Metro	26	I-5/OR 43/US 26 to OR 99E	3	Fourth Willamette River crossing in Portland Metro Geographic Zone
84	US 26	Portland Metro	26	OR 99E to I-205	3	Alternate route through Portland, mostly at grade with many detours available
85	US 26	Cascades	53	OR 212 to US 97	2	Redundant connection to Central Oregon, less critical to freight than I-84 route to east
86	OR 22	Cascades	162	I-5 to Santiam Jct	2	Freight route
87	US 20	Coast	33	US 101 to OR 99W	3	Low resilience
88	OR 34	Valley	210	OR 99W to OR 99E	3	Connection from OR 99W to I-5
89	OR 34	Valley	210	OR 99E to I-5	3	Connection from OR 99W to I-5
90	OR 34	Cascades	210	I-5 to US 20	0	Redundant to OR 22
91	US 20	Cascades	16	OR 34 to OR 126	0	Redundant to OR 22
92	US 20	Cascades	16	OR 126 to OR 22	0	Redundant to OR 22
93	US 20	Cascades	16	OR 22 to OR 126	2	Continuation of OR 22 route to Bend
94	US 20	Cascades	16	OR 126 to US 97	2	Continuation of OR 22 route to Bend
95	OR 126	Coast	62	US 101 to OR 99/ OR 569	2	Alternate route to OR 38

TABLE 6-2
Tier Designation by Segment

Seg.	Highway	Geographic Zone	ODOT Hwy No.	Description (Point to Point)	Tier	Tier Designation Justification Notes
96	OR 569	Valley	69	OR 99/OR 126 to I-5	0	Redundant to OR 99
97	OR 126	Cascades	69	I-5 to US 20	0	Redundant to OR 58
98	OR 38	Coast	45	US 101 to I-5	1	Southern Tier 1 route to coast
99	OR 58	Cascades	18	I-5 to US 97	1	Tier 1 route to Central Oregon
100	OR 42	Coast	35	US 101 to I-5	3	Alternate to OR 38
101	OR 140	Cascades	270	I-5 to US 97	2	Medford – Klamath Falls connection
102	US 199	Coast	25	I-5 to California border	3	Access to southern Oregon and CA border
103	OR 22	Coast	30	OR 18 to OR 99W	3	Alternate connection of OR 18 to OR 99W
104	OR 22	Valley	30	OR 99W to OR 99E Bus.	3	east west connection OR 99W to I-5, alternate crossing of Willamette
105	OR 22	Valley	30	OR 99E Bus. To I-5	1	Connection of State Government to I-5
106	OR 219	Valley	140	OR 99W to I-5	3	Alternate crossing of Willamette
107	OR 214	Valley	140	I-5 to OR 99E	2	East west connection OR 99E to I-5
108	OR 126	Cascades	15	US 20 to US 97	0	Redundant to US 20
109	OR 99E Bus.	Valley	72	I-5 to OR 22	3	Alternate to I-5 and OR 22

ATTACHMENT D
Community Leaders' Technical Briefing and Discussion, August 2, 2019

COMMUNITY LEADERS' TECHNICAL BRIEFING AND DISCUSSION
Friday, Aug. 2, 2019
Meeting Summary of Regional Emergency Transportation Routes Discussion

On Aug. 2, 2019, Metro hosted a community leaders' technical briefing and discussion, bringing together community leaders focused on social equity, environmental justice, labor fairness and community engagement. Invitees included community representatives on MPAC, CORE, PERC, MTAC and TPAC, as well as previous participants in 2018 Regional Transportation Plan (RTP) regional leadership forums and those involved in discussions about an affordable housing measure. More than 100 community leaders were invited, and about 20 leaders participated.

Attendees

Community Leaders: Bev Drottar, TPAC community member; Anjala Ehelebe, Woodlawn Neighborhood Association; Hannah Holloway, Urban League; DJ Hefferman, Sullivan's Gulch Neighborhood; Allie Yee, APANO; Coi Vu, IRCO Asian Family Center; Ali Mohamad Yusuf, IRCO; Sydney McCotter Bicknell, PAALF; Andrew Basin, Willamette Falls Trust; Diane Linn, Proud Ground; Richi Poudyal, The Street Trust; Nicole Johnson, 1000 Friends of Oregon; Chris Rall, Transportation for America; Vivian Satterfield, Verde; Mercedes Elizalde, Central City Concern; Arlene Kimura, East Portland Action Plan; Carol Chesarek, MTAC community member; Kari Schlosshauer, Safe Routes to School Partnership

Metro staff: Clifford Higgins (facilitator), Lake McTighe, Caleb Winter, Eryn Kehe, Matt Bihn

Cliff Higgins kicked off the meeting with introductions and an agenda overview.

Discussion 2: Emergency Transportation Routes
Presentation and large group discussion

- Cliff Higgins presented about the Emergency Transportation Routes Study to the group. He discussed some background on the region's existing Emergency Transportation Routes and the need to update the regional routes to reflect changing population centers, demographics, technology and new information about hazard risks. The study will both identify priority routes and also make recommendations on planning and investments to make those routes more resilient in preparation for major disasters.
- There were questions about how this project will go beyond just route prioritization and identification to also consider the connections between routes and ways community members can access the routes during an emergency.

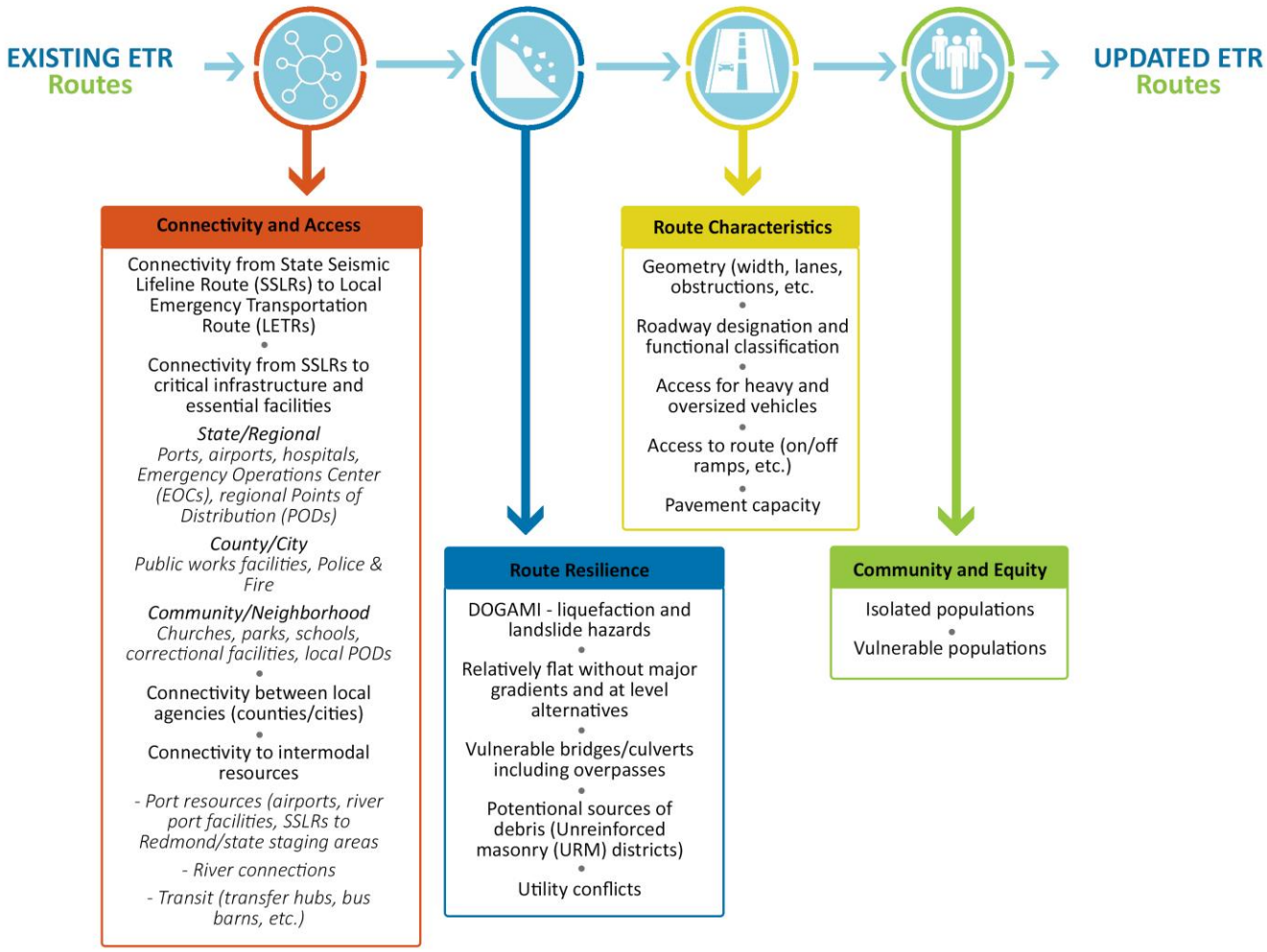
COMMUNITY LEADERS' TECHNICAL BRIEFING AND DISCUSSION
Friday, Aug. 2, 2019
Meeting Summary of Regional Emergency Transportation Routes Discussion

Small group discussions:
Below are the major themes and takeaways from each of the small group discussions on this topic. The participants in these small groups were responding to the following prompts:

1) Based on how we've described it, is this project on the right track?
2) Does the problem to be solved make sense?
3) What else should we consider as this project moves forward?
4) How can we best pursue equity on this topic?

- Participants generally agreed that this project was on the right track, but wanted to make sure it is relevant to individual community disaster preparedness and that there are clear lines of communication about how emergency routes play into overall disaster planning regionally.
- Though most participants understood the need for the project, many emphasized that there are infrastructure improvement needs in communities now that need addressing, and this project must balance the local needs of these emergency routes with helping local communities to prepare for disasters. There were some suggestions of phasing improvements on certain routes to better serve community's immediate needs.
- As the project moves forward, there was an interest in how we can learn from best practices in other communities who have experienced significant natural disasters.
- Individuals brought up specific examples of necessary coordination with other utilities in this planning effort, including: water and sewer lines under Burnside, Powell and Division, the Linnton fuel tanks (fire risk) and major institutions housing vulnerable or dependent populations such as jails, nursing homes or hospitals.
- The overarching concern brought up by each of the groups was to adequately evaluate who would be served by these prioritized emergency transportation routes, and ensuring that the planning prioritizes serving those with fewer access to resources in a disaster.
- Pursuing equity on this topic means clear communication with communities about how to prepare for a disaster, where emergency transportation routes are how improving emergency transportation routes would impact their neighborhood. This also includes communication in different languages and longer planning timeframes to incorporate voices less familiar with these planning processes.

ATTACHMENT E
RETR Evaluation Framework Criteria


EXISTING ETR Routes
UPDATED ETR Routes
Connectivity and Access
Connectivity from State Seismic Lifeline Route (SSLRs) to Local Emergency Transportation Route (LETRs)
Connectivity from SSLRs to critical infrastructure and essential facilities
State/Regional
Ports, airports, hospitals, Emergency Operations Center (EOCs), regional Points of Distribution (PODs)
County/City
Public works facilities, Police & Fire
Community/Neighborhood
Churches, parks, schools, correctional facilities, local PODs
Connectivity between local agencies (counties/cities)
Connectivity to intermodal resources
- Port resources (airports, river port facilities, SSLRs to Redmond/state staging areas
- River connections
- Transit (transfer hubs, bus barns, etc.)
Route Resilience
DOGAMI - liquefaction and landslide hazards
Relatively flat without major gradients and at level alternatives
Vulnerable bridges/culverts including overpasses
Potentional sources of debris (Unreinforced masonry (URM) districts)
Utility conflicts
Route Characteristics
Geometry (width, lanes, obstructions, etc.
Roadway designation and functional classification
Access for heavy and oversized vehicles
Access to route (on/off ramps, etc.)
Pavement capacity
Community and Equity
Isolated populations
Vulnerable populations

Performance management project | Regional Barometer

The Regional Barometer is an online tool that publicly provides information on how the region is doing relative to Metro's Six Desired Outcomes: transportation, economy, ecosystems, climate, communities and equity. It is part of a performance management system called By the Numbers, which will assess and communicate how Metro programs support those outcomes.

Regional Barometer users will be able to view easy-to-understand facts and figures with accompanying narratives; access links to supplemental information such as relevant strategies, research and reports; and download data for additional analysis.

Project purpose

Improve Metro decision-making through accountability, transparency and results.

The Regional Barometer will:

- **Promote accountability and transparency** for Metro and our programs.
- **Provide a service** to users who can access critical data all in one place.
- **Serve as a policy and communications tool** for Metro staff and elected officials through which to ground policy conversations, set the stage for key investments, and build shared understanding.
- **Support a coordinated data strategy** to reduce duplicative efforts and investments, fill regional data gaps and solidify Metro's role as a regional data hub.

The Regional Barometer makes progress towards Metro's regional goals by:

- Increasing capacity of Metro's staff and supporting impactful work
- Increasing capacity of community-based organizations and community leaders to advocate for and target investments and services relative to their goals
- Building public trust and solidifying Metro's mandate
- Increasing data-driven policymaking region-wide
- Expanding regional data capacity and accessibility

Success requires:

- Relevant, up-to-date and trusted data
- Usable and understandable tool
- Users see their priorities and needs reflected
- Effective program measurement tied to goals

Project phases

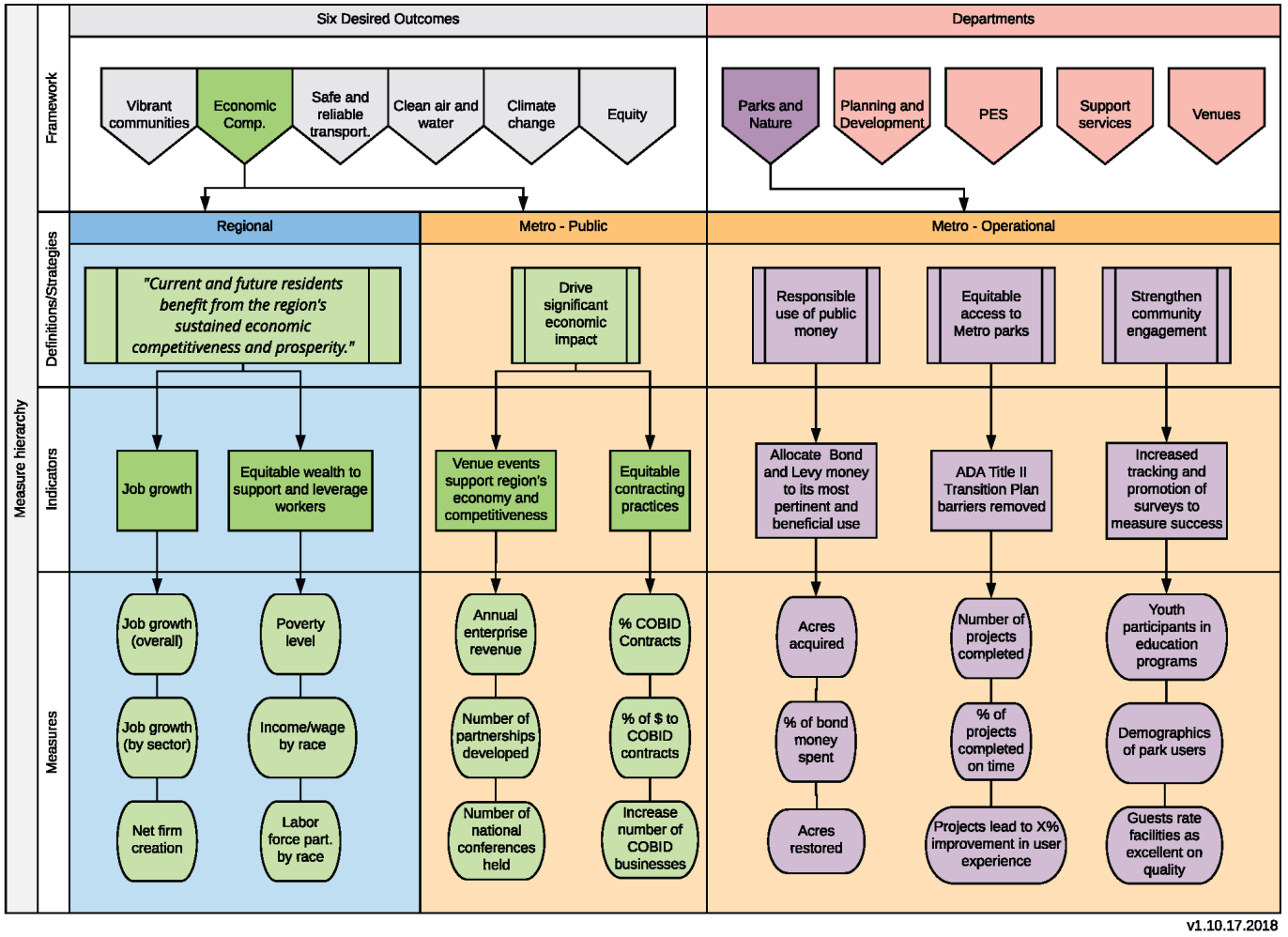
- Phase 1, By March 2020: Tool is made public with existing datasets, strategic data plan
- Phase 2, TBD: Develop composite indicators, performance targets and benchmarks; conduct robust community engagement; build out strategic data plan

Cary Stacey: cary.stacey@oregonmetro.gov, 503.797.1619 Jan. 30, 2020

By the Numbers (sample metrics)

Regional barometer

Operational measures



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Jan. 30, 2020

The Regional Barometer | Phase 1 Measures

EQUITY

Economy and transportation	Climate and ecosystems	Communities
Change in median annual household income in 2017 dollars by race & ethnicity (graph)	National Air Toxic Assessment diesel particulate matter (map)	Change in population by race (map)
Additional income disparities by race and ethnicity (graph)	Impervious Surfaces (map)	Housing cost burden by race (graph)
Income inequality (map)	Tree canopy (map)	Homeownership by race (graph)
Change in unemployment rate by race & ethnicity (graph)	Environmental hazard potential (map)	Inventory of public affordable units (map)
Poverty level (map)		Juvenile recidivism (graph)
Crash map application (map)		Food insecurity (graph)
		Life expectancy at birth (map)
		Sexually transmitted infections by age, gender, and race (graph)
		Substance use among 11th graders (graph)
		Kindergarten assessment (map)
		High school graduation rate (map)
		High school discipline rates (map)
		Educational attainment (map)
		Staffing level per student (map)
		Diversity of teachers (map)

COMMUNITIES

Recreation and community engagement	Housing	Land Use
Voter participation (graph)	Houselessness rate per 10,000 population (graph)	Planned transportation investment in regional centers and corridors (At a glance)
Arts and culture establishments (graph)	Change in population by race (map)	Residential building permit activity (map)
Cultural and ethnic awareness nonprofits (graph)	Housing cost burden by race (graph)	Number of permits for missing middle-type housing (graph)
	Homeownership by race (graph)	Development that is infill or redevelopment (graph)
	Median home price (graph)	Sidewalk coverage (map)
	Median rents (graph)	Urban density and transit (map)
	Inventory of public affordable units (map)	Transportation investments in regional centers and corridors (map)

COMMUNITIES (cont.)

Food	Education	Health
Food insecurity (graph)	Regional supply of child care (graph)	Life expectancy at birth (map)
Exposure to less healthy food (map)	Kindergarten assessment (map)	Uninsurance rate (graph)
Local food production (graph)	Standardized test scores (map)	Underinsurance rate (graph)
	High school graduation rate (map)	Exposure to less healthy food (map)
	Chronic absenteeism (map)	Accessibility to tobacco (map)
	High school discipline rates (map)	Substance use among 11th graders (graph)
	Educational attainment (map)	Suicide contemplation (graph)
	Staffing level per student (map)	Suicide rates (graph)
Crime and Criminal Justice	Diversity of teachers (map)	Sexually transmitted infections (graph)
Regional crime rate (graph)	Chronic absenteeism (map)	Youth immunizations (map)
Adult incarceration rates (graph		Asthma rates (graph)
Adult recidivism rates (graph)		Heart attacks (graph)
Juvenile recidivism rates (graph)		Diabetes (graph)

CLIMATE

Reducing our emissions: climate mitigation	Reducing the impacts: climate adaptation
Greenhouse gas emissions attributed to consumption (at a glance)	Average share of tree canopy (at a glance)
Emissions attributed to roadway vehicles in 2015 (at a glance)	Heat islands (map)
Share of trips by mode in 2017 (at a glance)	Canopy cover (map)
Consumption-based greenhouse gas emissions (graph)	Carbon sink (map)
Vehicle miles traveled per capita (graph)	Environmental hazard potential (map)
Percent of workers not driving alone to work (graph)	

The Regional Barometer | Phase 1 Measures

ENVIRONMENT

Air quality	Built environment	Healthy water and ecosystems
The share of measurements with unhealthy air quality for everyone in 2018 (at a glance)	Share of impervious surface in the region (at a glance)	Average share of tree canopy (at a glance)
The rate of asthma hospitalization per 10,000 people in 2017 (at a glance)	Regional average radon level (at a glance)	Average share of protected land (at a glance)
Unhealthy air quality (graph)	Impervious surfaces (map)	Water quality index (map)
Particulate matter (graph)	Potential lead paint share (map)	Tree canopy (map)
Ozone (graph)	Radon indicator (map)	Parks and protected lands (map)
National Air Toxic Assessment diesel particulate matter (map)		
Asthma rate (graph)		
National Air Toxic Assessment respiratory hazard index (map)		
Heating fuels (graph)		

ECONOMY

Developability and market activity	Job activity	Economic justice and inclusion
Building permits issued in the region (At a glance)	New jobs created over a five-year period (at a glance)	Regional median household income in 2013-2017 (at a glance)
Property value per acre in the 4-county region (At a glance)	Percent of goods-producing jobs (at a glance)	Regional unemployment rate in 2013-2017 (at a glance)
Industrial and commercial square footage (map)	Ten-year increase in jobs (at a glance)	Change in median annual household income in 2017 dollars by race & ethnicity (graph)
Property value (map)	Percent increase in jobs by county (map)	Additional income disparities by race and ethnicity (graph)
Residential building permit activity (map)	Number of goods-producing jobs by county (graph)	Women and minority-owned businesses (graph)
	All jobs in Greater Portland by type (graph)	Change in unemployment rate by race & ethnicity (graph)
	Goods-producing jobs in the region (map)	Poverty level (map)
		Income inequality (map)

TRANSPORTATION

Safety	Reliability	Mobility and access
Fatal crashes involving speed (at a glance)	Excessive delay (at a glance)	Average miles driven per person (at a glance)
Fatal crashes by mode (at a glance)	Travel time reliability (at a glance)	Ten-year change in daily miles driven per person (at a glance)
Fatalities resulting from traffic crashes in greater Portland (at a glance)	Bus service reliability over time (graph)	Households with access to frequent transit (graph)
Severe injuries resulting from traffic crashes in greater Portland (at a glance)	MAX service reliability over time (graph)	Vehicle miles traveled per capita (graph)
Crash map application (map)	LIFT service reliability over time (graph)	Total vehicle miles driven (graph)
Traffic deaths and severe injuries per capita (graph)	WES service reliability over time (graph)	Commutes driving alone to work (graph)
Traffic deaths and injuries by mode (graph)	Goods-producing jobs in the region (map)	Percent of workers not driving alone to work (graph)
Traffic death and severe injury rates (graph)		Number of rides on TriMet's bus and MAX services (graph)
		Number of rides on Trimet's LIFT and WES services (graph)
		Access to transit from households (graph)

Materials following this page were distributed at the meeting.

Regional ETR Update Project

MTAC/TPAC Meeting February 19, 2020

ETR Methodology Review

Project Team: RDPO, Metro

Thuy Tu Consulting, LLC, Salus Resilience, Cascade GIS & Consulting

SALUS RESILIENCE

Metro

RDPO

Regional Disaster Preparedness Organization

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Today's Meeting Agenda

- Update MTAC and TPAC on Regional ETR Project
- Review Draft ETR Definitions
- Present Methodology
- Review ETR Criteria

Outcome: Project Team receives feedback on draft ETR definitions and criteria.

Regional ETR Update Project

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Metro

Project Purpose: To update designated regional Emergency Transportation Routes (ETRs) for the five-county Portland/Vancouver area.

Additionally will:

- Update 1996 and 2006 ETRs
- Improve understanding of resilience of ETRs
- Raise visibility of ETRs
- Facilitate regional dialogue regarding resilience and recovery

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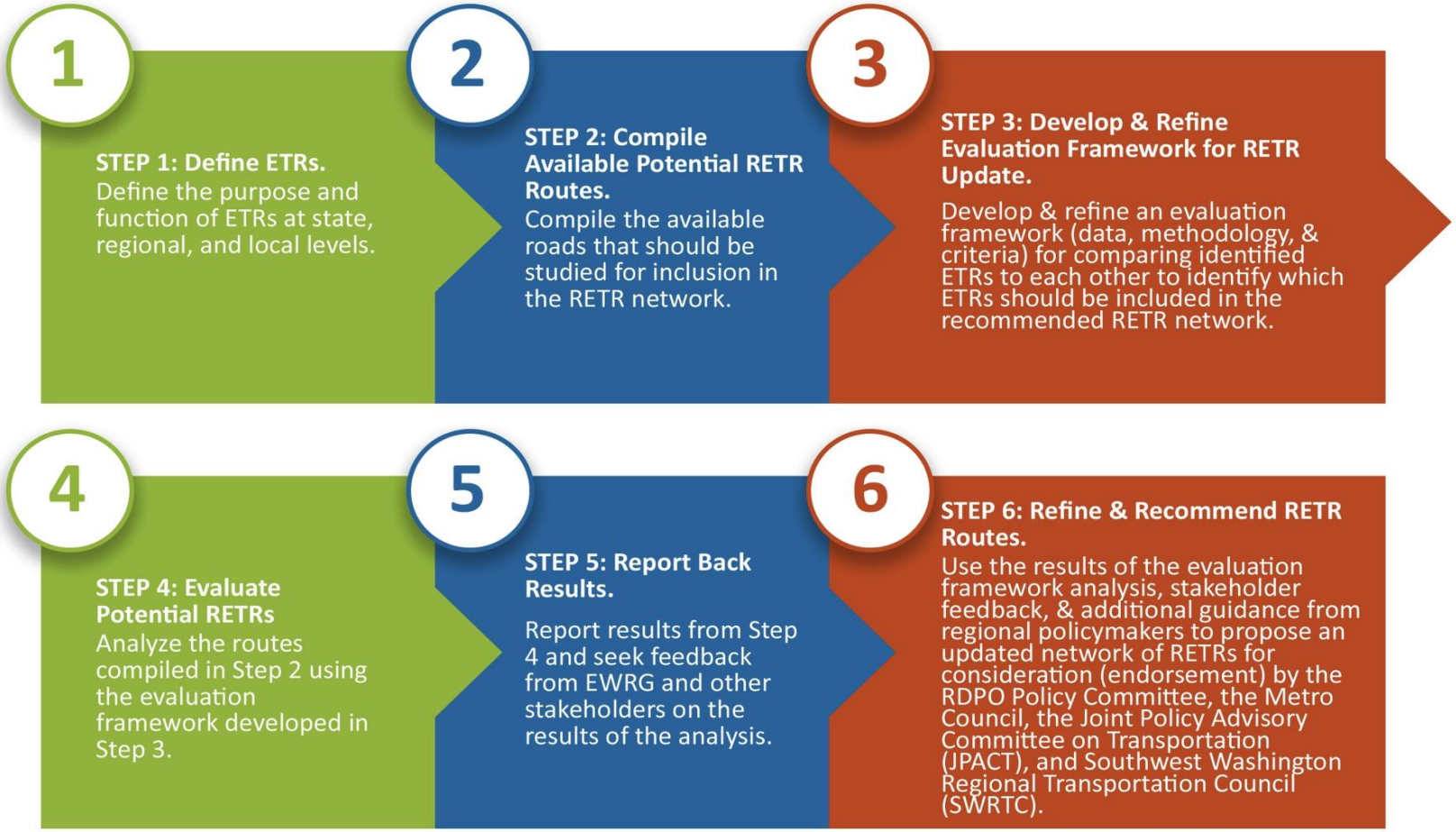
Project Approach



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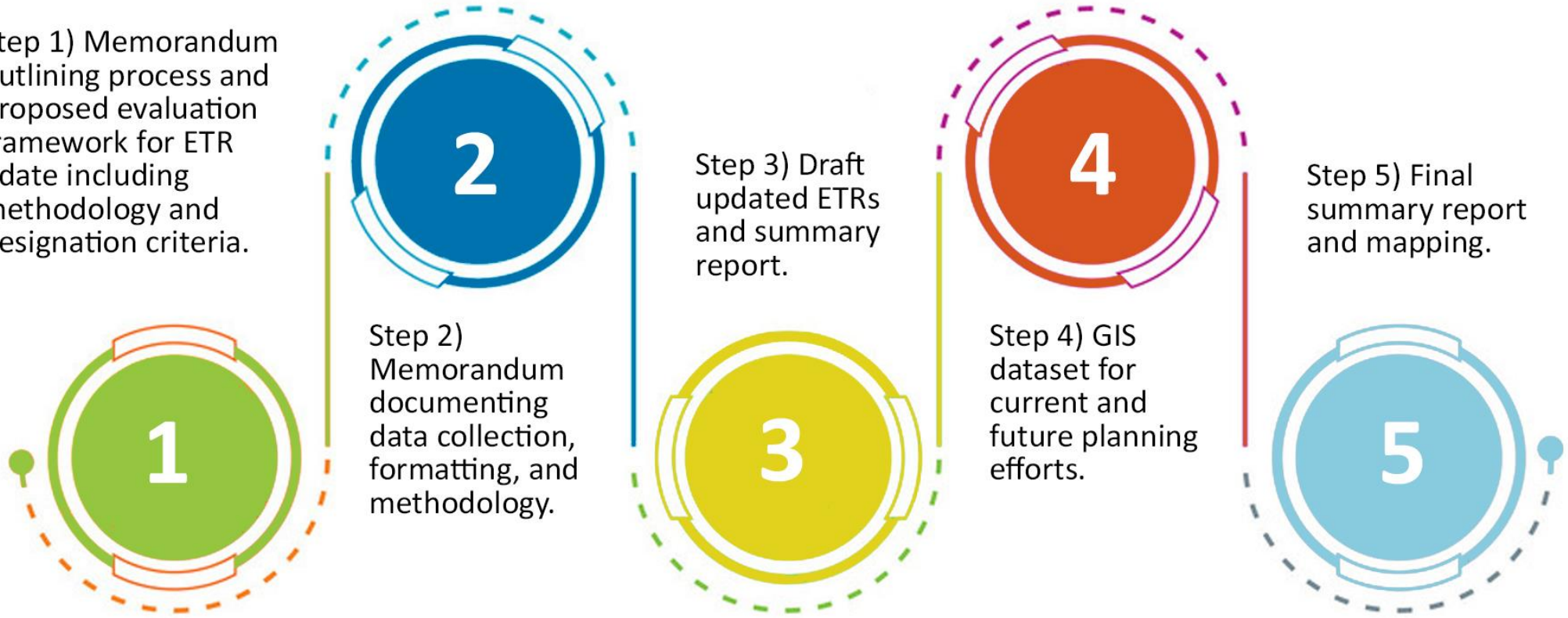
Project Deliverables



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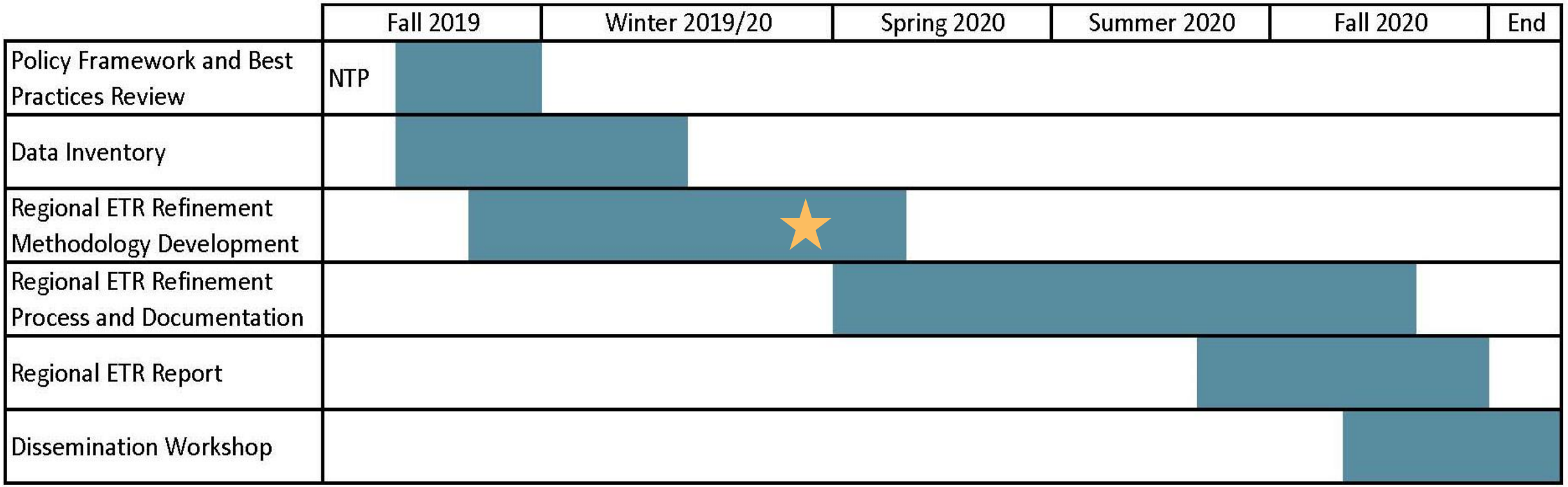
Project Work Plan



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Project Work Plan – Phase 1 (Fall/Winter 2019)

- ✓ Policy Framework and Best Practices Review
- ✓ Data Inventory/Collection
- ✓ Engage with ETR Workgroup

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Project Work Plan – Phase 1 (Winter/Spring 2020)

- Regional ETR Refinement Process Design
  - Compile ETR designation criteria and methodologies.
  - Make recommendations on alignment of criteria and best practices
- ***Brief RDPO/JPACT/Metro Council/RTC and others on draft criteria and recommended refinement process***
- Finalize criteria and refinement process report

Project Work Plan - Phase 2 (Spring – Fall 2020)

- Regional ETR Refinement Process & Documentation
  - Identify recommended RETRs based on criteria, methodology and available data
  - Prepare draft RETR maps and draft report with recommendations for future work for review
- Finalize Regional ETR Maps and Report
- Dissemination Workshop

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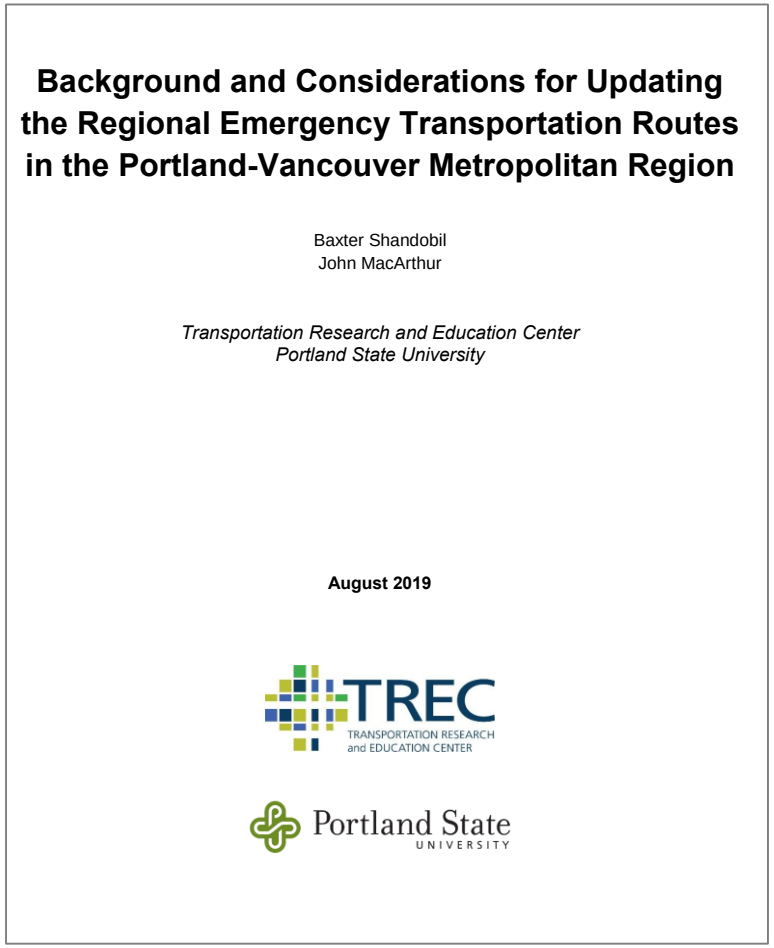
Infrastructure/Facility Definitions

Category	Critical Infrastructure Considered	Essential Facilities Considered
State/Regional	Airports, marine port terminals, rail yards, regional level lifeline facilities such as power and water transmission lines and state and regional fuel PODs	Hospitals, regional EOCs, state and regional PODs, state and county public works facilities and equipment stores, debris disposal sites
City/County	Local lifeline facilities such as local water and electrical transmission infrastructure, local river connections, transit hubs	Hospitals and health care facilities, police and fire stations, local EOCs and PODs, city and utility public works facilities, transit equipment facilities (bus barns), designated debris management sites
Community/ Neighborhood	Lifeline distribution systems, isolated lifeline distribution infrastructure	Churches, schools, community centers, shelters, community PODs

ETR Definitions

Definition of ETRs – PSU/TREC Memo

- General lack of consistency in names and definitions throughout documents
- Long and complicated definitions
- 1996/2006 regional efforts defined 4 types of ETRs



Background and Considerations for Updating the Regional Emergency Transportation Routes in the Portland-Vancouver Metropolitan Region

Baxter Shandobil
John MacArthur

Transportation Research and Education Center
Portland State University

August 2019

TREC
TRANSPORTATION RESEARCH and EDUCATION CENTER

Portland State
UNIVERSITY

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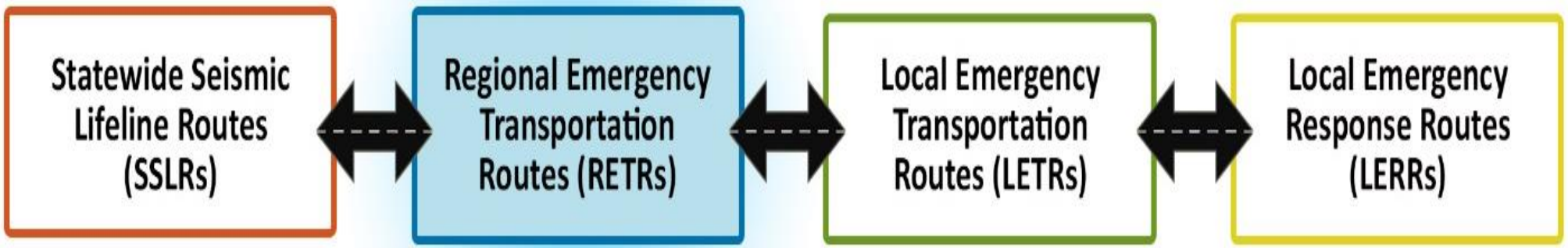
Definition of ETRs

ETR – Emergency Transportation Route

Routes used during and after a major regional emergency or disaster to move resources and materials including supplies, debris, equipment, and personnel (first responders, fuel, essential supplies, and patients).

Definition of ETRs



Definition of ETRs

Statewide Seismic Lifeline Routes (SSLRs)

State-owned roadways *pre-designated* by the state as priority transportation routes in Oregon and Washington. SSLRs provide key emergency response connections between regions within Oregon and Washington. Their primary function is to provide “a network of streets, highways, and bridges to facilitate emergency services response and to support rapid economic recovery after a disaster”.

Definition of ETRs

Regional Emergency Transportation Routes (RETRs)

A network of state- and locally owned (county and city) roadways *pre-designated* by the region as priority transportation routes that can best provide connectivity for emergency operations in the region in the event of a major disaster or earthquake. These routes are priorities targeted during an emergency for rapid damage assessment and debris clearance and used to facilitate life-saving and life-sustaining response activities throughout the region.

Definition of ETRs

Local Emergency Transportation Routes (LETRs)

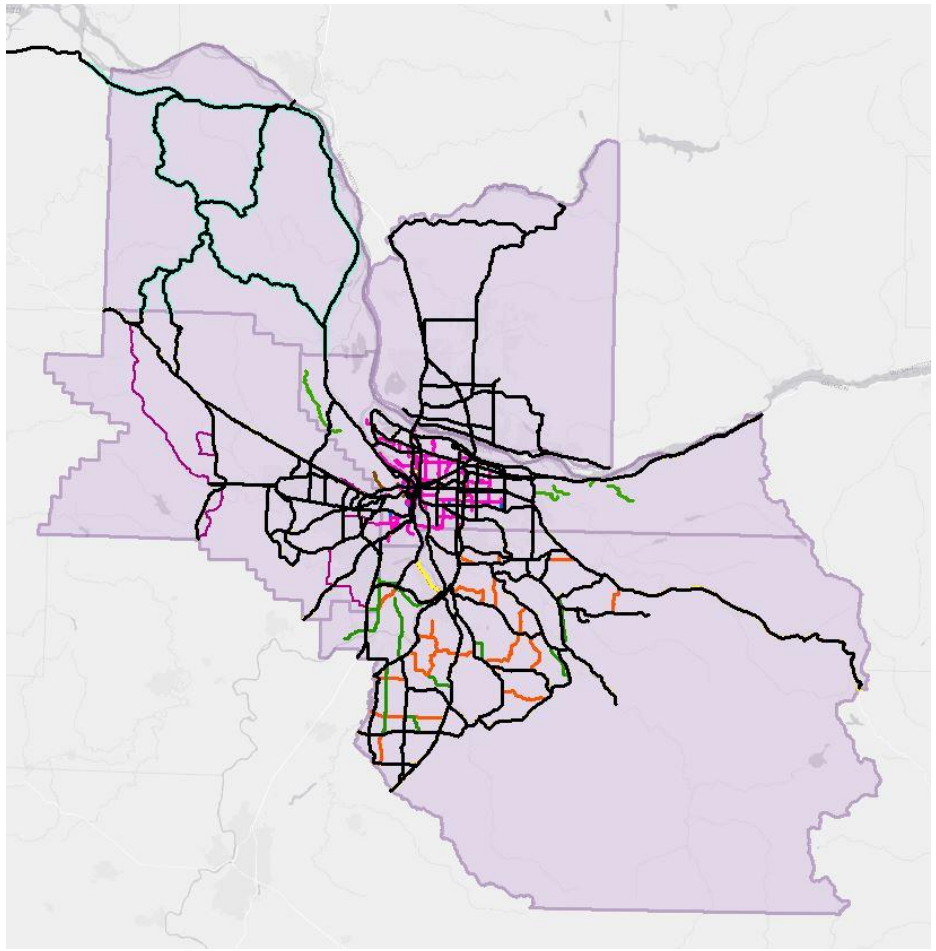
Locally owned roadways, *pre-designated* by local agencies (county and city) as priority transportation routes intended to provide a local network of arterials, collector and local streets that will connect LERR (defined next slide) to RETRs. They are generally used to connect more City/County critical infrastructure and essential facilities either directly or via RETRs.

Definition of ETRs

Local Emergency Response Routes (LERRs)

Locally owned roadways intended to provide a network of streets to facilitate prompt response to routine fire, police, and medical emergencies within a single jurisdiction. LERRs also provide a connection from LETRs to Community/Neighborhood facilities and services, such as shelters, medical facilities, and community PODs. These facilities are often not pre-designated and can be defined based on the community needs, scale of the disaster and resulting damage.

ETR Methodology



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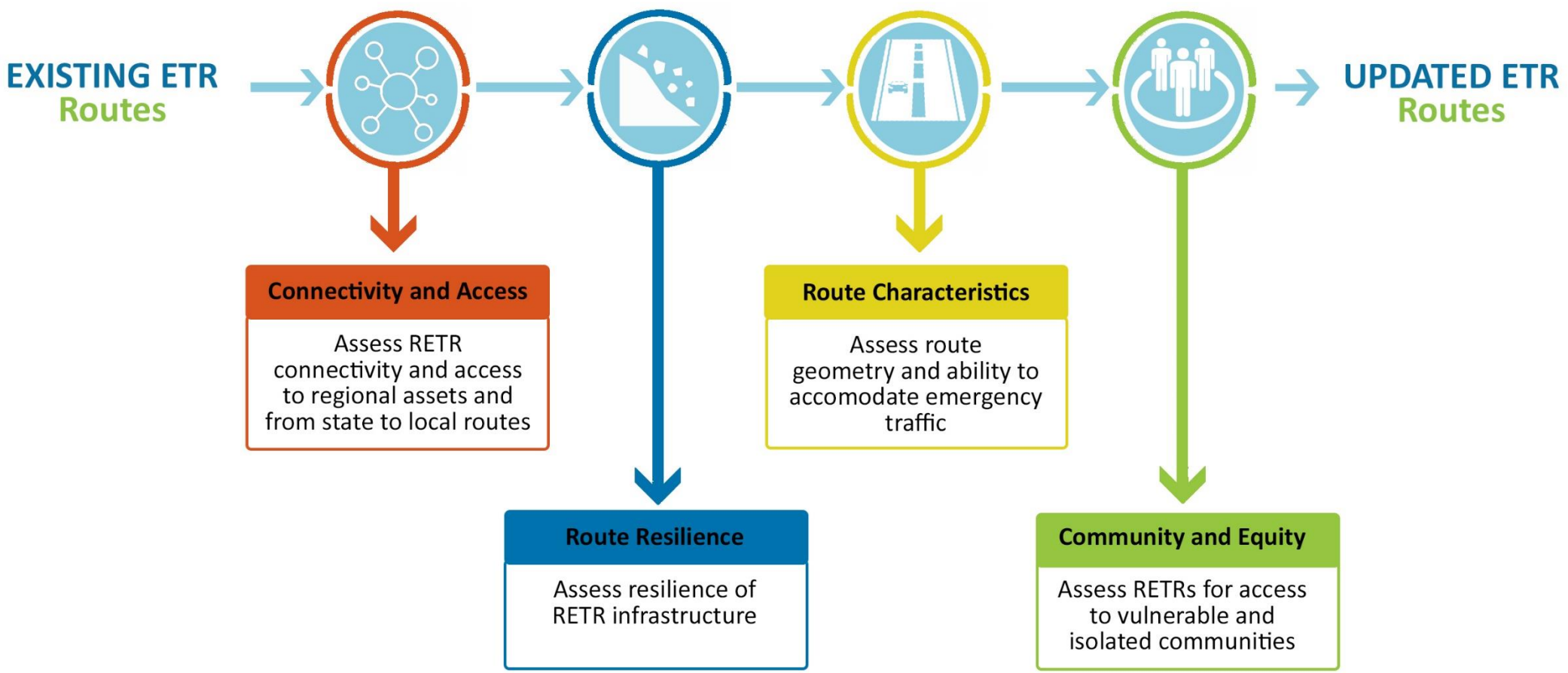
ETR Evaluation Methodology



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ETR Evaluation Criteria

Connectivity and Access

Assess RETR connectivity and access to regional assets and from state to local routes

- **Connectivity and Access** – The "Connectivity and Access" category includes all criteria relating to route proximity to key resources that are likely to be essential after a disaster/seismic event.
  - Connectivity and Access from SSLRs to LETRs
  - Connectivity and Access from SSLRs to critical infrastructure and essential facilities
    - State/Regional
    - County/City

ETR Evaluation Criteria

Connectivity and Access

Assess RETR connectivity and access to regional assets and from state to local routes

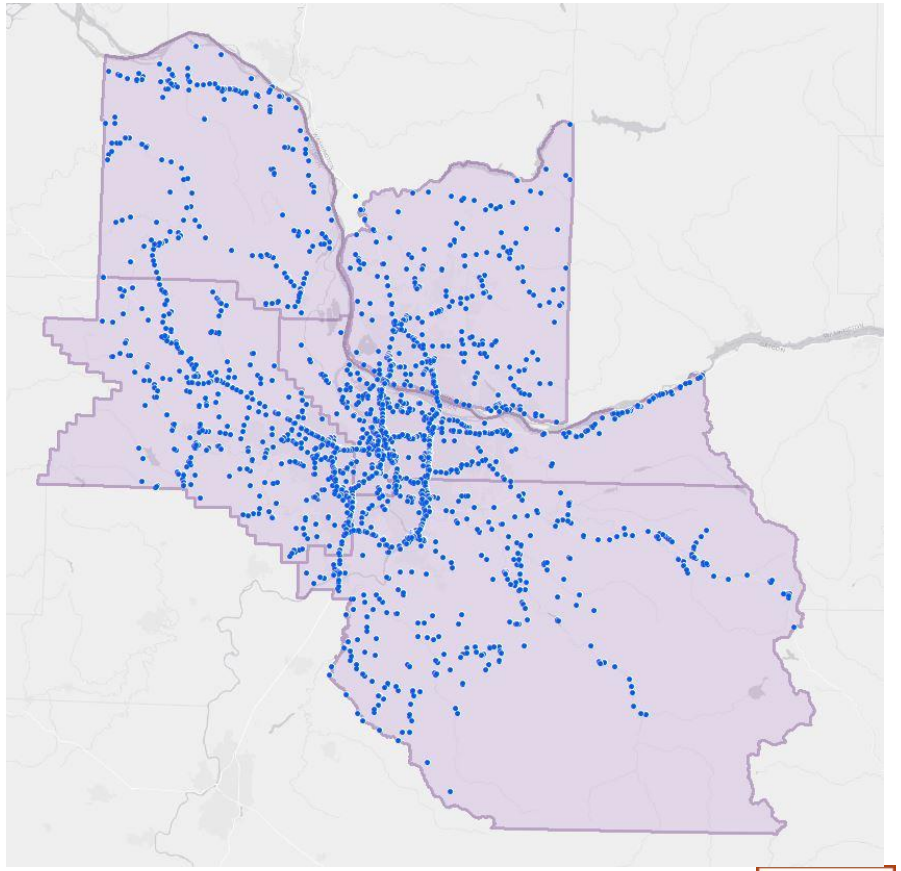
- Connectivity and Access between local jurisdictions (counties/cities)
- Connectivity and Access to intermodal resources
  - Freight intermodal facilities
    - SSLRs to state staging areas (Redmond Airport/Pendleton)
    - Portland International Airport (PDX), Hillsboro and Troutdale Airports
    - River port facilities and marine terminals (both sides of the Willamette and Columbia Rivers)
    - Rail yards and rail lines (Union Pacific Railroad [UPRR])
  - TriMet/CTRAN transit facilities (transfer hubs, bus barns, etc.)

ETR Evaluation Criteria

Route Resilience

Assess resilience of RETR infrastructure

- **Route Resilience** – The "Route Resilience" category includes all criteria relating to the vulnerability of the route itself (including bridges and culverts) to seismic and other natural hazards.
  - Liquefaction and landslide hazards (DOGAMI and WADNR)
  - Relatively flat routes without major gradients and at level alternatives
  - Vulnerable bridges/culverts including overpasses
  - Potential sources of debris (unreinforced masonry (URM) districts)
  - Condition of pavement
  - Utility vulnerability



Bridges and Culverts

ETR Evaluation Criteria

Route Characteristics

Assess route geometry and ability to accomodate emergency traffic

- **Route Characteristics**–all criteria relating to the characteristics of the route itself.
  - Pavement width and geometry (number of travel lanes, turning radius, etc.)
  - Ability to control use/access (on/off ramps, signalized intersections, presence of medians, presence of multiple driveways, etc.)
  - Functional classification and roadway designation
  - Average daily traffic (ADT) and traffic flow characteristics
  - Freight access (e.g., heavy and oversized vehicles, over-dimensional route designation)

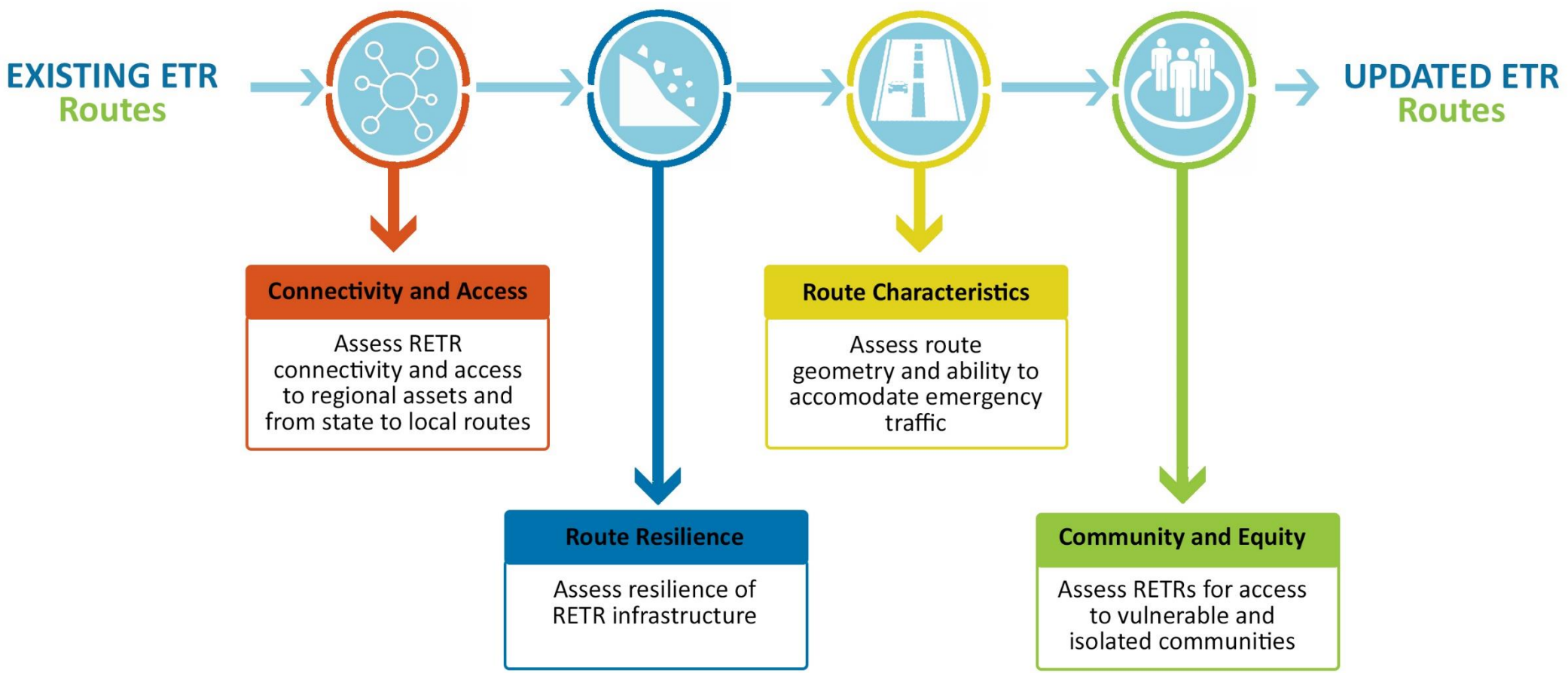
ETR Evaluation Criteria

Community and Equity

Assess RETRs for access to vulnerable and isolated communities

- **Community and Equity** – The "Community and Equity" category includes all criteria relating to route proximity to population centers, isolated populations and vulnerable populations after a disaster/seismic event for purposes of equitable rescue operations, emergency response or evacuation and providing equitable access to critical destinations (e.g., hospitals, temporary shelters, etc.).
  - populations centers (rural/suburban/urban)
  - isolated populations (rural/suburban/urban)
  - vulnerable populations (rural/suburban/urban)

ETR Evaluation Methodology



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Emerging Recommendations for Future Work

ETR Future Work

- Consider all hazards
- Include routes in future planning efforts and identify them in emergency plans
- Develop plans for users, uses, priorities, etc.
- Put MOUs in place between agencies

ETR Future Work

- Develop education about ETRs and encourage public to avoid
- Consider bike and ped uses
- Evaluate jurisdictional boundaries for continuity
- Evaluate river routes
- Equity and vulnerable communities

Next Steps

Spring /Summer 2020

- Finalize criteria and methodology based on input
- Apply criteria and methodology to update RETRs
- Develop recommendations for future planning work outside the scope of this effort

Fall 2020

- Report back and refinement of Regional ETR Maps and Report

Thank you!

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rdpo.net/emergency-transportation-routes

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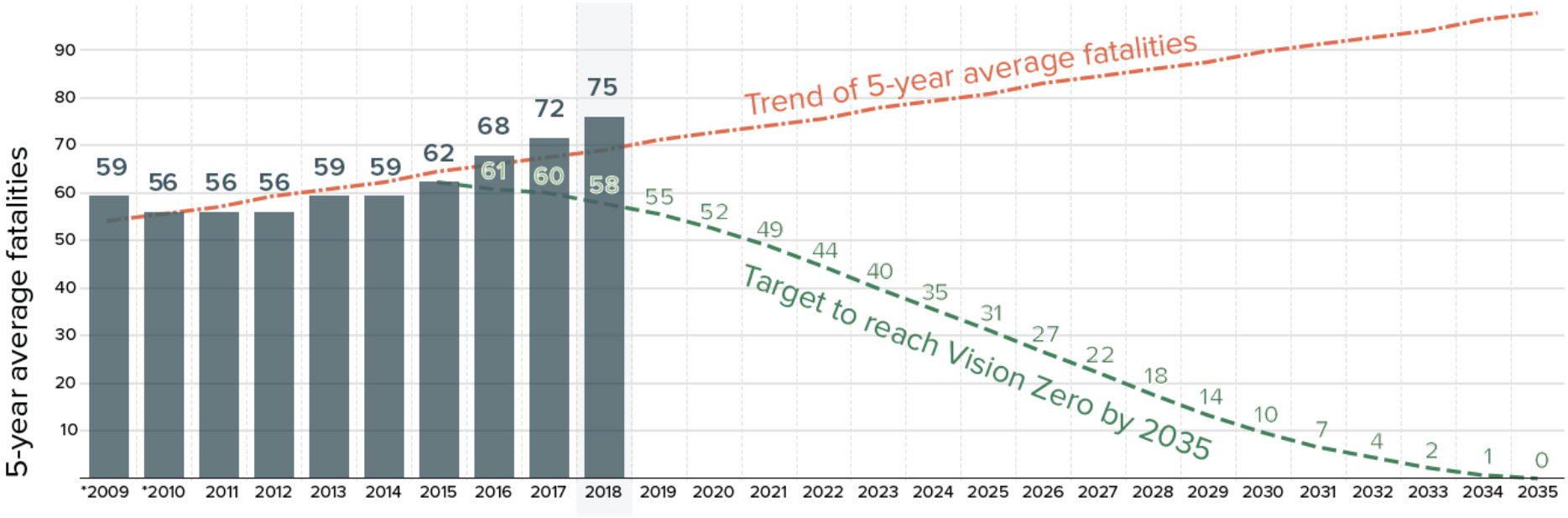
Traffic deaths and serious injuries ~update and discussion

February 19, 2020

We are not meeting regional fatality targets and we are not on track to zero fatalities

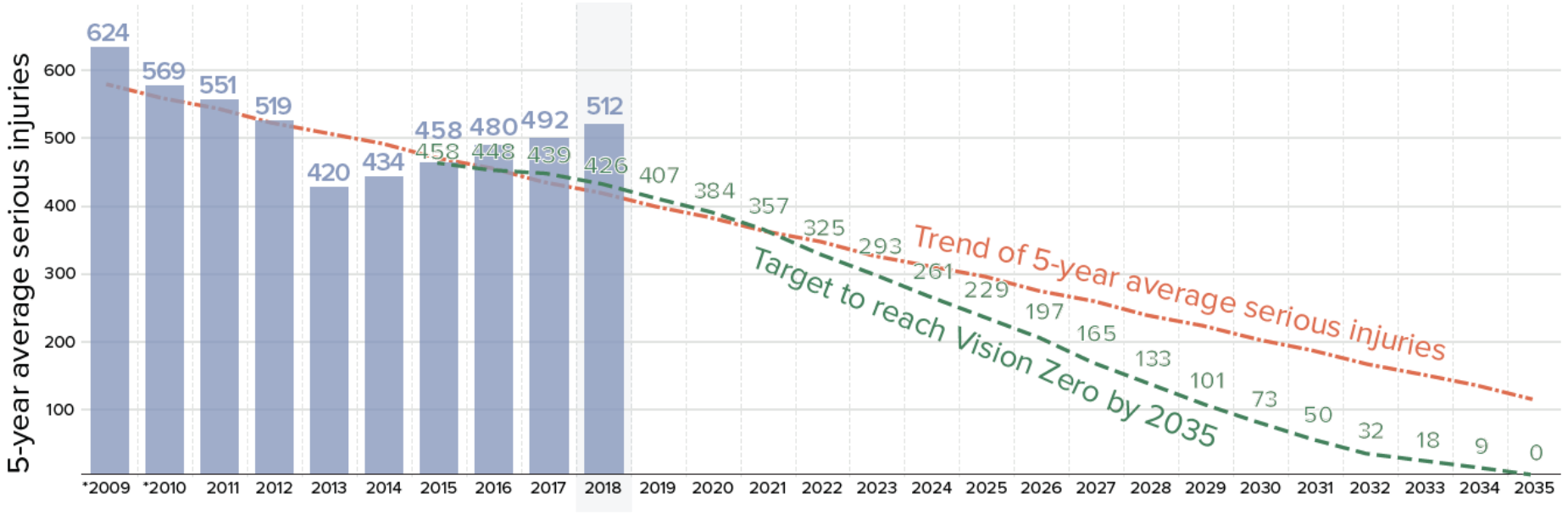
Annual motor vehicle involved fatalities
5-year rolling average, Metropolitan Planning Area



*2009/10 data are 3/4 year averages.

The trend is better for serious injuries, but we are still not meeting targets to reach Vision Zero goals by 2035

Annual motor vehicle involved serious injuries
5-year rolling average, Metropolitan Planning Area



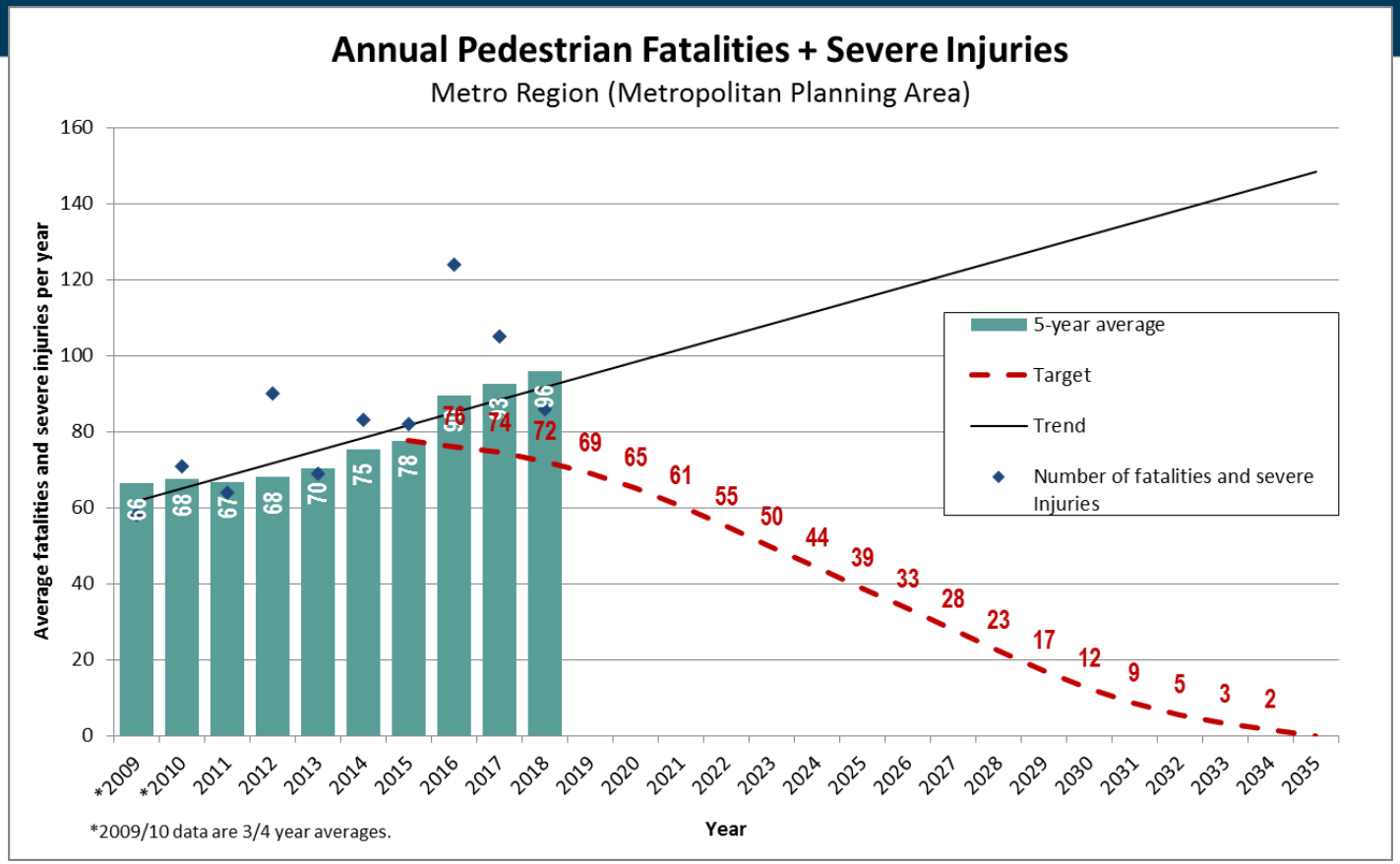
*2009/10 data are 3/4 year averages.

In 2018, traffic deaths increased and serious injuries decreased from 2017

	People walking		People biking		People in motor vehicles		
	Serious injuries	Fatalities	Serious injuries	Fatalities	Serious injuries	Fatalities	Totals
2014	60	23	37	1	327	33	481
2015	56	26	33	2	433	38	588
2016	91	33	26	7	476	41	674
2017	67	38	25	4	434	44	612
2018	51	35	27	3	419	49	584

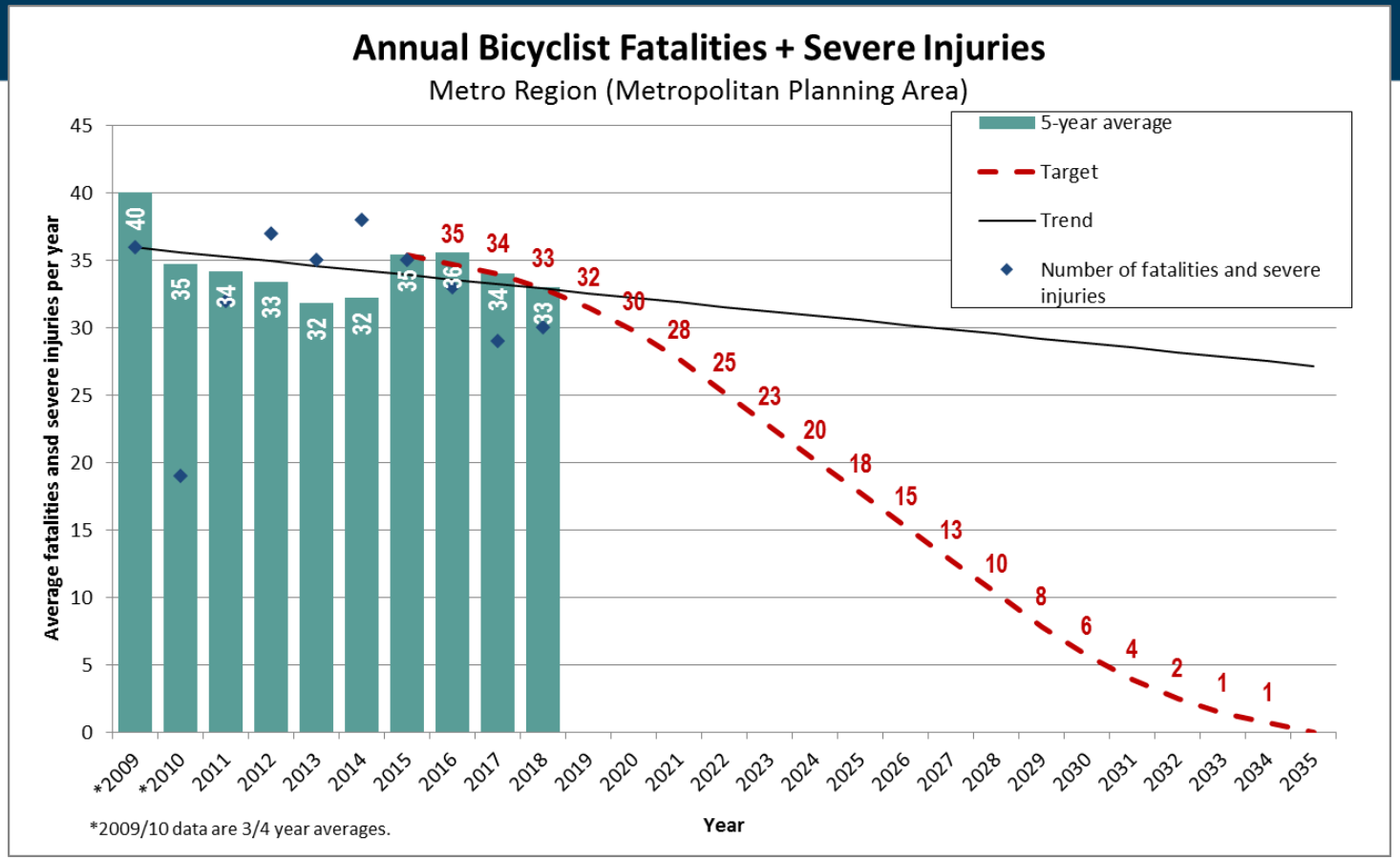
Within the Metropolitan Planning Area, 87 people died in traffic crashes and 491 suffered life changing injuries. In 2016, there were 81 deaths and in 2017, 86 people died. In 2016, 593 people suffered life changing injuries and in 2017, 526 people.

Pedestrians killed in traffic crashes made up 40% of all traffic fatalities in 2018



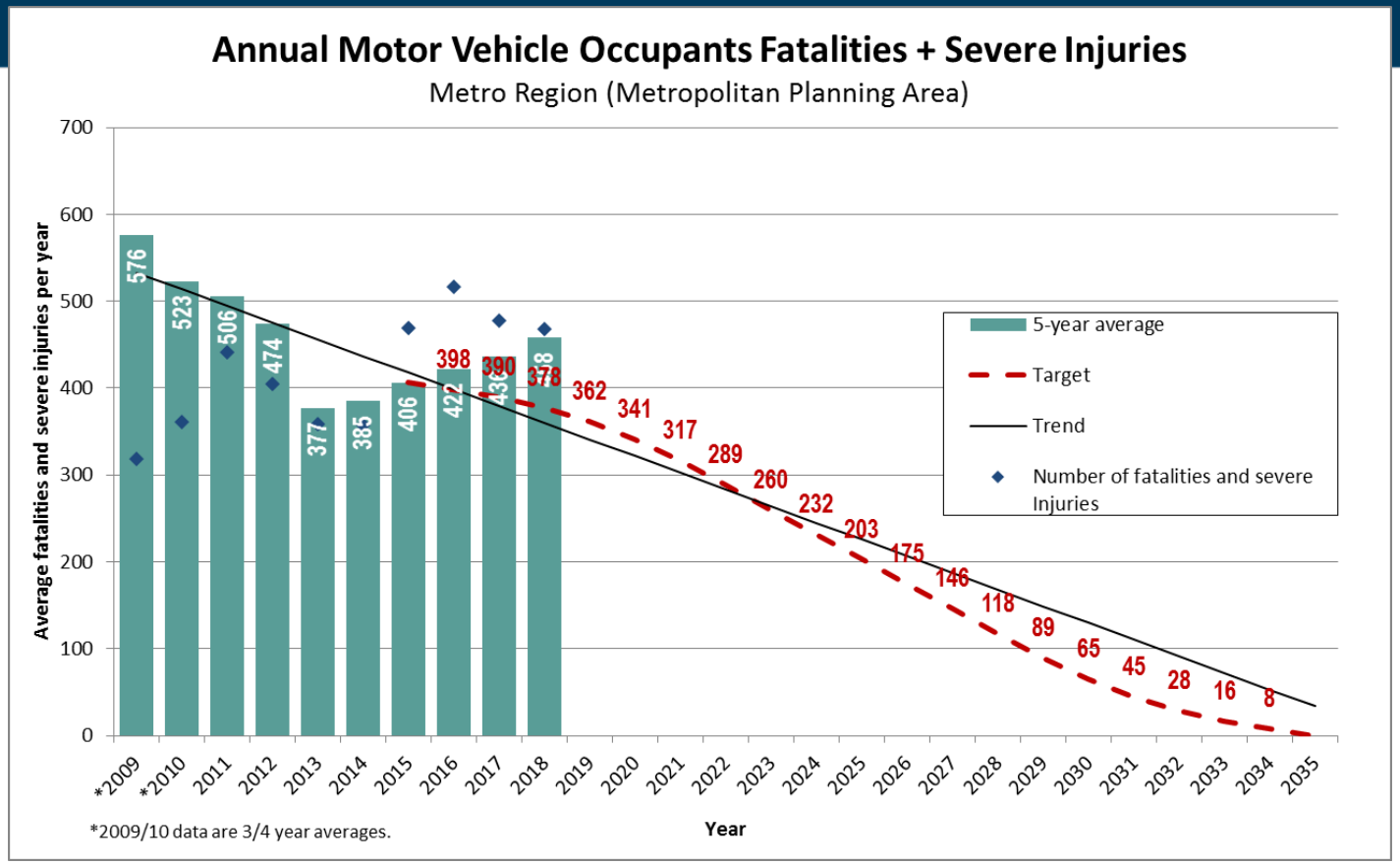
In 2018, there were 35 pedestrian deaths and 51 pedestrians were seriously injured in traffic crashes. There were fewer pedestrian deaths and serious injuries in 2018 compared to 2017, but the average annual pedestrian fatalities and serious injuries, based on a five-year rolling average, has increased each year since 2010.

In 2018, 3.4% of all traffic fatalities were people bicycling



In 2018, there were 3 bicyclist deaths and 27 people bicycling were seriously injured. Average annual bicyclist fatalities, based on a five-year rolling average, have slightly increased each year since 2010. Serious injuries have slightly decreased.

In 2018, 56.3% of all traffic fatalities were people in motor vehicles



In 2018, 49 people died while traveling in a motor vehicle and 419 people were seriously injured. While the trend is in the right direction, average annual fatalities and serious injuries, based on a five-year rolling average, have been increasing since 2013.

There are many contributing factors to crashes

Two common causes of fatal and serious injury crashes in 2018

Alcohol & other drugs

58.6% of total **fatalities** resulted from crashes in which alcohol, marijuana, or other drugs were determined to be a contributing factor.

17.3% of total **serious injuries** resulted from crashes in which alcohol, marijuana, or other drugs were determined to be a contributing factor.

↑ 0.4% from 2017

Speed

31.0% of total **fatalities** resulted from crashes in which speed was determined to be a contributing factor.

16.5% of total **serious injuries** resulted from crashes in which speed was determined to be a contributing factor.

↑ 0.6% from 2017

Impairment and speed continue to be some of the most common contributing factors to fatal and serious crashes. Aggressive behavior and failure to yield are also common causes. Other factors not included in crash statistics, such as economic factors, roadway design, vehicle size and education also influence the number and severity of crashes.

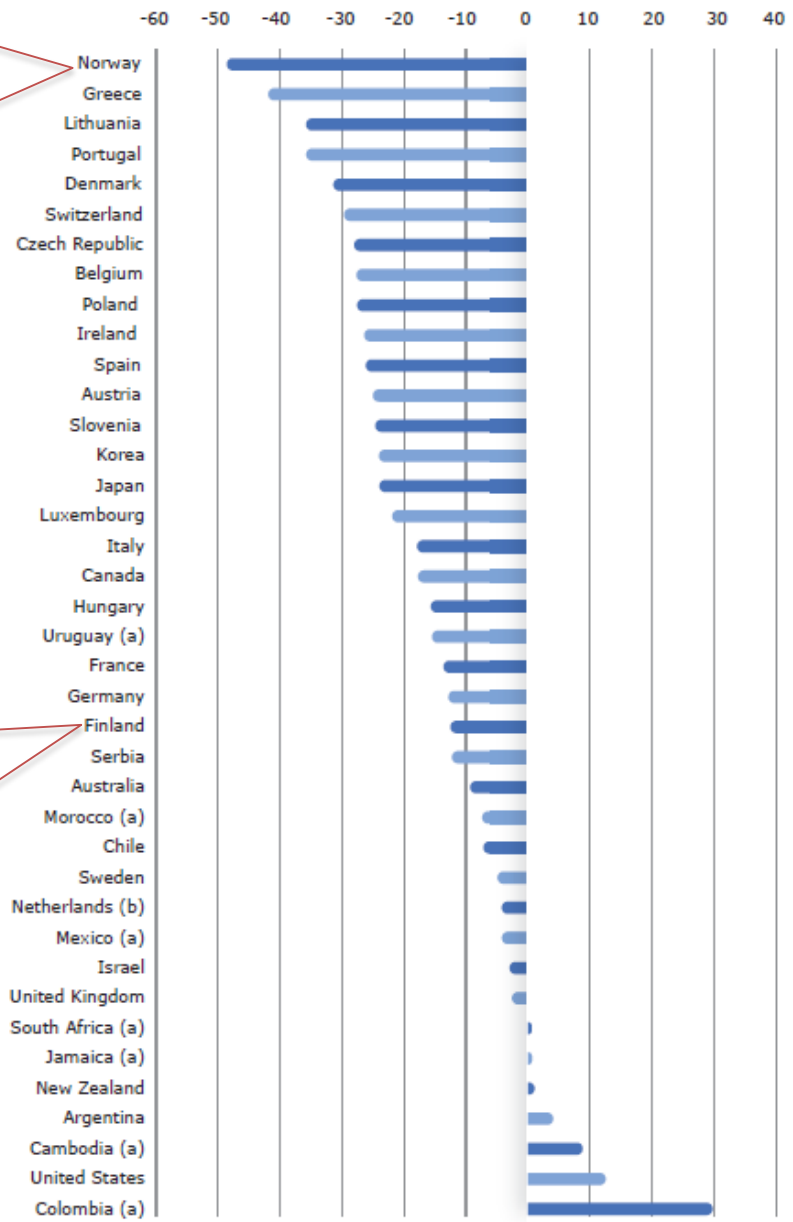
Examples of Metro efforts underway and planned to address safety

- Safe Routes to School programs and policy committee
- Regional Transportation Plan: 132 safety projects and 551 projects with a safety benefit planned
- Regional funding prioritizing safety projects: RFFA – safety is key criterion, possible regional transportation investment measure - corridors and safe and livable streets programs
- Supporting new speed setting methods at ODOT
- Aligning Metro equity actions to safety actions
- Tracking progress: Monthly deadly crash updates at TPAC, annual fact sheet, annual update to JPACT, annual reports to ODOT and FHWA on targets, and safety data on Regional Barometer

Figure 2. **Percentage change in the number of road deaths,** 2010-17

Oslo – only one fatality in 2018 and zero pedestrian and bicycle deaths

Helsinki – zero pedestrian deaths, 2019



Data for Iceland are not shown because the observations are too low to have meaningful percentage changes.
(a) Data as provided by the countries and not validated by IRTAD.
(b) Real data (actual numbers instead of reported numbers by the police).

We are not on track for Vision Zero, but it can be done!

Many cities and countries around the world are making progress

Road safety annual report 2019, International Transport Forum

Discussion – better highlighting safety in TPAC and TPAC/MTAC workshop work programs

How can we be more effective and highlight safety?

- Share thoughts with the person next to you
- Group discussion
- We'll capture your ideas and come back to you with recommendations to implement your ideas

oregonmetro.gov

Annual factsheet

February 2020

Traffic deaths and serious injuries, 2018

In 2018, 87 people were killed* in motor vehicle traffic crashes on roadways in the greater Portland region, while 497 suffered life changing injuries**.

Roadway deaths increased 1.2% and serious injuries decreased 6.7% from 2017. However, fatality rates per capita - the number of people killed and seriously injured per 100,000 people - increased in 2018. The region is not on track to meet Vision Zero goals for traffic fatalities or serious injuries.

Pedestrians killed in traffic crashes made up 40% of all traffic fatalities in 2018. The number of people killed while walking or bicycling decreased slightly, while the number of people killed in motor vehicles increased.

People walking:

Serious Injuries: **51**

Fatalities: **35**

People biking:

Serious Injuries: **27**

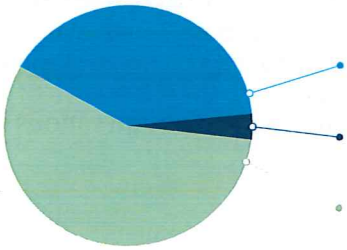
Fatalities: **3**

People in motor vehicles:

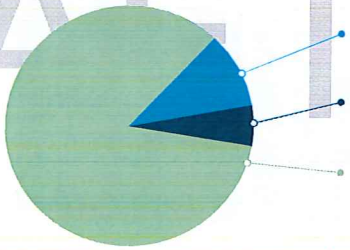
Serious Injuries: **419**

Fatalities: **49**

2018 Fatalities



2018 Serious injuries



Traffic deaths and serious injuries 2014-2018

Overall, traffic deaths have increased each year since 2014.

	People walking		People biking		People in motor vehicles		
	Serious injuries	Fatalities	Serious injuries	Fatalities	Serious injuries	Fatalities	Totals
2014	60	23	37	1	327	33	481
2015	56	26	33	2	433	38	588
2016	91	33	26	7	476	41	674
2017	67	38	25	4	434	44	612
2018	51	35	27	3	419	49	584

*Fatality - a death that occurs as a result of a motor vehicle crash, either at the scene or within 30 days as a result of the crash.

**Serious injury (also referred to as Injury A, severe injury or incapacitating injury) - an injury from a motor vehicle crash that prevents the injured person from or normally continuing the activities they were capable of performing before the crash. Examples include severed or broken limbs, skull or chest injuries, abdominal injuries, unconscious at or when taken from the crash scene, unable to leave the crash scene without assistance.

Common causes of fatal and serious injury crashes, 2018

Consistent with previous years, speed and impairment were two of the leading factors in fatal and serious injury crashes in 2018. There are typically several factors that contribute to crashes.

Alcohol & other drugs

58.6% of total **fatalities** resulted from crashes in which alcohol, marijuana, or other drugs were determined to be a contributing factor.

17.3% of total **serious injuries** resulted from crashes in which alcohol, marijuana, or other drugs were determined to be a contributing factor.

↑ 0.4% from 2017

Speed

31.0% of total **fatalities** resulted from crashes in which speed was determined to be a contributing factor.

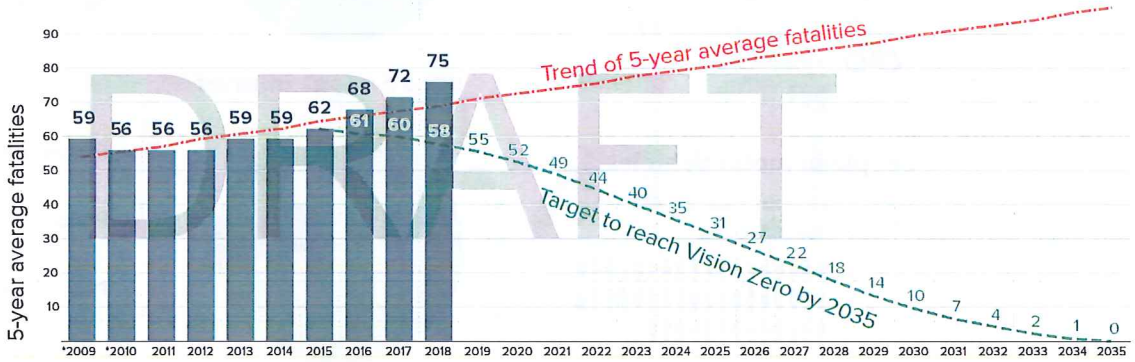
16.5% of total **serious injuries** resulted from crashes in which speed was determined to be a contributing factor.

↑ 0.6% from 2017

Average annual fatalities and serious injuries

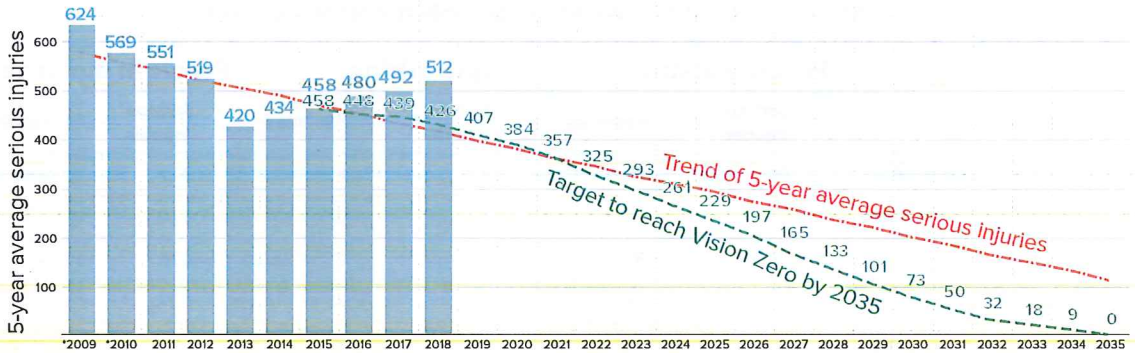
These graphs compare 5-year averages of fatalities and serious injuries to regional safety targets to help us understand if we are on track to meet our 2035 Vision Zero goals. Averages are used because of the random nature of crashes. We are not meeting our targets, though serious injuries are decreasing.

Fatalities



*2009/10 data are 3/4 year averages.

Serious injuries



*2009/10 data are 3/4 year averages.

Questions?

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Metro

Metro average annual safety targets and performance, 2014-2018

Performance Measure	5-year rolling average			Target achieved?	Better than baseline?	On track to Vision Zero?
	2011-2015 Baseline	2014-2018 Target	2014-2018 Actual			
Number of fatalities	62	58	75	NO	NO	NO
Fatalities per 100 million vehicle miles traveled	0.6	0.5	0.7	NO	NO	
Number of serious injuries	458	426	512	NO	NO	
Serious injuries per 100 million vehicle miles traveled	4.5	4.0	4.9	NO	NO	
Number of non-motorized fatalities and serious injuries	113	105	129	NO	NO	
Fatalities per 100 thousand people	4.0	3.6	4.7	NO	NO	NO
Serious injuries per 100 thousand people	29.5	26.4	31.8	NO	NO	NO
Number of motor vehicle only fatalities	38	35	41	NO	NO	NO
Motor vehicle only fatalities per 100 thousand people	2.4	2.2	2.5	NO	NO	NO
Motor vehicle only fatalities per 100 million vehicle miles traveled	0.4	0.3	0.4	NO	SAME	NO
Motor vehicle only serious injuries	369	343	417	NO	NO	NO
Motor vehicle only serious injuries per 100 thousand people	23.7	21.3	25.9	NO	NO	NO
Motor vehicle only serious injuries per 100 million vehicle miles traveled	3.6	3.3	4.0	NO	NO	NO
Number of pedestrian fatalities	22	20	31	NO	NO	NO
Pedestrian fatalities per 100 thousand people	1.4	1.3	1.9	NO	NO	NO
Pedestrian Fatalities per 100 million vehicle miles traveled	0.2	0.2	0.3	NO	NO	NO
Number of pedestrian serious injuries	56	52	65	NO	NO	NO
Pedestrian serious injuries per 100 thousand people	3.6	3.2	4.0	NO	NO	NO
Pedestrian serious injuries per 100 million vehicle miles traveled	0.5	0.5	0.6	NO	NO	NO
Number of bicycle fatalities	2.2	2.0	3.4	NO	NO	NO
Bicycle fatalities per 100 thousand people	0.14	0.13	0.21	NO	NO	NO
Bicycle fatalities per 100 million vehicle miles traveled	0.02	0.02	0.03	NO	NO	NO
Number of bicycle serious injuries	33	31	30	YES	YES	YES
Bicycle serious injuries per 100 thousand people	2.1	1.9	1.8	YES	YES	YES
Bicycle serious injuries/ 100 million vehicle miles traveled	0.3	0.3	0.3	SAME	SAME	SAME

Source: Metro, February 2020, Annual fatal and serious injury traffic crashes performance report.

Five-year rolling averages are used because of the random nature of crashes. Rolling averages smooth out short-term fluctuations in the data and highlight longer-term trends.