Evaluation Methodology Appendix

Updated: January 27, 2026

The Vision Zero team at the Portland Bureau of Transportation regularly releases evaluations of significant projects on the High Crash Network. This appendix provides information on the methodology used for evaluating crashes, speed, vehicle travel time, and active transportation improvements.

If you have any follow up questions, please reach out to visionzero@portlandoregon.gov.

Crashes

Crashes considered for reporting

PBOT's crash analysis uses the crash dataset provided by the Oregon Department of Transportation (ODOT). Using this dataset allows for consistent reporting from year to year. However, this dataset has a number of conditions and limitations.

ODOT uses the National Highway Traffic Safety Administration reporting criteria, which excludes people who die under the following circumstances:

- More than 30 days after a crash
- Intentionally (suicide)
- In an act of homicide (a person intentionally crashes into another person)
- In a crash not involving a motor vehicle (e.g., a MAX train and a pedestrian)
- From a prior medical event (e.g., a heart attack or drug overdose)
- In a crash on private property (e.g., in a parking lot)

ODOT compiles the official crash record for the state using self-reported information and traffic crash investigations. Although exact figures are not available, PBOT is aware that some crashes are not reported to ODOT and therefore do not make it into the crash dataset.

PBOT staff exclude crash data from the construction year(s) of a project to maintain consistency and to avoid the impacts of construction and the first few months after construction when people are adjusting to changes. Staff calculate the annual crash rate for the construction period and compare it with the before and after period. If the construction period crash rate is more than double the before crash rate and after crash rate for the key crash categories described below, staff may shift the analysis window to include non-construction months from the construction year(s) to incorporate key crashes that would more accurately inform trends.

Crash reporting schedule

ODOT releases crash data for an entire calendar year in the spring or summer approximately one-a-half years after the year ends (ex. 2023 data was available in the spring of 2025). Staff can establish crash trends with greater confidence only once there are multiple years of post-project data, especially when evaluating certain crash categories. Given the data availability schedule, PBOT intends release evaluations on the following schedule:

Years after project completion	Crash data available
1 year	Operations report, no crash data
3 years	1-year post-project crash data update
5 years	3-year post-project crash data update
7 years	5-year post-project crash data update

More than 7 years	Further updates if needed as described below

Crash categories

The crash evaluations typically focus on five crash categories:

- Deadly and serious injury crashes: These are the crashes that cause the most bodily harm, and are the target of Vision Zero's goal to eliminate deadly and serious injury crashes.
- Pedestrian and bicycle crashes: Pedestrians and people biking are some of the most vulnerable street users, and certain focused changes to street design can make big differences in improving safety for pedestrians and people biking. These crashes may also be counted in the deadly and serious injury crashes category if a pedestrian or person biking was killed or seriously injured.
- Vision Zero focus crashes: Includes all crashes where a pedestrian or person biking was hit, and any crash where anyone is killed or seriously injured. These are the crashes the Vision Zero team focuses on for project prioritization development.
- All crashes: Crashes are always unpleasant and are harmful even if they only cause minor injuries. They can also be an indicator of how infrastructure changes are performing.

Most evaluations will report on these five crash categories. However, staff may choose to exclude a category or include a different crash category depending on project context.

Data limitations and comparisons

We are fortunate, from a safety perspective, that many corridors only have a few deadly or serious injury, pedestrian, or bicycle crashes in a several-year period. However, this makes reliable comparison difficult. Nevertheless, PBOT wants to present crash data early and often to offer transparency about what is happening on the street after a project is complete.

Regardless of data availability, staff will include a descriptive crash analysis that will include the number of crashes before and after the project and a short description of Vision Zero focus crashes that have happened in the project area since the project was completed.

PBOT staff will analyze pre-project data to determine how many years are needed to achieve a minimum five total crash threshold for each of the crash categories. Staff always include a minimum of five years of pre-project data. If one or more crash categories does not meet the five crash threshold within five years, staff look at seven years and if necessary ten years of pre-project data to achieve that threshold. Staff use a maximum of ten-years of pre-project data. Once staff establish how many years of pre-project crash data are needed, the pre-project crash data will be used for all crash categories in every report update.

Staff use pre-project data to determine how many years of post-project data are needed to provide a comparative analysis. First staff calculate the annual crash rate for each category using the pre-project data. The number of years of post-project data is equal to the minimum necessary to forecast at least five total crashes based on the annual crash rate if there were no change.

Years of post-project	**Minimum pre-project crash rate**
1 year	5 crashes per year (5/1)
3 years	1.67 crashes per year (5/3)
5 years	1 crash per year (5/5)
7 years	0.72 crashes per year (5/7)
10 years	0.5 crashes per year (5/10)

If the pre-project crash rate is less than 0.5 crashes per year, staff will not include a comparative analysis for that crash category. Industry best practice often includes five years of post-project data in the analysis, therefore staff may choose to include a comparative analysis with five years of post-project data even if the minimum crash rate threshold is not met.

Even if there is sufficient data to include a comparative analysis for the All Crashes or Vision Zero Focus Crashes category, staff will not include that analysis until there is sufficient data for a comparative analysis for at least one of the Deadly and Serious Injury, Pedestrian, or Bicycle Crashes categories.

Data normalization

There are many factors that influence crash trends including vehicle safety features, driving and walking culture, the Covid-19 pandemic, distraction, changes to crash reporting method, etc. To account for the impact of these crash trends, PBOT staff normalize project area crash changes using crash trends citywide and in council districts.

The crash coefficient is calculated as the number of annual crashes in the post-project period divided by the number of annual crashes in the pre-project time period. Staff calculate the citywide crash coefficient for each category. Staff then calculate the district-wide crash coefficient for each category. The two coefficients are averaged to achieve the normalization coefficient for each crash category. If a project spans multiple council districts, the crash coefficient is calculated for each district and those values are averaged for the district-wide coefficient. If a project is multiple districts but more prominently in one district, staff may choose to apply different weights to the district coefficient values. For example, if a project spans roughly three miles in district 1 and one mile in district 2, the normalization coefficient = (citywide coefficient + 0.75*District 1 coefficient + 0.25 District 2 coefficient)/2

The normalization coefficient is used to calculate the presumed result in a no-change scenario and is contrasted with the observed result, similar to a difference in difference calculation. To achieve this the project area pre-project crashes are multiplied by the normalization coefficient before calculating the normalized project coefficient, then represented as positive or negative percentage changes:

$$\text{normalized project crash change} = \frac{\text{Post-project crashes}}{\text{Pre-project crashes} * \text{normalization coefficient}} - 1$$

Speed

Staff begin by aggregating existing speed and volume counts on the corridor being evaluated. Staff initially include all counts collected as early as five years prior to the project construction start. Counts are then excluded if they meet any of the following criteria:

- A given location does not have a matching pre-project and post-project count.
- Counts conducted during construction, during snow or ice events, or at other times when results may be unreliable.
- Counts conducted in the summer when school is not in session are excluded if there are other usable counts at that location.
- If there was a change in the street conditions before project construction began, for example, a speed limit reduction, counts conducted before the change are excluded as long as more recent counts are available.
- If there are more than three pre-project counts at the same location, only the three most recent counts are included.

If there are multiple counts at the same location pre-project or post-project, their values are averaged for the results used for the report.

Staff report on three measures:

- Median speed (50th percentile): Half of drivers travel faster than this speed, and half travel slower.
- Prevailing speed (85th percentile): 85% of drivers travel at or below this speed. It is a standard engineering measure.
- Top-end speeders: Drivers traveling more than 10 mph over the speed limit. If the speed limit is changed between before and after counts, top-end speeders includes people driving more than 10 mph over the new speed limit.

Staff may report on the change in the percent of drivers that are top-end speeding, the total number of drivers that are top-end speeding, or both, based on project context.

When a project includes a speed limit change between the pre-project and post-project data collection periods, top-end speeding is calculated as drivers traveling faster than a fixed speed equal to ten mph over the new lower speed limit.

Vehicle travel time

PBOT uses travel time data from the Regional Integrated Transportation Information System which is managed by ODOT. The travel time data is collected and aggregated by INRIX.

Travel time data is available for predefined segments. Staff select the segments that best correspond to the project extents. When evaluation conditions allow, staff analyze travel time data in a three-month period before and after project construction. The three-month period is generally in the fall or in the spring to avoid winter weather, winter holiday changes to travel patterns, and to coincide with when school is in session.

Staff download averaged probe data at 15-minute increments for the time periods on weekdays only. Staff then calculate the mean, median, and 90th percentile value for each 15-minute increment over the three-month period. Those values are used for the graphs in the report. The data is also aggregated into common commute peaks, shown below. If staff notice a specific peak outside of the established peak periods, they may analyze the change for those specific peaks as well.

Period	Hours
All hours	-
AM peak	7 AM to 9 AM
PM peak (concentrated)	4 PM to 6 PM
PM peak (broad)	3 PM to 7 PM

INRIX data has a few significant limitations. Data is only collected from connected vehicles. PBOT does not know exactly what the rate of connected vehicles is citywide or for a specific project extent, but it is estimated to be between 1%-3%. For high volume streets that should not impact travel time metrics too greatly, but could still have some effect, especially during low volume hours and on the 90th percentile results. INRIX provides two measures to determine the accuracy of the data provided.

The confidence score offers a number between 10 to 30 indicating to what extent the value shared is reflective of real time data. INRIX describes the values:

30 – Real Time Data: Any segment that has adequate data, at any time of day, will report real time data.

20 – Historical Average: Between 4 a.m. and 10 p.m., any segment without sufficient real time data will show the historical average for that segment during that daytime period (15 minute granularity).

10 – Reference Speed: From 10 p.m. to 4 a.m., any segment without sufficient real time data will show the reference speed for that segment, any segment that does not have calculated historical averages will show the reference speed 24 hours a data if there is not sufficient real time data.

The C-Value indicates the probability that the current probe reading represents the actual roadway conditions based on recent and historical trends. This value is only used when the confidence score is 30. (0 = low probability, 100 = high probability).

PBOT staff balance having high quality data and sufficient data to produce reliable and legible results. Different projects may have a different minimum confidence score or C-Value. Staff may use more stringent values for statistical analysis than for producing graphs, since outliers can make the graphs very difficult to read.

Active transportation improvements

Crossing spacing

PedPDX, Portland's citywide pedestrian plan, recommends marked pedestrian crossings every 530 feet inside pedestrian districts, and every 800 feet outside of pedestrian districts on Major City Walkways.

These guidelines represent an ideal outcome against which we can measure, but even PedPDX states that "the exact location of marked crossings should be context-driven, and will be determined based on pedestrian crossing demand, specific land use generators, sight distance needs, proximity to traffic signals, existing pedestrian crossings, and engineering judgment."

Crossing gaps can be identified by finding segments between crossings that do not meet guidelines, as shown on PBOT's PedPDX online map. This method is effective for quickly establishing where gaps exist. At the corridor level, it can miss improvements that do not quite meet the guideline. For example, if there were two crossings with 2,000 feet between them and a project added one crossing in the middle, the PedPDX analysis would still show all 2,000 feet as not meeting the crossing spacing guideline.

An alternative method is to interpret the crossing spacing guidelines as indicating the maximum desired distance from a crossing. A crossing every 530 feet means a crossing is never more than 265 feet away. A crossing every 800 feet means a crossing is never more than 400 feet away. For this method, a buffer is drawn around each crossing and staff measure the portion of the street that falls inside or outside of that buffer.

The evaluation reports will generally include the percentage of the project area that met PedPDX guidelines before and after the project, and the percentage of the project area that is within the desired distance of a crossing before and after the project.

Transit access guidelines

PedPDX, Portland's citywide pedestrian plan, recommends that all transit stops have a crossing within 100 feet. In some cases, bus stops are more than 100 feet from a crossing because of street design or operational constrains. To address these limitations, PBOT staff also analyzed which bus stops are within 200 feet of a crossing, which does not strictly meet spacing guidelines, but indicates crossing proximity.

Bicycle infrastructure

PBOT uses the National Association for City and Transportation Officials (NACTO) Contextual Guidance for Selecting All Ages & Abilities Bikeways to evaluate whether a bike facility is designed to accommodate all ages an abilities. This guidance can be found in the Portland Protected Bicycle Lane Planning and Design Guide and in the NACTO Designing for All Ages & Abilities guide.

In early 2025, NACTO released a new Urban Bikeway Design Guide. The new guide has a new table providing guidance on all ages and abilities bikeways, although the guidance is largely the same. At the time of writing this methodology appendix, the new table is not available online. Below is the table providing guidance from the Designing for All Ages & Abilities guide.

Contextual Guidance for Selecting All Ages & Abilities Bikeways

Roadway Context				
Target Motor Vehicle Speed*	**Target Max. Motor Vehicle Volume (ADT)**	**Motor Vehicle Lanes**	**Key Operational Considerations**	**All Ages & Abilities Bicycle Facility**
Any		*Any*	*Any of the following:* high curbside activity, frequent buses, motor vehicle congestion, or turning conflicts‡	**Protected Bicycle Lane**
< 10 mph	Less relevant	No centerline, or single lane one-way	Pedestrians share the roadway	**Shared Street**
≤ 20 mph	≤ 1,000 – 2,000		< 50 motor vehicles per hour in the peak direction at peak hour	**Bicycle Boulevard**
≤ 25 mph	≤ 500 – 1,500			
	≤ 1,500 – 3,000	Single lane each direction, or single lane one-way	Low curbside activity, or low congestion pressure	**Conventional or Buffered Bicycle Lane, or Protected Bicycle Lane**
	≤ 3,000 – 6,000			**Buffered or Protected Bicycle Lane**
	Greater than 6,000			**Protected Bicycle Lane**
	Any	Multiple lanes per direction		
Greater than 26 mph†	≤ 6,000	Single lane each direction	Low curbside activity, or low congestion pressure	**Protected Bicycle Lane, or Reduce Speed**
		Multiple lanes per direction		**Protected Bicycle Lane, or Reduce to Single Lane & Reduce Speed**
	Greater than 6,000	*Any*	*Any*	**Protected Bicycle Lane, or Bicycle Path**
High-speed limited access roadways, natural corridors, or geographic edge conditions with limited conflicts		*Any*	High pedestrian volume	**Bike Path with Separate Walkway or Protected Bicycle Lane**
			Low pedestrian volume	**Shared-Use Path or Protected Bicycle Lane**

* While posted or 85th percentile motor vehicle speed are commonly used design speed targets, 95th percentile speed captures high-end speeding, which causes greater stress to bicyclists and more frequent passing events. Setting target speed based on this threshold results in a higher level of bicycling comfort for the full range of riders.

† Setting 25 mph as a motor vehicle speed threshold for providing protected bikeways is consistent with many cities' traffic safety and Vision Zero policies. However, some cities use a 30 mph posted speed as a threshold for protected bikeways, consistent with providing Level of Traffic Stress level 2 (LTS 2) that can effectively reduce stress and accommodate more types of riders.[18]

‡ Operational factors that lead to bikeway conflicts are reasons to provide protected bike lanes regardless of motor vehicle speed and volume.

The City of Portland is committed to equity and meaningful access, and prohibits discrimination on the basis of race, color, national origin, Limited English Proficiency, disability, age, sex, religion, income level, sexual orientation, gender identity, familial status or other protected class as provided by Title VI of the Civil Rights Act, Title II of the Americans with Disabilities Act, and related authorities. To request translation, interpretation, accommodations, modifications, or other auxiliary aids or services, or to file a complaint of discrimination, contact 503-823-4000 (311) or Relay Service & TTY: 711.