

Oregon Highway-Rail Top 76 Higher-Risk Grade Crossings

Oregon State Rail Plan - 2027
Appendix B | Final Technical Report | September 4, 2026

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Table of Contents

1 Oregon State Rail Plan update context 1
2 Identifying higher-risk highway-rail grade crossings 2
2.1 Locally defined higher-risk crossings 2
2.1.1 Definition of "tiers" of at-grade crossings 2
2.1.2 Tier 1 crossings 3
2.1.3 Tier 2 crossings 4
2.1.4 Tier 3 crossings 5
2.1.5 Tier 4 crossings 6
3 Evaluating higher-risk at-grade crossings 7
3.1 Higher-risk at-grade crossings 7
3.2 Crossing risk and evaluation factors 7
3.2.1 Exposure 7
3.2.2 Accident prediction 7
3.2.3 Accident severity 7
3.2.4 Benefit-cost ratio 7
3.2.5 Equity 8
3.2.6 Oil-by-rail 10
3.3 Risk factor data normalization and scoring 10
3.4 Ranking of higher-risk at-grade crossings 10
4 Priority higher-risk at-grade crossings 11
4.1 Light rail higher-risk at-grade crossings 11
4.2 Other refinements to the higher-risk crossing data 12
4.3 Top 76 higher-risk crossings 12

Figures

Figure 1. Tier 1 crossings. Multiple incidents from 2019 to 2023 3
Figure 2. Tier 2 crossings. One incident from 2021 to 2023 4
Figure 3. Tier 3 crossings. Top 76 incident-prone crossings with one incident from 2019 to 2020 5
Figure 4. Tier 4 crossings. Top 76 incident-prone crossings with no incidents from 2019 to 2023 6
Figure 5. ODOT statewide social equity ratings by block group. 9
Figure 6. Top 76 higher-risk crossings 12

Tables

Table 1. ODOT Social Equity ratings.....8
Table 2. Risk factor data normalization and scoring 10
Table 3. Higher-risk highway-light rail crossings 11
Table 4: Oregon's top 76 higher-risk highway-rail at-grade crossings 13

1 Oregon State Rail Plan update context

This report summarizes the supplemental assessment of Oregon highway-rail grade crossings and is intended for use in updating the Oregon Department of Transportation (ODOT) Safety Action Plan.

As indicated here, the process and findings of this report reflect important action strategies of the Oregon State Rail Plan update and are consistent with key goals of the Oregon Transportation Plan.

How are the report content and findings related to Oregon State Rail Plan 2027 action strategies?

- ✓ *Design transportation projects to avoid, reduce, or address potential safety concerns with at-grade or grade-separated crossings in coordination with the ODOT Policy, Data and Analysis, and Commerce and Compliance Divisions.*
- ✓ *Use public-private and public-public partnerships for system investment that benefits both private and public objectives.*

How are the report findings consistent with Oregon Transportation Plan Goals?

Safety: Enable safe travel for all people, regardless of their age, ability, race, income, or mode of transportation.

Social Equity: Improve access to safe and affordable transportation for all, recognizing the unmet mobility needs of people who have been systemically excluded and underserved. Create an equitable and transparent engagement and communications decision-making structure that builds public trust.

Sustainability & Climate Action: Minimize transportation's negative role by reducing greenhouse gas emissions for all sectors of transportation, while also reducing air toxins, noise and light pollution, water toxins, and habitat loss.

Stewardship of Public Resources: Guided by open, data-driven decision-making processes, secure sufficient and reliable revenue for transportation funding and invest public resources that achieve a resilient and sustainable multimodal transportation system.

2 Identifying higher-risk highway-rail grade crossings

The Federal Railroad Administration's guidelines for development of rail highway state action plans were used to identify higher-risk highway-rail grade crossings. ODOT's State Action Plan may be updated based on the supplemental assessment in this report, which is focused exclusively on public highway-rail grade crossings. Federal Railroad Administration's guidelines narrow the examination of these crossings using the following specific criteria:

- Crossings that have experienced more than one incident in the past five years.
- Crossings that have experienced at least one incident in last three years.
- Crossings that are "higher-risk" as defined locally.

2.1 Locally defined higher-risk crossings

This grade crossing analysis uses some locally defined criteria to help select higher-risk highway-rail grade crossings in Oregon. The rankings of higher-risk at-grade crossings were defined by the Federal Railroad Administration's 2020 accident prediction model that is based on a zero-inflated negative binomial regression, with empirical Bayes adjustment, modeling system. This model gives a predicted number of incidents expected in the next five years for each grade crossing based on the following criteria:

Total trains: Total number of trains that cross per day

AADT: annual average daily traffic (highway)

Exposure: Total trains multiplied by annual average daily traffic

Maximum timetable speed: Maximum allowed speed for trains at the crossing

Surface of crossing: Material used at the intersection of rail and roadway

Urban or rural: Crossing location in urban or rural area

Flashing lights: Does the crossing have red flashing warning lights

Gates: Does the crossing have gates

Each crossing's predicted risk is calculated, and the highest 76 crossings are incorporated into the tier system described below. The predicted risk calculation is also used later in the ranking of which crossings should be considered a priority for upgrading, which are described later in this report.

2.1.1 Definition of "tiers" of at-grade crossings

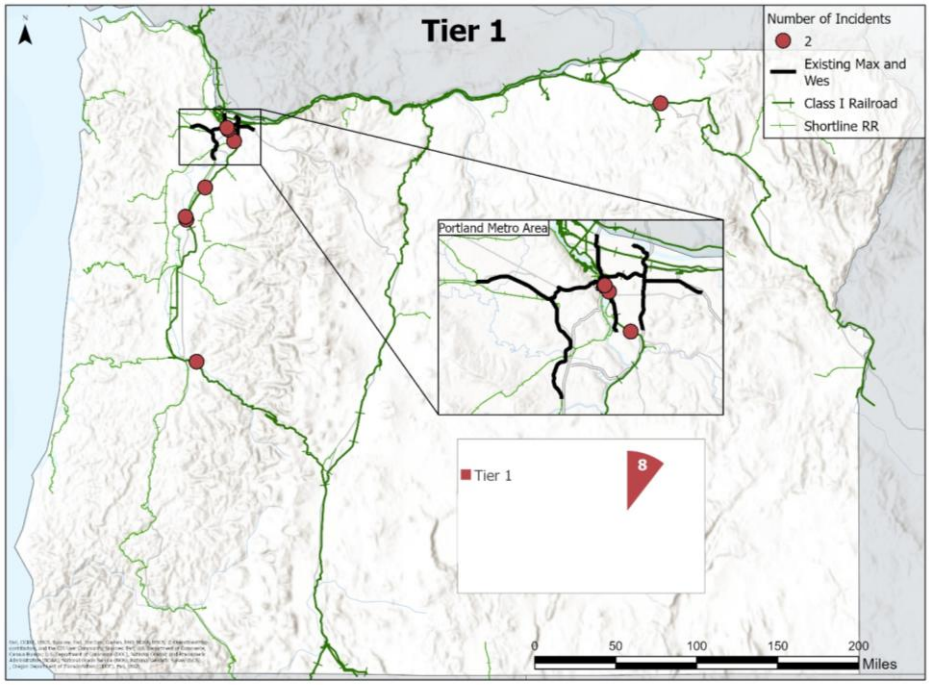
Using Federal Railroad Administration's online incident data for the five-year period from 2019 to 2023 and applying Federal Railroad Administration's three specific criteria and Oregon-defined criteria, this supplemental assessment establishes four separate tiers of at-grade crossings. These four tiers are used to help define and rank the higher-risk highway rail crossings in Oregon.

ODOT's online Rail System Atlas (link) illustrates the higher-risk rail crossings by ranking tier.

2.1.2 Tier 1 crossings

Tier 1 includes those highway- and pathway-rail at-grade crossings that experienced multiple incidents (more than one) during the five-year period from 2019 to 2023. As illustrated in **Figure** 1, there are eight crossings in the state that experienced multiple incidents during this five-year period. Several of these multi-incident crossings are located along the Union Pacific Railroad main north-south and east-west lines traversing Oregon.

Figure 1. Tier 1 crossings. Multiple incidents from 2019 to 2023

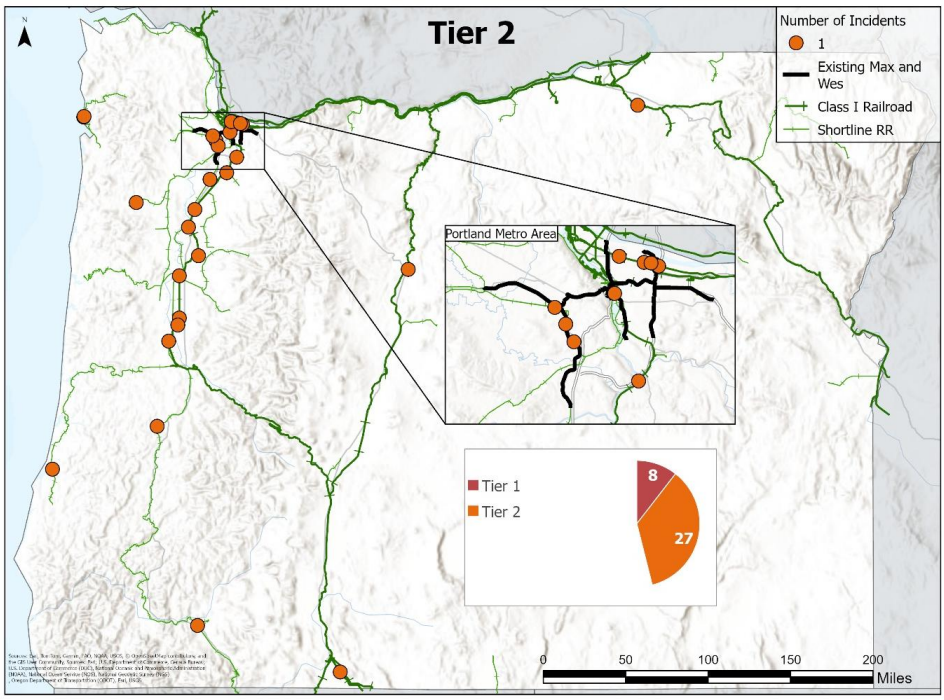


2.1.3 Tier 2 crossings

Tier 2 includes those highway- and pathway-rail at-grade crossings that experienced one incident within the three-year period of 2021 to 2023. As shown in **Figure 2**, there are 27 highway- and pathway-at-grade crossings in Oregon that experienced one incident within the three-year reporting period. Most of these single-incident crossings are located along the state's Class I rail lines and in western Oregon.

Of note, all of the grade crossings already ranked in Tiers 1 and 2 fell within the top 76 incident-prone highway-rail crossings.

Figure 2. Tier 2 crossings. One incident from 2021 to 2023

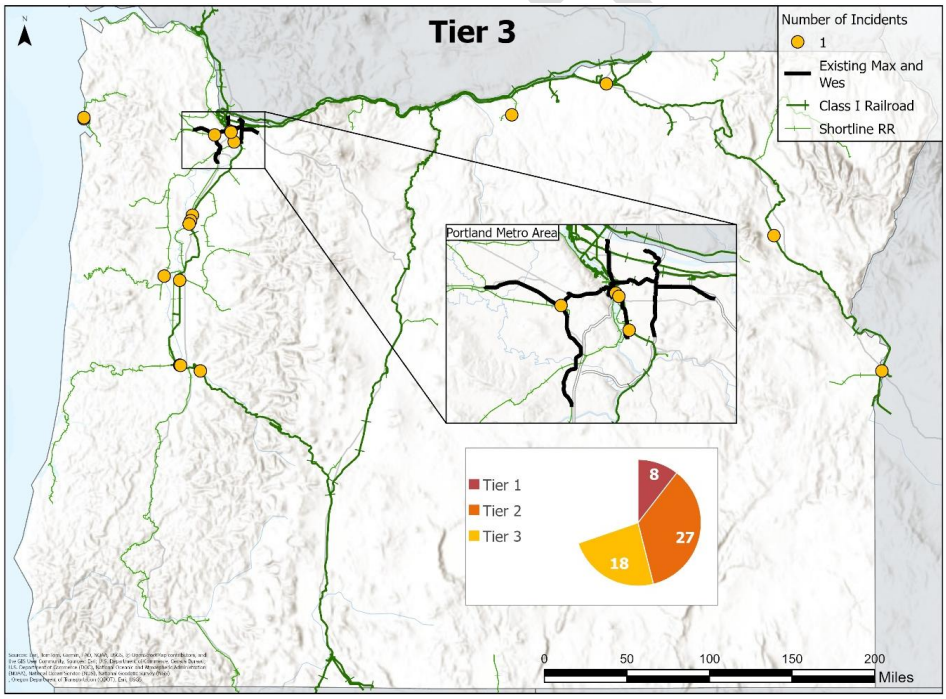


2.1.4 Tier 3 crossings

This supplemental assessment applies the Federal Railroad Administration's accident prediction model, described above, to help identify and rank incident-prone crossings. This analysis uses these crossing scores to initially rank all crossings and to help identify the top 76 incident-prone crossings for further classification in Tiers 3 and 4 below.

Tier 3 includes those highway and pathway at-grade crossings that experienced one incident within the period of 2019 to 2020 and rank within the top 76 incident-prone crossings. As shown in **Figure 3**, there are 18 crossings in Oregon that had one reported incident in 2019 or 2020 that also rank within the top 76 incident-prone crossings.

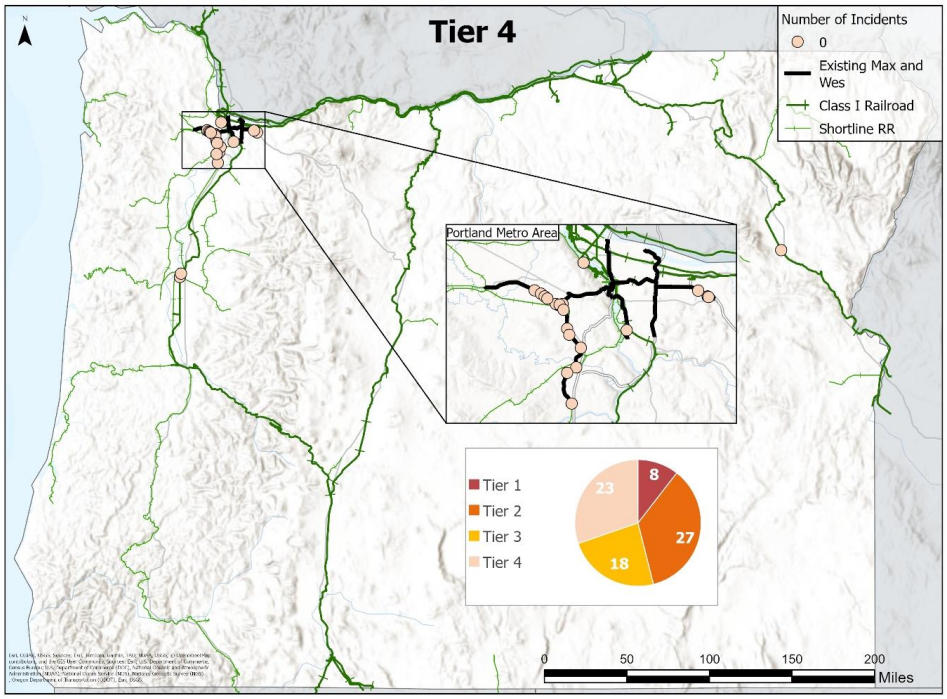
Figure 3. Tier 3 crossings. Top 76 incident-prone crossings with one incident from 2019 to 2020



2.1.5 Tier 4 crossings

The remaining top 76 incident-prone highway-rail crossings in Oregon that have not experienced an incident in the five-year period from 2019 to 2023 are included in Tier 4. **Figure 4** maps the 23 Tier 4 crossings. Most of the Tier 4 crossings are in the Portland Metro Area, as both train and vehicle traffic volumes are higher, which means a greater risk exposure for a potential incident.

Figure 4. Tier 4 crossings. Top 76 incident-prone crossings with no incidents from 2019 to 2023



3 Evaluating higher-risk at-grade crossings

3.1 Higher-risk at-grade crossings

A total of 76 at-grade crossings identified in Tiers 1-4 as higher-risk crossings in Oregon were subject to further evaluation, as described in this section.

3.2 Crossing risk and evaluation factors

This supplemental assessment applies six factors to further refine, evaluate, and score the higher-risk highway-rail at-grade crossings in Oregon. This score represents the "need" at each crossing, the overall need for improvements based on several different safety and equity factors. These six factors are Exposure, Accident prediction, Accident severity, Benefit-cost ratio, Equity, and Oil-by-rail. Each factor is defined in this section.

3.2.1 Exposure

An exposure for each at-grade crossing was calculated by multiplying the daily train count and the highway average annual daily traffic at that crossing. Train counts were obtained from the Federal Railroad Administration.

3.2.2 Accident prediction

An accident prediction score for each at-grade crossing was derived by applying the Federal Railroad Administration's accident prediction model. Inputs to the model include the five-year (2016–2020) incident history, setting (urban versus rural), maximum train timetable speed, crossing surface type, number of daily trains, highway average annual daily traffic, and crossing protection device (flashing lights and/or gates). The accident prediction regression model estimates the probability of accidents at higher-risk at-grade crossings.

3.2.3 Accident severity

Similarly, an accident severity score for each at-grade crossing was derived by applying the Federal Railroad Administration's accident severity model. Inputs to the model include the five-year incident history, setting (urban versus rural), maximum train timetable speed, number of daily trains, and crossing warning device (flashing lights and/or gates). The accident severity factor estimates the probabilities of accidents at higher-risk crossings belonging to each severity category (non-injury, injury, and fatality). This score more heavily weights at-grade crossings where fatal crashes have occurred.

3.2.4 Benefit-cost ratio

Another factor used to evaluate the higher-risk crossings in this supplemental assessment is the benefit-cost ratio.[1] The analysis included developing conceptual crossing improvements for each higher-risk crossing and then inputting the improvements' data into a specific model (Federal

[1] The benefit-cost assessment in the state action plan methodology is used exclusively in the rating and ranking of higher-risk crossings and does not imply either an assumption of final crossing operational or capital improvement plans or designs, and their more detailed economic costs or benefits.

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Railroad Administration's GradeDec model) to yield a benefit-cost ratio score. Examples of safety improvements assumed in the benefit-cost ratio analysis include:

- *Active Crossings* – adding items such as raised medians, signal interconnect, four-quadrant gates, and pedestrian gates.
- *Passive Crossings* – upgrading from a simple crossbuck sign to gates and flashing lights.

The GradeDec model estimates the safety benefit of potential highway-rail crossing safety improvements while accounting for capital investment and operational and maintenance costs. It incorporates estimates for costs associated with higher-risk rail crossing incidents and accounts for factors such as time of a stopped train, freight system and environmental impacts, and crash severity.

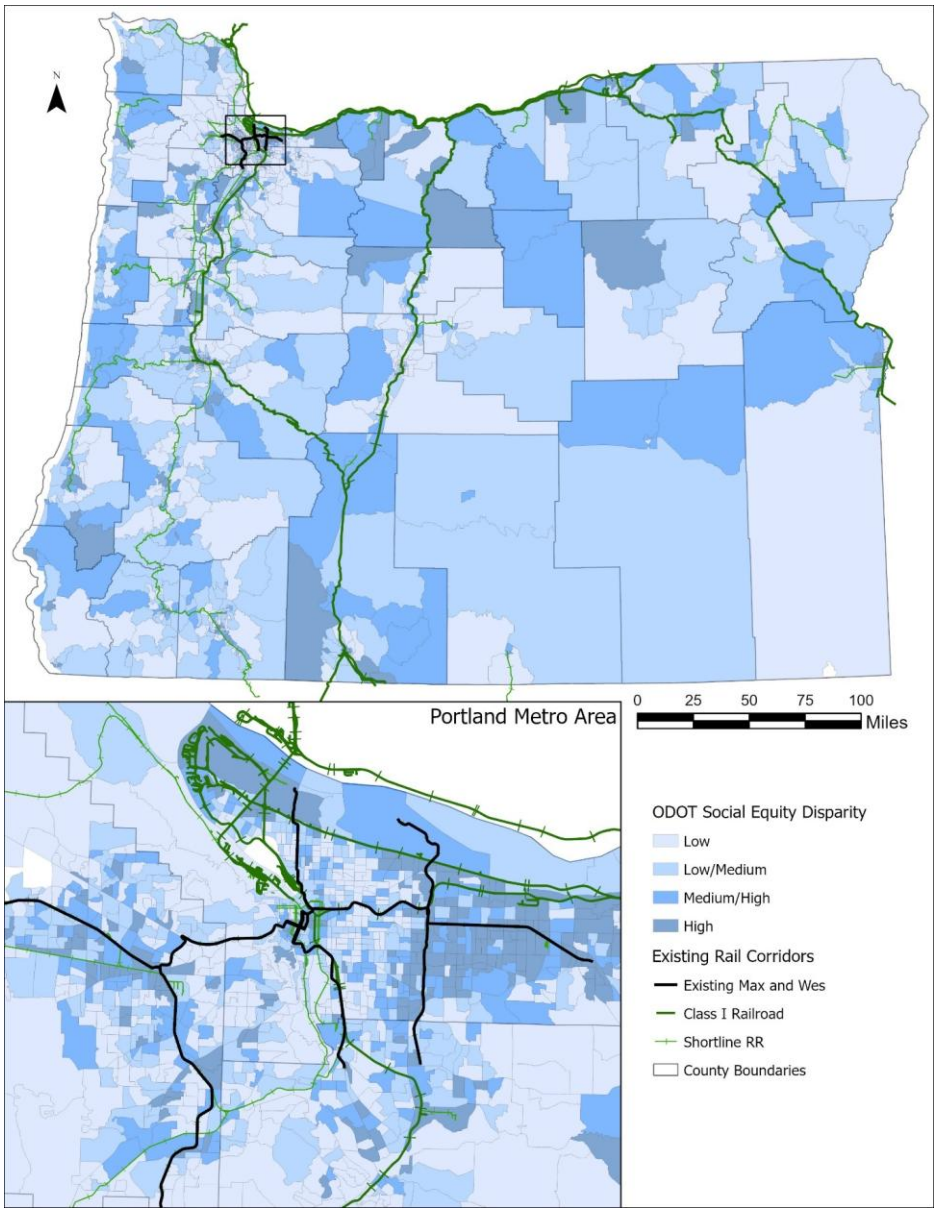
3.2.5 Equity

As part of the evaluation of higher-risk crossings, this supplemental assessment applies ODOT's Social Equity index ratings. Those block groups with the darkest shading in **Figure 5** reflect subareas of the state with the highest percentage of vulnerable populations. Each higher-risk crossing is assigned an equity score associated within its respective block group. The ODOT Social Equity ratings are listed in **Table 1** below. **Figure 5** maps the equity ratings for each block group in Oregon with reference to the active rail lines.

Table 1. ODOT Social Equity ratings

ODOT Social Equity Index Rating	Associated Score
Low disparity	1
Low/medium disparity	2
Medium/high disparity	3
High disparity	4

Figure 5. ODOT statewide social equity ratings by block group



3.2.6 Oil-by-rail

This supplemental assessment also includes an evaluation factor for higher-risk highway-rail crossings: whether the crossing was located along a Class I railroad line that regularly carries significant crude oil unit trains as cargo. The scoring for this evaluation factor is a simple binary score: each higher-risk crossing along a Class I oil-by-rail route received a score of 1, and each higher-risk highway-rail crossing that is not along such a route received a score of 0.

3.3 Risk factor data normalization and scoring

Each of the risk and evaluation factors yields a unique score for the higher-risk at-grade highway-rail crossings. The evaluation applied statistical analyses of the mean and standard deviation of each risk factor data range, and normalized and scored the data for consistency, as summarized in **Table 2** below.

Table 2. Risk factor data normalization and scoring

Standard Deviation	Risk Factor Score
Below -1 standard deviation below the mean	0
Between -1 standard deviation and the mean	1
Between the mean and +1 standard deviation	2
Between +1 and +2 standard deviations	3
Above +2 standard deviation	4

This scoring is applied to all risk factors except for equity and oil-by-rail, as noted above.

3.4 Ranking of higher-risk at-grade crossings

Once normalized, the highest possible total score for higher-risk at-grade crossings is 21. Total scores for all higher-risk crossings are tabulated and sorted from highest to lowest scores. The highest at-grade crossing score is 12, and the lowest is 5, which resulted in a number of ties in the overall ranking.

4 Priority higher-risk at-grade crossings

4.1 Light rail higher-risk at-grade crossings

Thirteen of the 76 higher-risk crossings that this supplemental evaluation initially identified statewide are light rail crossings along TriMet's MAX routes. Many of these crossings have already received enhanced pedestrian safety measures including railing channelized sidewalks (C), 90 degree crossing orientation (O), additional signage and/or warning lights (S), and Truncated Dome Americans with Disability Act tactile warning pads (T). **Table 3** shows the rank and enhanced pedestrian safety measures per TriMet crossing.

Table 3. Higher-risk highway-light rail crossings

Crossing ID	City	Highway	Incident (2019-2023)	Rank	Enhanced Ped Safety Measures
759735H	Portland	SE 12th Avenue	Pedestrian Killed, Vehicle Property Damage Only	1	OST
980055R	Gresham	NW Eastman Parkway	None	1	COST[†]
980053C	Gresham	NW Division Street	None	1	COST
980058L	Gresham	NW Eleven Mile Avenue	None	1	COST[†]
980084B	Hillsboro	SW 185th Avenue	None	19	COST
980079E	Beaverton	SW Cedar Hills Boulevard	None	19	COST[†]
980075C	Beaverton	SW 117th Avenue	None	19	OS[†]
759730Y	Portland	SE 8th Avenue	Vehicle PDO	34	COST
980085H	Beaverton	SW 170th Avenue	None	34	COST
980080Y	Beaverton	SW Hocken Avenue	None	34	COST
980077R	Beaverton	SW Hall Boulevard	None	34	OS
980073N	Beaverton	SW Merlo Road	None	45	COST
980083U	Beaverton	SW 153rd Drive	None	45	CST[†]

[†] *Only on one side of the crossing*

Metro Council has also identified a future project at 185th Avenue in Beaverton (Crossing ID 980084B) as a fully grade-separated crossing.

4.2 Other refinements to the higher-risk crossing data

The Federal Railroad Administration crossing database is missing average annual daily traffic and daily train count data for a limited number of the higher-risk crossings identified in Section 2. The SAP supplemental assessment includes ODOT data sources to supplement AADT and train counts for these crossings, from which the exposure score is recalculated.

4.3 Top 76 higher-risk crossings

Figure 6 maps and **Table 4** lists the Top 76 higher-risk crossings in this supplemental assessment. The majority of these are located in the Portland Metro area and the Willamette Valley.

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Figure 6. Top 76 higher-risk crossings

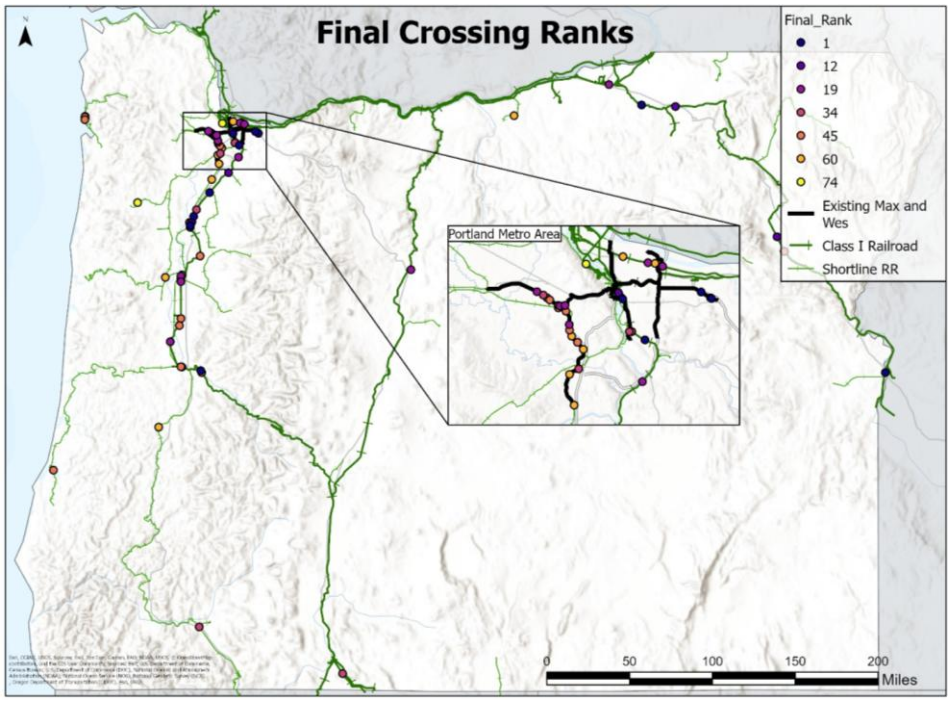


Table 4: Oregon's top 76 higher-risk highway-rail at-grade crossings

			Normalized Scores							
Crossing ID	**City**	**Street**	**Exposure Score**	**Incident Prediction**	**Fatality Probability**	**Benefit-Cost Ratio**	**Equity Rating**	**Oil-by-Rail**	**Total Score**	**Final Rank**
759763L	Milwaukie	SE Harmony Rd	1	4	3	1	2	1	12	1
759735H	Portland	SE 12th Ave	1	4	3	1	2	1	12	1
759671Y	Salem	Court St NE	1	4	2	1	3	1	12	1
756636A	Springfield	Mt Vernon Rd	1	4	2	1	3	1	12	1
759613D	Woodburn	Cleveland St	1	4	2	1	3	1	12	1
819436T	Ontario	5th Ave	1	2	3	1	4	1	12	1
759643V	Salem	Blossom Dr	1	2	3	1	4	1	12	1
809083F	Echo	Cunningham Rd	1	2	2	4	2	1	12	1
980055R	Gresham	Eastman Pkwy	4	0	3	1	4	0	12	1
980053C	Gresham	Division St	4	0	3	1	4	0	12	1
980058L	Gresham	Eleven Mile Rd	4	0	3	1	4	0	12	1
809011C	Pendleton	SW Frazer Ave	1	4	2	1	2	1	11	12
754552X	Portland	SE Salmon St	1	4	1	1	3	1	11	12
759652U	Salem	Silverton Rd NE	1	2	2	1	4	1	11	12
759669X	Salem	Center St NE	1	2	2	1	4	1	11	12
760042H	Canby	Ivy St	1	2	3	1	3	1	11	12
809451T	Haines	Pole Line Rd	1	2	2	4	1	1	11	12
760051G	Salem	Hines St	1	2	2	1	4	1	11	12
067023U	Salem	Norway St	1	4	0	4	1	0	10	19
749205R	Beaverton	Hall Blvd	2	2	2	1	3	0	10	19
760017A	Oregon City	Singer Hill Rd	1	2	2	1	3	1	10	19
759797F	Junction City	First Ave	1	2	3	1	2	1	10	19
759683T	Albany	Queen Ave	1	2	2	1	3	1	10	19

			Normalized Scores							
Crossing ID	**City**	**Street**	**Exposure Score**	**Incident Prediction**	**Fatality Probability**	**Benefit-Cost Ratio**	**Equity Rating**	**Oil-by-Rail**	**Total Score**	**Final Rank**
754559V	Portland	SE Clay St	1	2	2	1	3	1	10	19
066727A	Madras	Cherry Ln	1	2	1	4	1	1	10	19
807676R	Hermiston	Westland Rd	1	2	3	1	2	1	10	19
759689J	Albany	Ellingson Rd	1	2	2	1	3	1	10	19
808435F	Portland	NE Cully Blvd	1	2	2	1	3	1	10	19
808340X	Portland	NE 105th Ave	1	2	2	1	3	1	10	19
754558N	Portland	Hawthorne Blvd	1	2	2	1	3	1	10	19
980084B	Hillsboro	SW 185th Ave	4	0	3	1	2	0	10	19
980079E	Beaverton	SW Cedar Hills Blvd	3	0	2	1	4	0	10	19
980075C	Beaverton	SW 117th Ave	2	0	3	1	4	0	10	19
759756B	Milwaukie	SE Harrison St	1	2	3	1	1	1	9	34
759730Y	Portland	SE 8th Ave	1	2	2	1	2	1	9	34
759636K	Brooks	Quinaby Rd	1	2	2	1	2	1	9	34
756053N	Central Point	Willow Springs Rd	1	2	1	4	1	0	9	34
749044X	Klamath Falls	Matney Rd	1	2	1	3	2	0	9	34
980085H	Hillsboro	SW 170th Ave	3	0	2	1	3	0	9	34
101884N	Tualatin	Tualatin-Sherwood Rd	3	0	2	1	3	0	9	34
980080Y	Beaverton	SW Hocken Ave	2	0	2	1	4	0	9	34
980077R	Beaverton	SW Hall/Watson Blvd	2	0	2	1	4	0	9	34
749166C	Milwaukie	Harrison St	2	0	3	1	3	0	9	34
759688C	Albany	34th Ave	1	0	3	1	3	1	9	34
058285C	Tigard	SW Hall Blvd	2	2	2	1	1	0	8	45
927296P	Beaverton	SW Millikan Wy	1	2	0	1	4	0	8	45

			Normalized Scores							
Crossing ID	City	Street	Exposure Score	Incident Prediction	Fatality Probability	Benefit-Cost Ratio	Equity Rating	Oil-by-Rail	Total Score	Final Rank
759727R	Halsey	Lake Creek Dr	1	2	2	1	1	1	8	45
766262Y	Springfield	Smith Rd	1	2	2	1	1	1	8	45
760075V	Marion	Marion Hill Rd	1	2	2	1	1	1	8	45
759783X	Harrisburg	Bond Butte Rd	1	2	2	1	1	1	8	45
756156N	North Bend	Virginia St	1	2	0	1	4	0	8	45
756536V	Eugene	Van Buren St	1	2	0	1	3	1	8	45
749545C	Rockaway	S 6th Ave	1	2	0	3	2	0	8	45
749536D	Rockaway	Watseco Ave	1	2	0	3	2	0	8	45
749204J	Tigard	Scholls Ferry Rd	2	0	2	1	3	0	8	45
845116L	Baker City	Broadway Ave	1	0	2	2	3	0	8	45
980073N	Hillsboro	SW Merlo Rd	2	0	2	1	3	0	8	45
753587V	Beaverton	SW Fifth St	1	0	2	1	4	0	8	45
980083U	Beavercreek	SW 153rd Dr	2	0	2	1	3	0	8	45
753926X	Corvallis	Elliott Cir S	1	2	1	1	2	0	7	60
749316H	Beaverton	SW Hocken Ave	1	2	0	1	3	0	7	60
058336K	Donald	Donald Rd	1	2	1	1	2	0	7	60
808428V	Portland	NE 11th Ave	1	2	1	1	1	1	7	60
759547T	Drain	Laurel Hills Rd	1	2	1	2	1	0	7	60
808339D	Portland	NE 87th Ave	1	2	0	1	3	0	7	60
756540K	Eugene	Washington St	1	2	0	1	2	1	7	60
906450C	Arlington	Cedar Sprgs Rd	1	2	1	1	2	0	7	60
749548X	Rockaway	S 4th St	1	2	0	2	2	0	7	60
759682L	Albany	Jackson St	1	0	1	2	3	0	7	60
058286J	Tigard	Bonita Rd	2	0	3	1	1	0	7	60
058311P	Wilsonville	Boeckman Rd	2	0	3	1	1	0	7	60
749202V	Tigard	SW Tiedeman Ave	1	0	2	1	3	0	7	60

			Normalized Scores							
Crossing ID	**City**	**Street**	**Exposure Score**	**Incident Prediction**	**Fatality Probability**	**Benefit-Cost Ratio**	**Equity Rating**	**Oil-by-Rail**	**Total Score**	**Final Rank**
058301J	Tualatin	SW Avery St	1	0	3	1	2	0	7	60
754061Y	Willamina	Bridge St	1	2	0	1	2	0	6	74
749541A	Rockaway	Pansy St	1	2	0	1	2	0	6	74
092360A	Portland	NW Balboa Ave	1	0	1	2	1	1	6	74



Early highway-rail grade active warning device.