



Evaluation Report  
Left turn calming pilot project  
City of Portland  
2020

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## Summary: Results suggest turn calming enhances safety

Left turn calming is an experimental street design intended to make intersections safer. The Portland Bureau of Transportation piloted this tool in 2019-20 to understand its impacts and to inform future use.

Left turn calming uses a combination of small, prefabricated rubber bumps (referred to simply as “bumps” in this report), delineator posts (“delineators”), and/or thermoplastic striping at signalized intersections to help prevent turning drivers from colliding with other road users, especially pedestrians (see Figure 1 at right).

The pilot project had two main goals: (1) recommend whether PBOT should continue using left turn calming, and (2) provide guidance on how any future left turn calming installations should be installed and maintained.

To achieve these goals, PBOT installed left turn calming at 42 intersections. Staff collected pre- and post-treatment data on driver turning speeds and corner cutting incidents, tracked costs associated with installation and maintenance, and gathered input from planners, engineers, Maintenance & Operations staff, and the public.

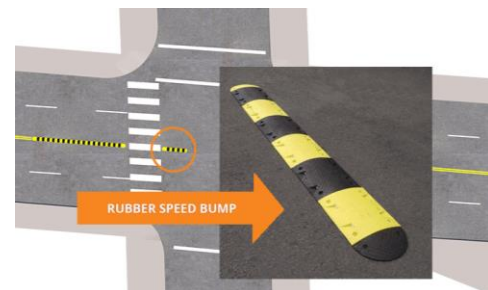
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### Key findings

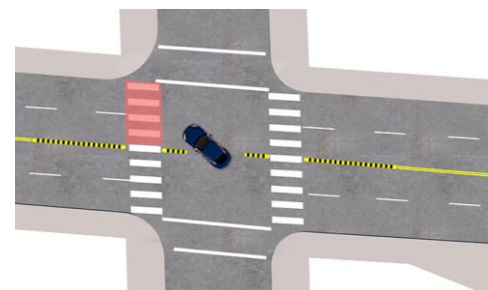
- Left turn calming consistently reduces turning speeds by modest but potentially significant amounts (median speed reduction of 13 percent, from an average median speed of 14.0 to 12.1 mph, across all locations with hardened centerlines).
- Hardened centerlines that include a “nose” that extends into the intersection are approximately 50 percent more effective at slowing speeds relative to centerlines without a nose (median speed reductions of 16 percent with noses compared to 10 percent without noses, see Figure 2).
- All left turn calming treatments nearly eliminate sharp turns in which drivers cross the centerline (reductions ranging from 82 to 100 percent, see Figure 3).



1. Left-turning drivers pose a high risk to people in crosswalks.



2. Bumps “harden” the centerline on both sides of a crosswalk.



3. Left-turning drivers turn more slowly and at an angle that more directly faces the crosswalk, reducing crash risk.

Figure 1. Basics of left turn calming

- Hardened centerlines using bumps are about equally effective at slowing turning speeds as hardened centerlines with delineators (12 percent average reduction in median speeds with bumps compared to 13 percent reduction with delineators).
- Installation and maintenance costs are lower for hardened centerlines that use bumps relative to those that use delineators (\$820 and \$1,298 per leg, respectively). The longer-term durability of the bumps, including during inclement weather that requires snow plowing, is unknown.

Complete results are available on [page 16](#) of this report.

**Turning speed before and after turn calming, by design type**

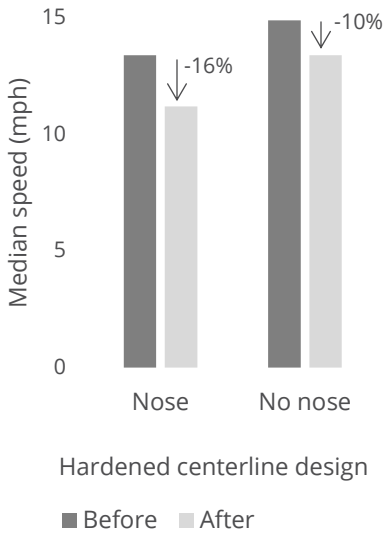


Figure 2. Left turn calming with “noses” extending into the intersection are about 50 percent more effective at slowing speeds.

**Proportion of drivers crossing centerline before and after turn calming, by material and design**

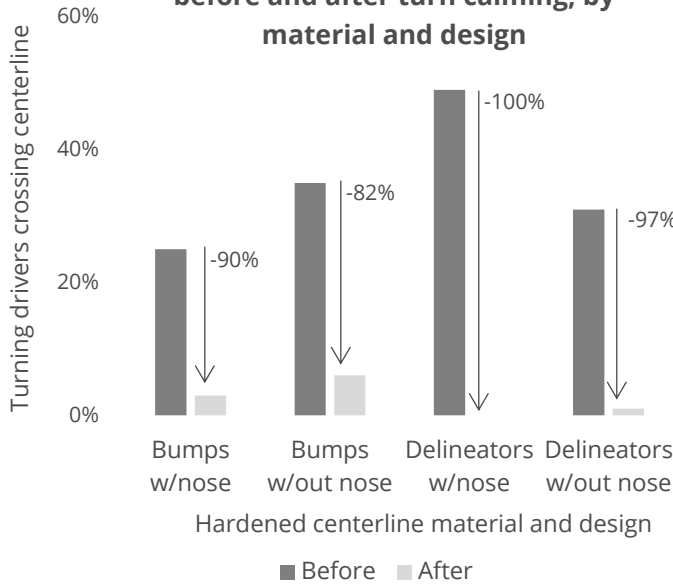


Figure 3. Hardened centerlines of all types nearly eliminate sharp turns.

### Recommendations

- 1. Expand left turn calming where permissive turns present risks to pedestrians.** Evaluation data suggest that the design may help prevent crashes and lessen their severity when they occur.
- 2. Consider using bumps instead of delineators.** Based on limited data, bumps were nearly as effective as delineators and less expensive to install and maintain.
- 3. Create guidelines for PBOT planners, project managers, engineers, and maintenance staff.** Like any tool, left turn calming is a better fit for some intersections than for others. The treatment appears to have the greatest impact on turning speeds

where a bump can be placed into an intersection (the “nose” portion of a hardened centerline), and care should continue to be taken to avoid creating hazards for cyclists.

- 4. Re-examine left turn calming when crash data is available.** Crash data is needed to better understand the impact of this treatment on safety. Lag time in the availability of complete crash data means that this analysis can occur no sooner than summer 2023.

The next section of this report describes the pilot project in more detail, including variations in design across pilot project locations and details on data collection.

The Results section summarizes key data points on the pilot, including observed impacts on driver behavior and maintenance costs.

The Discussion & recommendations section explains why this report recommends continued use of left turn calming and describes key design considerations for future use and maintenance.

Appendices include results of material selection evaluation, detailed treatment information and feedback received from the public.



Figure 4. A hardened centerline using bumps with a nose at SE 99<sup>th</sup> Avenue & Stark Street, looking northeast, on December 23, 2019.

# Overview: Portland’s left turn calming pilot project

Left turn calming is intended to prevent or reduce the severity of crashes that occur when a driver turns left and collides with a person in a crosswalk.

Crash data indicate that these crashes are among the most common ways pedestrians are hurt or killed on Portland streets:

- Nearly half of pedestrian crashes occur at signalized intersections (see Figure 5).
- Nearly a quarter of pedestrian crashes involve left-turning drivers at signalized intersections (see Figure 6).

Left turn calming has two intended effects on driver behavior: (1) reduce turning speeds, which can give drivers more time to avoid a collision or reduce its severity, and (2) change the turning angle so that drivers more directly face a crosswalk.

The second effect may improve safety by reducing the likelihood that a vehicle’s A-pillar obstructs a driver’s view of a pedestrian. (The A-pillar is the vertical column along the left side of a vehicle’s windshield.)

PBOT staff learned about left turn calming [from the New York City Department of Transportation](#). PBOT’s designs and materials are directly informed by New York’s program, where preliminary data indicate left turn calming has reduced pedestrian crashes by 20 percent.

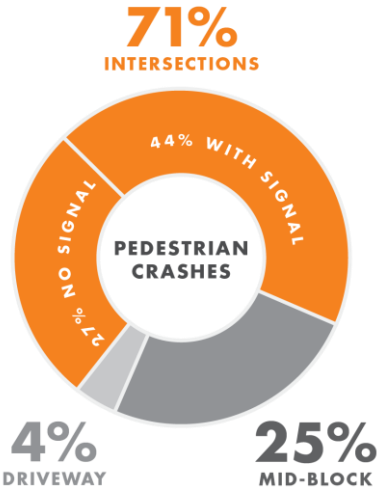


Figure 5. Most pedestrian crashes in Portland occur at intersections, especially where there are traffic signals. Data: 2006-15, Oregon Department of Transportation.



Figure 6. Left turns by people driving can be especially risky for people in crosswalks.

## Outreach and education

PBOT shared information about the pilot project on the city’s website, in social media, and via 16 emails to the 35 neighborhood associations where turn calming was installed (see [Appendix C](#)).

Content included an animated gif that briefly explained the intention of hardened centerlines, a short video describing the evaluation process, a video of a turn calming



installation in action, an interactive citywide map of turn calming locations, and contact information to share comments or concerns about the project.

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## Materials and configurations

Pilot project materials consisted of bumps, plastic curbing with delineators, and thermoplastic striping. PBOT tested two bump products (see [Appendix A](#)) to inform selection. PBOT used Tuff Curb XLP plastic curb and delineators based on the bureau's previous experience with this product.

PBOT used these materials to test several variations of left turn calming across a total of 42 intersections (see Table 1) using a combination of three elements: hardened centerlines, "noses" that extend into the intersection, and "wedges" at corners.

**Hardened centerlines:** Most pilot project intersections (35 out of 42) included a "hardened centerline" (see Figure 7). This is a section of centerline leading up to an intersection equipped with bumps (24 intersections) and/or raised plastic curbing with delineators (11 intersections).



Figure 7. A PBOT work order (left) shows a top-down view of a hardened centerline using plastic curbing and delineators (labeled "A") that is extended to support access management (B) on the south leg of SE 122<sup>nd</sup> Ave. & Market St. The photo (right) shows the installation looking north/northeast.

**"Nose" extension:** A subset of intersections with hardened centerlines also included one bump (a "nose," installed at 17 out of 35 intersections with hardened centerlines) that extended slightly into an intersection (see Figure 8). The nose is intended to reinforce the hardened centerline's impact on speed and turning angle.



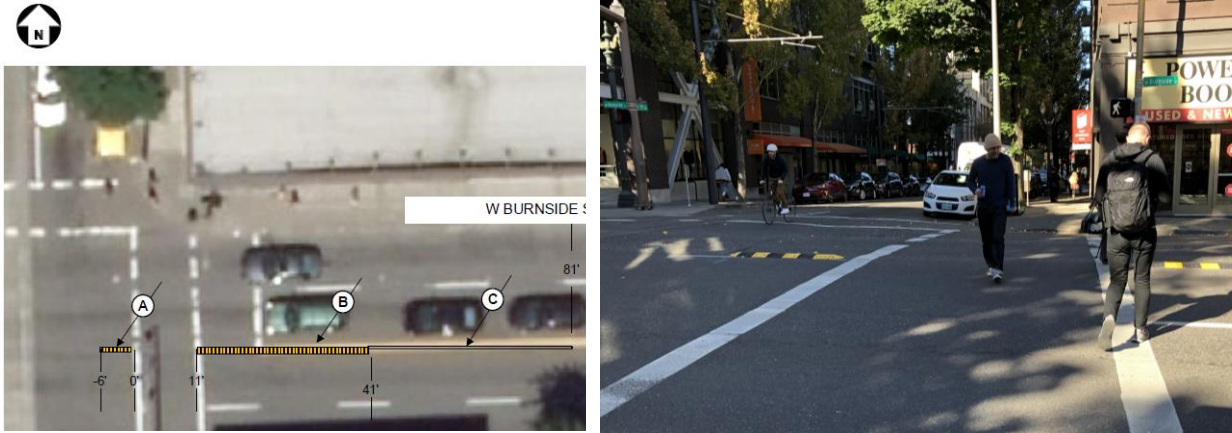


Figure 8. A PBOT work order (left) shows a top-down view of a nose (labeled “A”) and hardened centerline (B) on the east leg of W Burnside St. & 11<sup>th</sup> Ave. The photo (right) shows the installation looking north.

**“Wedge” at corners:** Some intersections (11 out of 42) received a “wedge” at corners (see Figure 9). Wedges are similar to curb extensions, but are located outside of crosswalks and can be driven over if necessary. Most wedges use only bumps and striping. They can be used to slow left- or right-turning drivers.



Figure 9. A PBOT work order (left) shows a top-down view of a wedge with thermoplastic striping on the southeast corner of SE 102<sup>nd</sup> Ave. & Stark St. The photo (right) shows the installation looking north/northwest.

**Several intersections had unique configurations:**

- One location (SE 7<sup>th</sup> Ave. & Hawthorne Blvd.) had a wedge made up of delineators rather than bumps to mitigate conflicts with people biking.
- Two locations (W Burnside St. & 3<sup>rd</sup> Ave., SE 99<sup>th</sup> Ave. & Stark St.) had both a wedge and a hardened centerline to address right and left turns, respectively.
- Two locations (SE Holgate & Chávez boulevards, SE Harold St. & 122<sup>nd</sup> Ave.) had hardened centerlines using both types of materials at different intersection legs.

Data was collected only at one leg of each intersection. As a result, some intersections have data that reflect only one aspect of a configuration (e.g. the effect of a hardened centerline rather than a wedge).

Table 1 describes various treatment configurations and data availability for each intersection. [Appendix B](#) has more detailed information on project locations.

Hardened centerline design	Nose extends into intersection	No nose	Total # of intersections
Centerline hardened with bumps	15 (8)	9 (4)	24 (12)
Centerline hardened with delineators	2 (2)	9 (3)	11 (5)
Total # of intersections	17 (10)	18 (7)	35* (17)

Table 1. Number of intersections installed with each type of hardened centerline design and presence of nose (# of locations with complete data collected shown in parentheses)

*\*Does not include 9 locations with a wedge and no hardened centerline; data was collected on the impact of wedges at 7 of these locations.*

## Site selection and installation criteria

Left turn calming is a flexible treatment that can fit in a variety of intersection types. Figure 10 shows the locations of the 42 intersections piloted for left turn calming,

The biggest site selection constraint is the presence of parking lanes, which are generally required to fit noses and wedges into an intersection. Given that PBOT often repurposes parking lanes for travel at major intersections, it can be difficult to find space for noses and wedges at high-volume locations.

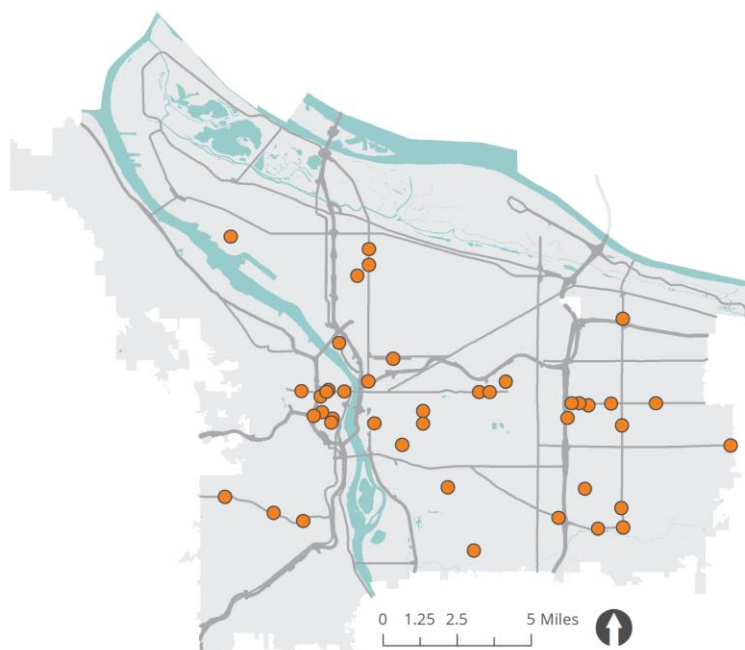


Figure 10. Left turn calming pilot locations in Portland.

Many major intersections in Portland also have left turn signals with dedicated green phases, which should eliminate the conflict that turn calming is designed to address.

Table 2 shows the criteria PBOT used to identify potentially suitable intersections.

Turn calming installation criteria	Explanation
1. Any combination of one-way and two-way streets	Hardened centerlines and noses require at least one two-way street, while wedges do not.
2. Appropriate geometry	Noses and wedges generally require the presence of a parking lane. Must consider path of travel for people biking.
3. Traffic signal present	Not necessary, but an indication of higher volumes and potentially greater frequency of conflict.
4. Left turns allowed at the same time pedestrians have the right of way	A split phase or left turn signal with a dedicated or “protected” green phase should eliminate left turn conflicts, negating the need for left turn calming.
5. Located on a <a href="#">High Crash Network</a> street or intersection, or a history of left turn crashes involving pedestrians	Not necessary, but a potential indicator of pedestrian activity level and risk of being hit by a person driving.

Table 2. Criteria for selecting pilot project locations.

## Evaluation details

The evaluation aims to answer two main questions:

1. Does left turn calming improve safety?
2. Can left turn calming be installed and maintained at a reasonable cost?

In addition, the evaluation seeks to provide guidance on how PBOT designs and maintains any future left turn calming treatments.

Design and maintenance considerations include:

- What is the ideal length of a hardened centerline?
- Do hardened centerlines with bumps perform differently than those with delineators?
- How does snow plowing impact the condition of left turn calming treatments?
- How can site selection criteria be refined to identify where left turn calming will perform best?

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### Timeline

PBOT collected pre- and post-treatment data for pilot project locations from January 14, 2019, through March 11, 2020. Installation occurred from March 28, 2019, through March 12, 2020, with one location still pending completion as of May 22, 2020.

Post-treatment data was collected no sooner than 12 days after installation, with an average of 83 days between installation and post-treatment data collection at all installed locations with complete data.

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### Types of data collected

PBOT gathered pre- and post-treatment data on three items:

- Turning speeds
- Centerline crosses (number of turning vehicles driven over centerline on receiving street)
- Lane position for receiving lane (inside or outside lane on multilane streets)

#### Why crash data isn't evaluated as part of the pilot project

Due to lag time in the availability of crash data, there will not be enough data for analysis of left turn pilot locations until at least mid-2023, when three full years of post-treatment data should be available.

Given this lag time, PBOT is using speed and centerline crosses as preliminary indicators of crash risk.

Speed is a well-documented predictor of crash risk and crash severity, and turning sharply enough to cross the centerline may increase the likelihood that pedestrians are obstructed by a vehicle's A-pillar.

PBOT should re-evaluate left turn calming when enough crash data is available to identify any potential effects on the incidence and severity of crashes.

Lane position was observed at the request of Portland Police Bureau’s Traffic Division, whose members expressed concern that traffic calming may cause more people to turn into outside lanes in violation of the law.

Other information include installation and maintenance costs, feedback from Maintenance & Operations staff, and comments from the public. PBOT provided contact information on the project website for people wishing to submit comments or questions about left turn calming. Comments could also be submitted via social media and PBOT’s 823-SAFE system. PBOT did not actively solicit public feedback about the project.

### Collection method

PBOT collected data on turning speeds, centerline crosses, and lane position (if applicable) by visiting each pilot project location before and after receiving left turn calming (see Table 3).

All observations occurred during clear or cloudy daylight hours when pavement was mostly dry, between 10 a.m. and 5 p.m., at one leg of each intersection. Speed, corner cutting, and lane position were all recorded during a single observation at each site before and after left turn calming installation.

PBOT collected pre- and post-data on turning speeds, centerline crosses, and/or lane position at 24 intersections. The 18 remaining pilot project locations do not have complete data for one of three reasons:

- **Time constraints:** Some locations received turn calming before staff could collect pre-treatment counts. The coronavirus pandemic also interrupted post-treatment data collection in spring 2020, further limiting available counts.
- **Low volume of turning vehicles:** Staff did not collect data if there were approximately five or fewer turning drivers during an initial 30-minute observation period.
- **Bundled with bigger project:** One treatment location (SW Beaverton-Hillsdale Hwy. & Dosch Rd.) is being installed as part of a larger capital project scheduled for construction later in 2020.

Data	Observation period	Relevant treatment	Collection details
Speed	30 minutes minimum; speed captured for a minimum of 30 turning vehicles	Hardened centerlines or wedges on single or multilane streets	Handheld lidar device (LTI 20-20 UltraLyte 100) directed at oncoming motor vehicles approximately 250 feet from an intersection along the sidewalk with clear line-of-sight, activated at the point a turning vehicle completes or nearly completes a turn in free-flowing



Data	Observation period	Relevant treatment	Collection details
			conditions (not limited by speed of another vehicle)
Cross centerline	30 minutes during same period as lane position count	Hardened centerlines (excludes wedge-only locations)	Manual count of instances a turning vehicle's wheel touches a centerline (hitting a nose does not count)
Lane position	30 minutes during same period as centerline count	Hardened centerlines on multilane streets (excludes wedge-only locations and single lane receiving streets)	Manual count of the lane (inside or outside) a turning vehicle moves into

Table 3. Data collection method for speed, centerline crosses, and lane position.

## Limitations



Figure 11. PBOT installed high-visibility crosswalks concurrent with left turn calming, including at SE Holgate & Chávez boulevards, pictured on May 20, 2019 (left) and on March 9, 2020, afterward.

The left turn calming evaluation is intended to provide guidance to PBOT staff. The pilot project should not be interpreted as a definitive study on the effectiveness of this treatment, especially given limitations that include:

- **No control group:** The lack of a control group increases the probability that any results detected in the evaluation stem from factors other than the left turn calming treatment. For example, PBOT concurrently installed high visibility crosswalk markings at most left turn calming locations, introducing a potentially confounding factor in the analysis (see Figure 11).
- **Small samples:** Treatment groups consisted of as little as two locations, increasing the chance that evaluation results do not accurately represent the treatment's effects.
- **Uncertain speed measurements:** Turning speeds could be more accurately assessed through video analysis, or a similarly rigorous method, rather than by use of a handheld Lidar device.



- **Short study duration:** The approximately year-long pilot cannot assess the longer-term effects and durability of the treatments or the impact of snow plowing (there was minimal snow in Portland during the pilot).
- **Lack of crash data:** The evaluation can only assess the safety benefits of the treatment through proxy measures such as turning speed.

## Results

### Turning speeds, centerline crosses, and lane positions

Data summaries for treatment locations are shown below in Tables 4 through 7, followed by descriptions of costs and internal and public feedback related to the project.

Median speed, 85<sup>th</sup> percentile speed, percentage of turning drivers crossing the centerline, and percentage of drivers turning into the inside lane as opposed to the outside lane are averaged across all locations within each group. Sample size (“n”) refers to the number of locations where data was collected for each treatment group; for example, Table 1 includes pre- and post-data from 12 locations with bumps and five with delineators, with each column representing calculations averaged across those treatment groups for each metric.

Material	Median speed, average (mph)			85 <sup>th</sup> percentile speed, average (mph)			Cross centerline, average (%)			Inside lane, average, if applicable* (%)		
	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)
Bumps (n=12)	13.1	11.5	-1.6 (-12%)	15.5	13.6	-1.9 (-12%)	26	2	-24 (-92%)	70	63	-7 (-10%)
Delineators (n=5)	16.2	14.1	-2.1 (-13%)	18.9	16.5	-2.4 (-13%)	42	0	-42 (-100%)	71	58	-13 (-19%)
Combined (n=17)	14.0	12.1	-1.9 (-13%)	16.5	14.4	-2.1 (-13%)	31	3	-28 (-91%)	71	60	-10 (-15%)

Table 4. Effect of material type: Hardened centerlines with bumps compared to no bumps.

\*9 locations

Design	Median speed, average (mph)			85 <sup>th</sup> percentile speed, average (mph)			Cross centerline, average (%)			Inside lane, average, if applicable* (%)		
	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)
Nose (n=10)	13.4	11.2	-2.2 (-16%)	15.7	13.3	-2.4 (-15%)	30	2	-27 (-93%)	73	64	-9 (-13%)
No nose (n=7)	14.9	13.4	-1.6 (-10%)	17.7	15.8	-1.8 (-10%)	32	4	-29 (-89%)	68	56	-12 (-17%)

Table 5. Effect of nose: Hardened centerlines with nose compared to no nose.

\*5 locations with noses, 4 locations without noses

Material & design	Median speed, average (mph)			85 <sup>th</sup> percentile speed, average (mph)			Cross centerline, average (%)			Inside lane, average, if applicable* (%)		
	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)
Bumps w/nose (n=8)	12.9	10.8	-2.2 (-17%)	15.1	12.8	-2.3 (-15%)	25	3	-22 (-90%)	72	65	-6 (-9%)
Delineators w/nose (n=2)	15.0	12.8	-2.3 (-15%)	18.0	15.0	-3.0 (-17%)	49	0	-49 (-100%)	75	61	-14 (-18%)

Material & design	Median speed, average (mph)			85 <sup>th</sup> percentile speed, average (mph)			Cross centerline, average (%)			Inside lane, average, if applicable* (%)		
	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)
Bumps w/out nose (n=4)	12.7	11.8	-0.9 (-7%)	15.6	14.4	-1.2 (-8%)	35	6	-28 (-82%)	n/a	n/a	n/a
Delineators w/out nose (n=3)	16.6	15.0	-1.6 (-10%)	19.3	17.3	-2.0 (-10%)	31	1	-30 (-97%)	68	56	-12 (-17%)

**Table 6.** Effect of material type and nose: Hardened centerlines, bumps compared to delineators, with and without noses.

\*3 locations at bumps with noses, 2 locations at delineators with noses, 0 locations at bumps without noses, 4 locations at delineators without noses.

Treatment	Median speed, average (mph)			85 <sup>th</sup> percentile speed, average (mph)		
	Before	After	Absolute Δ (relative Δ)	Before	After	Absolute Δ (relative Δ)
Wedge (n=7)	14.8	12.5	-2.3 (-15%)	17	14.3	-2.7 (-16%)

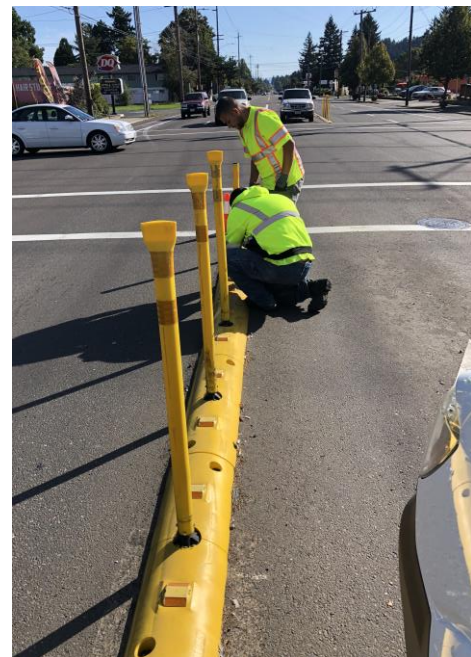
**Table 7.** Effect of wedges: Turning speeds at all locations with available data.

## Installation & maintenance costs

The cost to install and maintain the left turn calming treatments totaled approximately \$59,000 over the course of the pilot project.

Of this amount, \$53,000 was for installation (including materials) and \$6,000 for maintenance. These costs do not include engineering, inspection, or evaluation related expenses, nor an additional \$13,000 in extra bumps to support ongoing maintenance.

Installation costs were higher for hardened centerlines using delineators relative to those using bumps. Table 8 shows average installation and maintenance costs for intersection legs with hardened centerlines using bumps compared to those with delineators, and for locations that received only a wedge.



**Figure 12.** PBOT staff replace six displaced delineators at SE Division Street & 174<sup>th</sup> Avenue on October 2, 2019.

Only locations using delineators required maintenance during the pilot, except for one location where bump installation damaged signal detection loops.

Treatment	Labor cost per intersection leg or wedge, average (\$)	Material & tool cost per intersection leg or wedge, average (\$)	Maintenance cost per intersection leg or wedge, average (\$)	Total cost per intersection leg or wedge, average (\$)
Hardened centerline w/bumps	252	568	0	820
Hardened centerline w/delineators	224	931	143	1,298
Wedge	212	307	0	519

**Table 8.** Approximate installation and maintenance costs per intersection leg with bumps or delineators or per wedge. The table excludes a \$3,000 maintenance cost to repair damaged signal detection loops because this may occur regardless of whether a hardened centerline is installed with bumps or delineators.

**PBOT Maintenance & Operations (MO) staff feedback**

PBOT Maintenance & Operations staff responsible for installing and maintaining left turn calming shared the following information and concerns:

- **Pair turn calming with crosswalk upgrades:** Work orders for turn calming should be paired with high-visibility crosswalk upgrades (where needed) to improve efficiency and to ensure that intersections meet PBOT design standards.
- **Bumps should not be installed with included hardware:** Installation hardware included with the bumps uses plastic sleeves that are “small, brittle and break when hammered in.” Staff also noted that the small drill bit was “binding up” and there was an overheating issue. After several installations, MO staff switched to using anchor bolt kits that come with Tuff Posts from Impact Recovery Systems, which are a regularly stocked item at PBOT and use the same drill bit for surface mounted pipe (see Figure 13). MO staff indicate this hardware has worked well. ([Appendix E](#) documents a similar experience in New York. [Appendix F](#) provides specifications for the Impact Recovery Systems anchor kit.)
- **Snow plowing may damage bumps:** MO staff raised concerns that the bumps may suffer damage from snow plowing. The pilot was not able to evaluate these concerns due to a lack of snow during the 2019-20 winter season. New York City staff shared that about 20 percent of bumps require replacement as a result of snow plowing during their winter season (see [Appendix D](#)). New York staff also indicated that the bumps have not caused any damage to the plows themselves.
- **Early morning hours are ideal for installation:** Many left turn calming locations are at high-volume intersections that can require significant traffic control to protect MO staff during installation (see Figure 14). Lower traffic volumes during early morning hours

can help staff to install turn calming more efficiently relative to daytime hours while still ensuring their safety.



Figure 13. The orange sleeves and longer (4") bolts work better than the grey sleeves and shorter bolts that are included with the bumps.



Figure 14. High-volume intersections such as SE 122nd Avenue & Market Street can require significant traffic control.

## Public feedback

PBOT received approximately 18 comments from 15 individuals or groups about the left turn calming pilot project (see [Appendix G](#)).

Concerns or suggestions included:

- General appreciation / Find the treatment helpful (5 comments)
- Hardened centerlines make it difficult to turn left when driving, especially when there is another driver turning left from the opposite direction (5 comments)
- Concerned that the bumps are hazardous for people biking, including one unconfirmed report of a cyclist crash involving a wedge (4 comments)
- Hardened centerline with bumps is not sufficiently "intimidating" or "enough" to prevent dangerous turns (2 comments)
- Bumps are not visible enough, allegedly creating a hazard for motorcyclists, especially at night and at one-way to two-way locations (1 comment)
- Suggestion for additional locations (1 comment)

Hey @PBOTinfo Why is there now a bicycle speed bump at the corner of burnside and 3rd downtown? I was heading east on burnside and made a right turn on green and hit that hard. I was probably only going about 10mph but man is this thing ever dangerous.



5:52 PM - 25 Sep 2019

Figure 14. Online comment about W Burnside Street & 3<sup>rd</sup> Avenue wedge on September 25, 2019.

## Discussion & recommendations

The left turn calming pilot is a success based on the three criteria established at the project's outset. Treatment locations consistently saw reduced turning speeds, fewer sharp turns, and had reasonable maintenance costs.

These positive results are reinforced by [preliminary findings from New York City](#) and from a small study [released in April 2020 by the Insurance Institute for Highway Safety \(IIHS\)](#), which examined the effect of left turn calming in Washington, D.C.

Left turn calming in both cities has been linked to reduced turning speeds, a 20 percent reduction in pedestrian crashes in New York, and a 70 percent reduction in near-miss pedestrian crashes (e.g. sudden braking or swerving) in Washington, D.C. The IIHS concludes that these "simple infrastructure changes make left turns safer for pedestrians," and recommends that left turn calming be used alongside other tools such as road diets, curb extensions, and median islands.

### Recommendations for next steps

Based on the results of the pilot, PBOT should consider the following:

#### **1. Expand left turn calming to include more locations where permissive turns present risks to pedestrians.**

Results from the pilot suggest that pedestrians are less likely to be hit or injured at intersections equipped with left turn calming due to reduced speeds and sharp turns.

While the reductions in speed are relatively small, even slight changes in speed have a large impact on the probability of crashes and resulting injuries. For example, the IIHS notes that the odds of a pedestrian sustaining a serious injury rises from 10 percent to 25 percent as impact speeds increase from 17 to 25 mph.

In addition to reducing speeds, hardened centerlines nearly eliminate instances of drivers crossing the centerline. This may reduce the likelihood that pedestrians are obscured by the A-pillar within vehicles, an occurrence noted in research.<sup>1</sup>

#### **2. Use bumps instead of delineators.**

Based on limited data, bumps are nearly effective as delineators and less expensive to install and maintain. New York City staff have already indicated they are transitioning to

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<sup>1</sup> Reed, M. (2008). *Intersection kinematics: A pilot study of driver turning behavior with application to pedestrian obscuration by A-pillars* (Report No. UMTRI-2008-54). University of Michigan.



using only bumps in their installations based on similar findings. Delineators may still be preferred at locations where turn calming can support access management.

### **3. Create guidelines for PBOT planners, project managers, engineers, and maintenance staff.**

Like any tool, left turn calming is a better fit for some intersections than for others. PBOT should consider creating guidelines that cover issues including:

- **Intersection suitability:** Left turn calming appears to have the greatest impact on turning speeds where a bump can be placed into an intersection (the “nose” portion of a hardened centerline). This generally requires that parking lanes exist leading up to an intersection. PBOT should not install bumps that conflict with the path of people biking.
- **Length of hardened centerline:** Hardened centerlines in the pilot are generally between 15 and 30 feet in length. The pilot project does not have enough data to identify any differences in performance based on length. Engineering judgement may be sufficient until better information is available.
- **Thermoplastic striping:** Centerline markings should be upgraded to thermoplastic for 40’ approaching hardened centerlines that use delineators. (Paint striping equipment cannot mark lines directly adjacent to delineators.)
- **Access management opportunities:** Hardened centerlines may help prevent risky turning maneuvers within the intersection area of influence, especially if installed with delineators.
- **Installation:** PBOT Maintenance & Operations staff began using more durable hardware to install the bumps during the pilot and discarded the included bolts and rods. New York City staff have indicated that they also use stronger bolts and do not use the rods. In addition, PBOT staff should be aware that signal detection loops may be vulnerable to damage from hardened centerline installation.
- **Inspection and maintenance, especially after snow plowing:** The useful life of the bumps remains unknown. Over time, they may become loose or dislodged, or less visible due to weathering and accumulation of dirt, especially where the cateye reflectors are recessed into the bumps. Snow plowing will likely damage bumps.

### **4. Re-examine left turn calming when crash data is available.**

Crash data is needed to better understand the impact of this treatment on safety. Lag time in the availability of complete crash data means that this analysis can occur no sooner than summer 2023. In the meantime, PBOT should monitor the effects of left turn calming through Portland Police Bureau crash reports and constituent comments.

###

# Appendices

## Appendix A: Rubber speed bump product comparison



The TreeTop Products bump (left photo at front and middle photo) and Checkers bump installed for testing at a PBOT parking lot, pictured after approximately two months of use.

Products	<b>TreeTop Products Premium Recycled Rubber Speed Bump compared to Checkers Easy Rider Rubber Speed Bump</b>
<b>Walking</b>	Both bumps were walked on in dry and wet conditions during daytime. The Checkers bump was comparable to the TreeTop bump in dry conditions, but felt considerably more slippery in wet conditions. The TreeTop bump felt safer on foot overall.
<b>Biking</b>	A steel-frame bicycle with standard road tires was ridden over both bumps at various angles in dry and wet conditions during daytime. The Checkers bump felt significantly more jarring relative to the TreeTop bump during all approaches. Slipping did not occur on either bump at relatively low speeds, even when impacting the bumps at an angle and in wet conditions. Slipping could be an issue at higher speeds, but the more likely hazard may stem from momentary loss of control following impact with either bump. Both bumps were unpleasant to experience on a bicycle, but the Checkers bump was more jarring and may be more likely to present a hazard to people riding bikes. The TreeTop bump felt safer overall on a bicycle.

<b>Motorcycle</b>	<p>Both speed bumps were tested to ensure that a motorcyclist can safely maneuver over them at various angles without slipping or crashing. The motorcyclist rode a 2015 Yamaha SR400 over the bumps multiple times roughly between 10 and 20 mph in dry and wet conditions during daytime. When approaching perpendicular to the speed bumps, neither brand felt slippery but the Checkers bump felt a bit more jarring than the TreeTop bump, particularly at higher speeds. When approaching the bumps at an angle, the TreeTop bump appeared to be more slip resistant and the Checkers bump caused the wheel to slip a bit when wet. In the rider's opinion, the TreeTop product felt safer on a motorcycle.</p>
<b>Driving</b>	<p>Both bumps were driven over using a sedan and SUV at various angles in dry and wet conditions during daytime. No significant differences were noted. Both bumps create a noticeable impact within the vehicles, but the impact is significantly dampened by vehicle suspensions. The bumps seem to be equally suitable.</p>
<b>Additional comments</b>	<p>The cat's eye reflectors in the TreeTop bump showed signs of accumulating dirt, which may reduce the visibility of the bump in dark conditions.</p> <p>The TreeTop bump's yellow coloring appears to be embedded in the rubber; in contrast, the Checkers bump has yellow tape, which may wear out relatively quickly and degrade visibility.</p> <p>The Checkers bump has yellow tape coated with glass beads, which may be a source of reduced traction noted during testing.</p> <p>Large maintenance trucks and equipment drove over the bumps while we were observing. One operator noted that they were "soft," and we observed the bumps deflecting when heavy vehicles drove over them.</p>

## Appendix B: Left turn calming locations, data collection dates, and components

Hardened centerlines are located on the street people driving turn onto (“receiving street”) unless otherwise noted.

Quadrant	Departing street	Receiving street	Install date	Data collection date (pre   post)	Components			
					Wedge	Nose	Rubber bump centerlines	Delineator centerlines
SE	102 <sup>nd</sup> Ave.	Stark St.	6-18-19	4-22-19 n/a	✓			
SE	104 <sup>th</sup> Ave.	Holgate Blvd.	7-25-19	n/a		✓	✓	
SE	106 <sup>th</sup> Ave.	Washington St.	7-24-19	n/a		✓	✓	
NW	10 <sup>th</sup> Ave.	Couch St.	9-15-19	3-11-19 11-1-19		✓	✓	
SW	10 <sup>th</sup> Ave.	Jefferson St.	2-13-20	11-19-19 n/a	✓			
SE	110 <sup>th</sup> / 111 <sup>th</sup> avenues	Foster Rd.	5-16-19	3-21-19 3-3-20				✓
SE	117 <sup>th</sup> Ave.	Stark St.	10-4-19	3-29-19 11-15-19		✓		✓
W	11 <sup>th</sup> Ave.	Burnside St.	9-15-19	3-5-19 10-10-19		✓	✓	
NE	122 <sup>nd</sup> Ave.	Fremont St.	12-19-19	n/a				✓
SE	139 <sup>th</sup> Ave.	Stark St.	10-7-19	3-29-19 2-3-20		✓		✓
SE	174 <sup>th</sup> Ave.	Division St.	5-17-19	3-21-19 n/a				✓
W	21 <sup>st</sup> Ave.	Burnside St.	9-15-19	3-14-19 10-10-19		✓	✓	
SE	30 <sup>th</sup> Ave.	Hawthorne Blvd.	7-20-19	3-15-19 9-19-19		✓	✓	
SE	30 <sup>th</sup> Ave.	Belmont St.	7-20-19	3-20-19 9-12-19			✓	
W	3 <sup>rd</sup> Ave.	Burnside St.	9-15-19	4-8-19 10-11-19 (wedge)	✓	✓	✓	
SW	4 <sup>th</sup> Ave.	Market St.	9-27-19	2-20-19 3-11-20	✓			
E	55 <sup>th</sup> Ave.	Burnside St.	6-18-19	3-19-19 11-15-19		✓	✓	
E	60 <sup>th</sup> Ave.	Burnside St.	12-11-19	3-19-19 12-23-19			✓	
NE	67 <sup>th</sup> Ave.	Glisan St.	12-19	n/a		✓	✓	
SE	92 <sup>nd</sup> Ave.	Foster Rd.	12-12-19	4-29-19 3-3-20			✓	
SE	96 <sup>th</sup> Ave.	Main St.	12-17-19	n/a			✓	
SE	99 <sup>th</sup> Ave.	Stark St.	7-24-19	4-22-19 12-23-19 (centerline)	✓	✓	✓	
NE	Ainsworth St. <sup>2</sup>	Martin Luther King Jr. Blvd.	3-12-20	11-8-19 n/a		✓	✓	
SW	Alder St.	13 <sup>th</sup> Ave.	6-29-19	4-8-19 10-28-19	✓			
SW	Columbia St.	4 <sup>th</sup> Ave.	9-26-19	1-14-19 10-28-19	✓			
NE	Dekum St.	Martin Luther King Jr. Blvd.	12-19-19	n/a		✓	✓	

<sup>2</sup> Left turn pocket added on west leg as part of installation.

Quadrant	Departing street	Receiving street	Install date	Data collection date (pre   post)	Components			
					Wedge	Nose	Rubber bump centerlines	Delineator centerlines
SE	Division St.	20 <sup>th</sup> / Ladd avenues	12-12-19	n/a			✓	
SW	Dosch Rd. <sup>3</sup>	Beaverton-Hillsdale Hwy.	n/a	n/a				✓
SE	Flavel St.	52 <sup>nd</sup> Ave.	12-19-19	n/a			✓	
SE	Foster Rd. <sup>4</sup>	122 <sup>nd</sup> Ave.	4-26-19	n/a				✓
SE	Harold St. <sup>5</sup>	122 <sup>nd</sup> Ave.	8-24-19	4-12-19   2-3-20 (delineator centerline)			✓	✓
SE	Hawthorne Blvd. <sup>6</sup>	7 <sup>th</sup> Ave.	4-27-19	3-26-19   n/a	✓			
SE	Holgate Blvd. <sup>7</sup>	Chávez Blvd.	12-10-19	5-20-19   3-9-20 (bump centerline)			✓	✓
N	Interstate Ave.	Mississippi Ave.	7-15-19	4-3-19   10-29-19	✓			
SW	Market St.	13 <sup>th</sup> Ave.	12-19	12-16-19   1-21-20	✓			
SE	Market St.	122 <sup>nd</sup> Ave.	6-10-19	4-9-19   9-26-19				✓
NE	Martin Luther King Jr. Blvd.	Lloyd Blvd.	12-11-19	5-3-19   1-3-20	✓			
N	Portsmouth St.	Willamette Blvd.	12-19-19	12-6-19   1-30-20		✓	✓	
SW	Shattuck St.	Beaverton-Hillsdale Hwy.	4-19	3-28-19   n/a				✓
SW	Sunset Blvd.	Capitol Hwy.	9-15-19	3-28-19   n/a		✓	✓	
NE	Weidler St.	16 <sup>th</sup> Ave.	12-19	n/a   1-31-20			✓	
N	Williams St.	Killingsworth St.	12-12-19	4-3-19   1-3-20		✓	✓	
<b>Total # of locations</b>			<b>40 (+1 pending)</b>	<b>25 with pre &amp; post data</b>	<b>11</b>	<b>17</b>	<b>24</b>	<b>11</b>

<sup>3</sup> Installation pending larger project; not included in evaluation.

<sup>4</sup> Serves access management function only due to split phase signal.

<sup>5</sup> East and west legs have rubber bumps on centerlines, north and south legs have delineators. Data collected only on north leg.

<sup>6</sup> Wedge uses delineators rather than rubber bumps to mitigate potential conflict with people biking.

<sup>7</sup> South leg has delineators, north curb has delineator to supplement existing access management. Data collected only on south leg.

## Appendix C: Email to neighborhood associations

**From:** Kelly, Matthew

**Sent:**

**To:**

**Subject:** New intersection design in your neighborhood

Dear Portland community members,

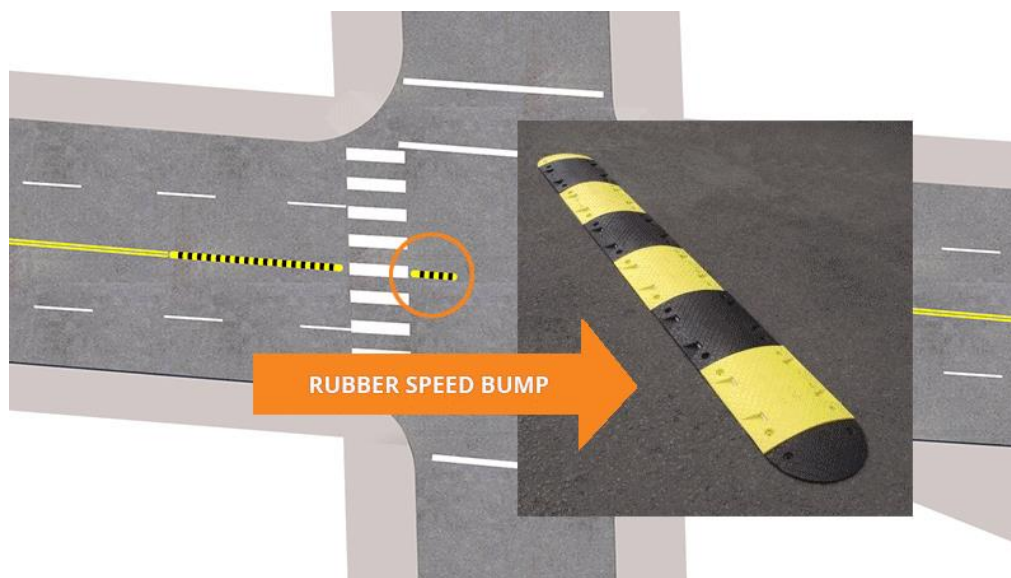
Earlier today the Portland Bureau of Transportation installed “left turn calming” in your neighborhood at [location]. This is a new tool that we are piloting to improve safety on our streets for people walking, biking, and driving.

Left turns by people driving are one of the most common ways pedestrians are hit and killed in Portland. Left turn calming uses small rubber speed bumps or flexible posts to slow turning speeds and improve left-turning drivers’ view of the crosswalk. Some locations also address right-turning movements. The graphic below is a top-down view of an intersection with left turn calming and a photo of a rubber speed bump. Preliminary results from [New York City](#) indicate that left turn calming may be an effective safety tool.

More information about left turn calming is [available on the Portland Bureau of Transportation’s website at this link](#). Please let me know if you have any questions or concerns about the pilot project.

Thank you.

Matt



**Matt Kelly** | [Vision Zero](#)

**Pronouns:** He/Him



Portland Bureau of Transportation

1050 SW 6<sup>th</sup> Avenue, Floor 4

Portland, OR 97204

Desk: 503.823.5831

Mobile: 517.438.0187

[matthew.kelly@portlandoregon.gov](mailto:matthew.kelly@portlandoregon.gov)

[www.portlandoregon.gov/transportation](http://www.portlandoregon.gov/transportation)

[twitter](#) | [facebook](#) | [instagram](#) | [publicalerts](#)



The City of Portland ensures meaningful access to city programs, services, and activities to comply with Civil Rights Title VI and ADA Title II laws and reasonably provides: translation, interpretation, modifications, accommodations, alternative formats, auxiliary aids and services. To request these services, contact 503-823-5185, City TTY 503-823-6868, Relay Service: 711.

**Appendix D: Communication with New York City Department of Transportation on effects of plowing on bumps (Non-PBOT staff names withheld)**

From:

Sent: Wednesday, October 23, 2019 11:46 AM

To: Kelly, Matthew [Matthew.Kelly@portlandoregon.gov](mailto:Matthew.Kelly@portlandoregon.gov)

Cc:

Subject: RE: Snow plows and left turn calming

Hello Matt,

As per our most updated data, we estimate that snow plows cause about 22% of bumps to be replaced. During other seasons, bumps for the most part require only basic maintenance such as replacing caps or bolts but the winter months witness the vast majority of all replacements and we can safely assume that it's caused by snow plows. For some of these replacements we are able to use the same bump (or part of it) that was dislodged.

We have not received any reports of issues caused to snow plows by the bumps.

Not sure if we discussed this before, but based on our experience in NYC, the rods that come with the product as well as their hardware shouldn't be used. It's best to avoid the rods altogether and also use Quick Kurb hardware for bolting. I've attached the specs.

Thanks

## **Appendix E: Communication with New York City Department of Transportation on bump installation details (Non-PBOT staff names withheld)**

From:

Sent: Thursday, October 24, 2019 5:02 AM

To: Kelly, Matthew [Matthew.Kelly@portlandoregon.gov](mailto:Matthew.Kelly@portlandoregon.gov)

Cc: Cawley, Wendy [Wendy.Cawley@portlandoregon.gov](mailto:Wendy.Cawley@portlandoregon.gov)



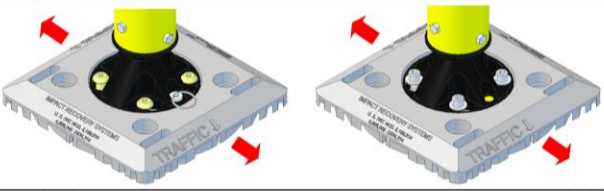
Subject: RE: Snow plows and left turn calming


Hello Matt,

The bumps are made up of a 4.5' section and a 6" end cap on each side. A longer bump will have more than one 4.5' section. The rod connects both the 4.5' and the 6" cap and initially we thought that the rod was the reason why the bumps hold up so well but after further review it turned out that the rods are actually bad because in the event that the end cap is dislodged (and this is the most vulnerable part of the bump to dislodging) the 4.5' is also damaged since it's connected with the cap through the rod.

We started installing without the rod and our crews noticed an improvement in long-term resiliency and came to the conclusion that it is the bolting that makes these particular bumps so resilient. These bumps have twice the number of holes to bolt than other bumps. The bolts that TreeTop provides tend to pop out after a while whereas the Quick Kurb hardware is a little longer, thicker and has better anchor. After all, these bolts are design to hold in place quick kurb bases and posts that are much heavier than the speed bump so when used with the bump they really hold it in place well.

# Appendix F: Specifications for Impact Recovery Systems anchor kit

Impact Recovery Systems Installation Instructions—#BS-SMxx Surface Mount Base	
<p>It is the responsibility of the owner and installer to determine the suitability of the substrate for proper anchorage and the method used. Substrate should generally be properly installed, in good repair and crack free. Connection to the road surface is the responsibility of others. Road surfaces and installation conditions vary widely from location to location. Consult a local licensed engineer as necessary to ensure proper installation. IRS cannot provide site specific engineering recommendations with regard to road connections.</p>	
<p><b>ANCHOR KIT (#IM-ANCHOR-KIT)</b></p> <p>Kit contains four each: 16mm x 3" plastic sleeve, 1/2" x 4" lag screw, 1-1/4" metal washer</p> <p>Recommended Tools: Hammer drill with 5/8" bit, small hammer, 3/4" wrench or socket, 1/4" Allen wrench (fixed style only)</p> <ol style="list-style-type: none"> <li>Place Fixed Base on surface and align arrows to the desired position in the direction sign face or post will face. Mark anchor holes.</li> <li>Drill four (4) holes 3" deep using a 5/8" bit. Clean holes.</li> <li>Using a small hammer, gently tap the plastic sleeves into the holes. Top of sleeve should be flush with surface.</li> <li>Place the base over the anchors. Assemble washer to lag screw. Start lag screw through anchor holes into plastic sleeves. Use 3/4" wrench to tighten lag screws snug into base. Washer will rest on top of base and not in counter-sunk holes.</li> </ol>  <p>#IM-ANCHOR-KIT</p>	<p><b>EPOXY</b></p> <p><b>FOR BEST RESULTS CLOSELY FOLLOW THE EPOXY MANUFACTURER'S INSTALLATION RECOMMENDATIONS</b></p> <ol style="list-style-type: none"> <li>Check the bottom of base for tape covering t-nuts (fixed style only). Tape prevents epoxy from entering screws threads upon installation.</li> <li>Pavement surface must be clean, dry, and free of dirt, debris, and oil.</li> <li>Flame treat the underside of the base prior to installation. Quickly passing a cool flame over the plastic surface greatly increases adhesion. Do not overheat.</li> <li>Mix epoxy as directed and closely follow epoxy instructions. Time, temperature, pressure, mix ratios, working life and shelf life all vary by manufacturer. Use a total of approximately 16 to 20 ounces per base.</li> <li>Align the base with arrows facing traffic and push into epoxy. Rotate base 90 degrees and back, filling underside channels and holes in base with epoxy. Allowing epoxy to fill anchor holes will increase adhesion through mechanical bonding.</li> <li>Epoxy should extend around sides of fixed base.</li> <li>Allow epoxy to dry 24 hours for optimum performance. Most epoxies are temperature sensitive. Take care to follow manufacturer's recommendations.</li> </ol>  <p>Epoxy      Installed Base</p>
<p><b>Post Installation:</b></p> <ol style="list-style-type: none"> <li>Place the sign or post into the base and check for proper alignment. For fixed bases, insert and tighten all four socket cap screws with 1/4" allen wrench. For quick release bases, set spring unit on shoulder washers and turn slightly counterclockwise until pull pin fully seats.</li> <li>Ensure proper alignment of the spring and base with traffic. The pull-pin holes in the lower part of the spring should align with traffic and indication on surface mounted base. See diagrams at right.</li> </ol> 	
<p>www.impactrecovery.com      1-800-736-5256      Jun 2019</p>	

Impact Recovery Systems Installation Instructions—#BS-SMxx Surface Mount Base	
<p style="text-align: center;">SUPER BUNDY® PLUS ADHESIVE (#IM-SBK)</p> <p><b>SUPER BUNDY® PLUS IS ONLY RECOMMENDED FOR USE WITH DELINEATORS AND TUBULAR MARKERS WHEN INSTALLED ON A FIXED BASE.</b></p> <p>General Requirements:</p> <p>Moisture: Pavement must be dry.</p> <p>Surface: Asphalt and concrete must be free of dirt, dust chemicals or significant oily substances. Do not apply on top of paint, cold plastic, or Greenlite. It can be applied on top of thermoplastic, provided it is clean.</p> <p>Material: SUPER BUNDY® PLUS must be kept dry at all times. Store between 35° and 90° F. Shelf life is 12 months.</p> <p>Safety: Be sure to use proper safety equipment such as gloves and safety goggles. Use appropriate caution when using an open flame.</p> <p>Instructions:</p> <ol style="list-style-type: none"> <li>SUPER BUNDY® PLUS is a two-piece system. Do not attempt to use only a single piece as this will result in inadequate bonding.</li> <li>Check the bottom of fixed base for tape covering t-nuts (fixed style only). Tape prevents epoxy from entering screws threads upon installation.</li> <li>Pavement surface must be clean and dry.</li> <li>Pre-heat the pavement surface using a propane fueled torch.</li> <li>Position the first piece of SUPER BUNDY® PLUS on the pre-heated pavement surface.</li> <li>Begin heating the material by moving the flame from the torch slowly and steadily over the material in a sweeping motion. Evenly heat the material until it melts completely to bond with the pavement. A brownish film will typically form on the surface when material has reached molten stage. Continue to heat the adhesive pad until the well defined edges of the pad are no longer visible.</li> <li>Without delay, position the second pad directly on top of the molten piece.</li> <li>Heat the second adhesive pad until it is completely molten, in the same way as the first. When complete, the pads should appear as a puddle of molten adhesive.</li> <li>Position the Fixed Base directly on top of the molten adhesive and apply slight downward pressure to ensure embedding and bonding. Twist back and forth slightly. It is important to ensure that there is a small cushion of SUPER BUNDY® PLUS material remaining between the pavement and the Fixed Base.</li> <li>Curing is complete when the SUPER BUNDY® PLUS material has cooled down to a temperature that the fixed base can no longer be moved.</li> </ol>  <p>#IM-SBK Super Bundy Kit      Heating Adhesive Pad      Placing Second Pad      Molten Puddle</p>	
<p>www.impactrecovery.com      1-800-736-5256      Jun 2019</p>	

Appendix G: Public comments (redacted to remove identifying information)

Follow 

Hey @PBOTinfo Why is there now a bicycle speed bump at the corner of burnside and 3rd downtown? I was heading east on burnside and made a right turn on green and hit that hard. I was probably only going about 10mph but man is this thing ever dangerous.



5:52 PM - 25 Sep 2019

I was lucky not to lawn dart into traffic when I hit this thing. These will cause bicycle accidents and could cause a fatality if a person hits this and high sides into a car. Maybe try something different? At least put up some cones? @BikePortland @thestreettrust @PBOTinfo

**Portland Bureau of Transportation** @PBOTinfo · Sep 26, 2019

Replying to @consolewitch

This is part of our new left-turn calming pilot. The goal of these speed bumps is to both slow down drivers as they take turns and to prevent corner cutting. You can learn more about this at [portlandoregon.gov/transportation...](http://portlandoregon.gov/transportation...)

9:48 AM · Sep 26, 2019 · Twitter for Android

Aug 27, 2019

Not sure what it is but it's something. Thanks @PBOTinfo for making improvements by Tubman MS.

Cc:



2



5





Item: 1645510

Item Code 26961645510

Category 823-SAFE - Non-Urgent Traffic Safety Report Form

Contact

[Redacted]  
PortlandOnline User  
[Redacted]

Contact Type Website

Date Created 07/13/2019 6:58 PM (Received 07/13/2019)

Date Due 08/12/2019

Created By TrackIT

Status Closed

Name: [Redacted]

Email: [Redacted]

Phone:

Select One Intersection safety

Where is this happening?  
Type the closest address or  
intersection to your concern  
then press "Verify Location."

Contact Specified: 55th and E Burnside  
System Verified: Not Verified

Description of what is  
happening.

The new center line "curbs" on burnside create far too narrow of an angle for turning left.

This is an absolutely horrible design in a city full of absolutely absurd traffic designs. I feel like children just make these things up in an effort to outdo each other with no actual testing at all. I catch the curb even at very slow speeds and I cant not describe how annoying and dangerous this curb is.

Further I've never seen a bike there and pedestrians are easy to see at that intersection.

Please remove these curbs immediately. I honestly cant believe anyone thought this was a good idea.

Upload photos or  
documents here.

[email.msg](#) (55.3KB)  
[followup.msg](#) (217.6KB)

Is this related to an ADA  
issue or concern?

No

ADA Issue comments -  
Describe the issue.

Item: 1647490

Item Code 2E691647490

Category 823-SAFE - Non-Urgent Traffic Safety Report Form

Contact [REDACTED]  
PortlandOnline User  
[REDACTED]

Contact Type Website

Date Created 07/16/2019 5:23 PM (Received 07/16/2019)

Date Due 08/15/2019

Created By TrackIT

Status Closed

Name: [REDACTED]

Email: [REDACTED]

Phone: [REDACTED]

Select One Intersection safety

**Where is this happening?  
Type the closest address or  
intersection to your concern  
then press "Verify Location."**

Contact Specified: SW Beaverton Hillsdale Hwy and SW Shattuck Rd

System Verified: SW BEAVERTON HILLSDALE HWY & SW SHATTUCK RD  
([Google](#), [Bing](#))  
HAYHURST, PORTLAND



**Description of what is happening.**

The new permanent traffic stanchions that have been installed at this intersection along the center of SW Beaverton Hillsdale Hwy in both the East and West Direction from the intersection are making left turns from Shattuck Rd (from both the southbound and northbound direction on Shattuck) extremely dangerous. They protrude so far out into the intersection that you can not make a left turn into the left traffic lane on Beaverton Hillsdale so you are forced to go over the left lane and into the right lane where a collision from cars turning right onto Beaverton Hillsdale Hwy (from either direction on Shattuck) is very likely. Please remove the last few stanchions at the intersection in each direction and remove any bumps in the road under them so that cars can safely navigate left hand turns off of Shattuck Rd. The reason this happens is that Shattuck Rd is not at a right angle to Beaverton Hillsdale Hwy. It is at about a 60 degree angle making it a necessarily sharp turn. Thank you for addressing this serious safety issue ASAP.

**Upload photos or documents here.**

[Forward.msg](#) (103.4KB)  
[M Kelly 7-18-19.msg](#) (90.1KB)

**Is this related to an ADA issue or concern?**

No

**ADA Issue comments - Describe the issue.**

## Kelly, Matthew

---

**From:** [REDACTED]  
**Sent:** Monday, September 23, 2019 9:18 PM  
**To:** Kelly, Matthew  
**Subject:** Fwd: [RNA-announce] Fwd: New intersection design in your neighborhood

Matthew

Thanks for the notice. This would be more helpful had we received the explanation prior to installation.

The intersection of 30th and Hawthorne is becoming difficult to negotiate because left turning cars, waiting for an opening, prevent straight passing cars from making it through the intersection.

This intersection receives many drivers who smartly avoid turning onto Hawthorne at non-signaled intersections.

I suspect that the innermost speed bumps make it hard for opposing cars to simultaneously turn left. That condition is what commonly keep traffic flowing. Please consider if a slight tweak would protect pedestrians while keeping cars moving.

[REDACTED]

## Kelly, Matthew

---

**From:** [REDACTED]  
**Sent:** Tuesday, September 24, 2019 5:37 PM  
**To:** Kelly, Matthew  
**Subject:** Left turn calming location proposal  
**Attachments:** IMG\_20190809\_175107.jpg; IMG\_20190809\_175140.jpg

I'd like to add one corner to your list of intersections to try these very unassuming bumps. 16th Ave., from at least SE Hawthorne to NE Irving, is a Neighborhood Greenway. At Irving, unfortunately, it becomes a freeway entrance, so it draws more traffic than a greenway should have to support.

One particular feed is SE Belmont. I do city bike traffic counts at the intersection of 16th and Belmont, and this August I spent much of the two hours trying to design some kind of traffic control that would prevent the dangerous turns I saw again and again. Impatient drivers heading east on Belmont do wide corner-cutting turns north onto northbound 16th. I ride home on 16th, and there are two problems exacerbating each other at that corner. Because Portland will not enforce the state rule to leave 20' clear, I have to practically pull into the vehicle lane of the intersection to see if I can cross. The turning driver can't see me any better than I can see them, and if s/he is inclined to cut that corner, I'm in danger. If a driver is heading south on 16th, s/he has the same visibility issues - hard to both see and be seen.

If you look at the lean of the car in the first picture, you get an idea of the speed of that turn. I was imagining a jersey barrier maybe the same 20' as the theoretical clear zone down the center of 16th, to stop at the line of the legal crosswalk. Perhaps something less intimidating would also work. The bumps used at 30th and Hawthorne seem less threatening than I think necessary here, but I mostly would like you to look at the intersection and decide to add it to your project list.

Please let me know. Thanks,

■

[REDACTED]

## Kelly, Matthew

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**From:** [REDACTED]  
**Sent:** Monday, September 23, 2019 9:27 PM  
**To:** Kelly, Matthew  
**Subject:** Re: [Contact BNA] New intersection design in your neighborhood

Hi Kelly, the posts on Shattuck seem to be a nice addition so far, thought one of the posts has already broken off...

Are there and to add the left turn speed bump that extends past the crosswalk at BHH and Shattuck? This might be a nice addition.

[REDACTED]



**Kelly, Matthew**

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**From:** [REDACTED]  
**Sent:** Tuesday, September 24, 2019 11:22 AM  
**To:** Kelly, Matthew  
**Subject:** Re: [RNA-announce] Fwd: New intersection design in your neighborhood

● The City's email systems have identified this email as potentially suspicious. Please click responsibly and be cautious if asked to provide sensitive information.

● The City's email systems have identified this email as potentially suspicious. Please click responsibly and be cautious if asked to provide sensitive information.

Matt,

I do like this new calming measure, but I'm not convinced it is enough. I've observed motorists drive right over it (most recently at 10th and Couch). Perhaps a Bollard or similar device would help with calming and communicate the correct path a motorist is supposed to take since it would be more awkward to run that over.

Thank you for all the work the team is doing to encourage motorists to slow down.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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**From:** [REDACTED]  
**Sent:** Wednesday, October 23, 2019 9:21 AM  
**To:** Kelly, Matthew <Matthew.Kelly@portlandoregon.gov>  
**Subject:** Burnside VZ Pilot Program - Motorcyclist Point of View

Matt,

I'm writing you concerning the Burnside VZ crossing improvement works. I was referred to you by Shane Valle, who I know through a PBOT CAC. I've been seeing more of these mountable curbs installed throughout the City. I actually had a pair installed at my place of work [REDACTED]. I understand their intended use to have them inside the box -- encourage drivers to make a wider-radius left-hand turn.

The problem I have with them is visibility. When they were installed on Mississippi, they were demarcated by white paint. On Burnside, there are no such markings (or at least not yet). I was motorcycling SB on NW 11th and turned left onto NB Burnside. The mountable curb is barely visible at night/in the rain and I nearly lost control of my motorcycle while crossing this unexpected, wet plastic "log" in the road in the box. Motorcycles have a different turning path than 4-wheeled vehicles and suffer from the inability to handle off-axis bumps gracefully.

I believe this is only problematic where you have one-way lefts onto Burnside where these curbs occur.

Please consider the safety of motorcycles when installing unorthodox (but innovative) traffic-calming. Hard black plastic is a surprising element to find in the intersection box. If it were outlined by white paint, cats-eyes, a white flex pole etc, that would be probably be more effective and certainly safer for everyone.

## Kelly, Matthew

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**From:** [REDACTED]  
**Sent:** Friday, July 19, 2019 10:42 AM  
**To:** Kelly, Matthew  
**Subject:** Re: City of Portland TrackIT Submission: Item 1647490 - 823-SAFE - Non-Urgent Traffic Safety Report Form

Matt,

I know for sure my wife, my father and my mother-in-law could not make that turn at any speed and keep in the left hand lane. Experienced, skillful drivers likely could. However, that is not the majority of the driving public.

Thanks for looking into this.

■

**From:** [REDACTED]

**Sent:** Friday, July 19, 2019 7:58 AM

**To:** Kelly, Matthew <Matthew.Kelly@portlandoregon.gov>

**Subject:** Re: City of Portland TrackIT Submission: Item 1647490 - 823-SAFE - Non-Urgent Traffic Safety Report Form

Matt,

Thank you for your reply. I drive a compact size car (Mercedes C300) and at slow speeds it is not possible to make that turn and stay within the boundaries of the left lane. There is no way that larger SUVs could make it. There simply is not enough room to make that tight of a turn within the left lane and not hit the stanchion.


I don't see how it has any impact on pedestrian safety. You are still crossing the crosswalk with your vehicle whether the stanchions are where they are or if they are cut back a few feet. Pedestrians are not protected by the stanchions from crossing traffic or through traffic. If you leave it the way it currently is the result will be vehicle accidents with no improvement in pedestrian safety. It is just a bad design and makes no sense at this intersection.


[REDACTED]

## Kelly, Matthew

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**From:** [REDACTED]  
**Sent:** Tuesday, September 24, 2019 10:38 PM  
**To:** [REDACTED] Kelly, Matthew  
**Cc:** 'buckmanboard'  
**Subject:** RE: New intersection design in your neighborhood

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Matthew,

Sorry about the atrocious spelling and grammar!

I've definitely notice the raised areas at Hawthorne and 30<sup>th</sup>. I have kids, and occasionally walk across that area, as my wife works at the Safeway close by. Also ride my bike thru. And drive a car thru.

As a pedestrian, it's not fun to see a car swerve to miss the bump when crossing the street. They come right toward the corner where pedestrians are stand at, and swerve.

As a cyclist, its more junk in the road to navigate. I do ride on Hawthorne and make that turn, and raised junk on the road is REALLY dangerous when trying to navigate a corner in traffic.

As a driver, diverters are an issue with buses, wide vehicles, cyclist, and those trying to get in their car that need just a little extra space. A driver can give extra space crossing over the middle lane. It's a fact of Hawthorne. Probably most of inner SE.

I appreciate the traffic calming, but more crap in the street isn't helpful in my experience getting around Portland.

Hopefully this is all helpful.

[REDACTED]

## Kelly, Matthew

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**From:**  
**Sent:** Monday, February 10, 2020 8:08 AM  
**To:**  
**Cc:** Kelly, Matthew  
**Subject:** RE: Roadway concerns

**From:** Geller, Roger <[Roger.Geller@portlandoregon.gov](mailto:Roger.Geller@portlandoregon.gov)>  
**Sent:** Friday, February 7, 2020 10:51 AM  
**To:** Cawley, Wendy <[Wendy.Cawley@portlandoregon.gov](mailto:Wendy.Cawley@portlandoregon.gov)>; Dickman, Dana <[Dana.Dickman@portlandoregon.gov](mailto:Dana.Dickman@portlandoregon.gov)>; Schweitzer, Leeor <[Leeor.Schweitzer@portlandoregon.gov](mailto:Leeor.Schweitzer@portlandoregon.gov)>; Sun, Christopher <[Christopher.Sun@portlandoregon.gov](mailto:Christopher.Sun@portlandoregon.gov)>; Wong, Chon <[Chon.Wong@portlandoregon.gov](mailto:Chon.Wong@portlandoregon.gov)>  
**Subject:** Roadway concerns

I gave a talk at the Portland Cycling Club's monthly meeting last night (formerly: Portland Wheelmen). These are people who ride in Portland a lot, generally fast, on expensive light bikes. Most club members are post-50 yrs old and have thus been riding in Portland for a long time.

The good news: They think conditions for bicycling in Portland are improving and are significantly better than they've been in the past. They are very much in favor of more protected bicycle lanes and they understand the benefit of congestion pricing to keep the roads moving for people who must drive. They support mass transit and dedicated transit lanes and are ok with shifting roadway capacity from auto lanes to bicycle and transit lanes.

The news: Only about 3 of 30 in the room support the I5 Rose Quarter project, thinking that it's a waste of \$700 million.

The not so good news (and the main focus for this email): They are having difficulty seeing the left- and right-turn calming treatments we're installing. They reported near-crashes, especially at night when those treatments can be difficult to see. One person mentioned 52nd and Flavel. They also expressed that the asphalt island on 102nd on the overcrossing is a hazard because it's difficult to see at night. Finally, in terms of hazards, they identified the construction bio-bags that we put around inlets as a significant problem. They'd like to see those better marked because at night they can be difficult to see.

I'd appreciate some follow-up as I told them I'd get back to them.

Thanks.

Roger Geller | Bicycle Coordinator  
Pronouns: He/Him  
Portland Bureau of Transportation  
1120 SW 5th Avenue, Suite 800  
Portland, OR 97204  
Phone: 503.823.7671  
[roger.geller@portlandoregon.gov](mailto:roger.geller@portlandoregon.gov)  
[www.portlandoregon.gov/transportation](http://www.portlandoregon.gov/transportation)



**Kelly, Matthew**

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**From:** [REDACTED]  
**Sent:** Monday, September 23, 2019 6:21 PM  
**To:** Kelly, Matthew  
**Subject:** thank you!! New intersection design in your neighborhood

Hi, Matt.

I first noticed these a week or two ago and immediately could envision their purpose. What a great idea!

Just a few weeks ago I was on my bike NB on 33rd Ave. waiting for the light to change at Powell. An inattentive WB driver on Powell made the left turn fast to beat the yellow light, cutting the corner into my lane on 33rd and nearly hitting me. It was early evening and I suppose the setting sun contributed, but that is no excuse for driving blindly into the oncoming lane, (or driving blindly at all).

These calming devices would have slowed that car down.

However, I would rather call them a curb or median than a speed bump. When I first saw them I thought they would serve the curb purpose, not the bump purpose - meaning that they would get people not to cut the corner but to drive straight further into the intersection so that they could execute their turn into the proper lane and also have a better view of people in the crosswalk or in the oncoming lane. What do you think?

Thanks again, Matt!

[REDACTED]

## Kelly, Matthew

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**From:** [REDACTED]  
**Sent:** Wednesday, April 22, 2020 1:15 PM  
**To:** Kelly, Matthew  
**Subject:** Left Turn Bump: N Portsmouth and Willamette Blvd.

Hey Matt,

Just wanted to point out and share my concern over the left turn bump at N. Portsmouth and Willamette Blvd.

My concern is when two cars on opposite sides of Portsmouth both have a green light to make a left turn, it is impossible to do so at the same time without a collision, even though they both have the right of way. Has this been noted already?

Cheers,

[REDACTED]

Item: 1676160

Item Code 05C11676160

Category BOM Radio Dispatch

Contact

PortlandOnline User

Contact Type PDXReporter

Date Created 08/29/2019 7:28 PM

Date Due 08/30/2019 7:28 PM

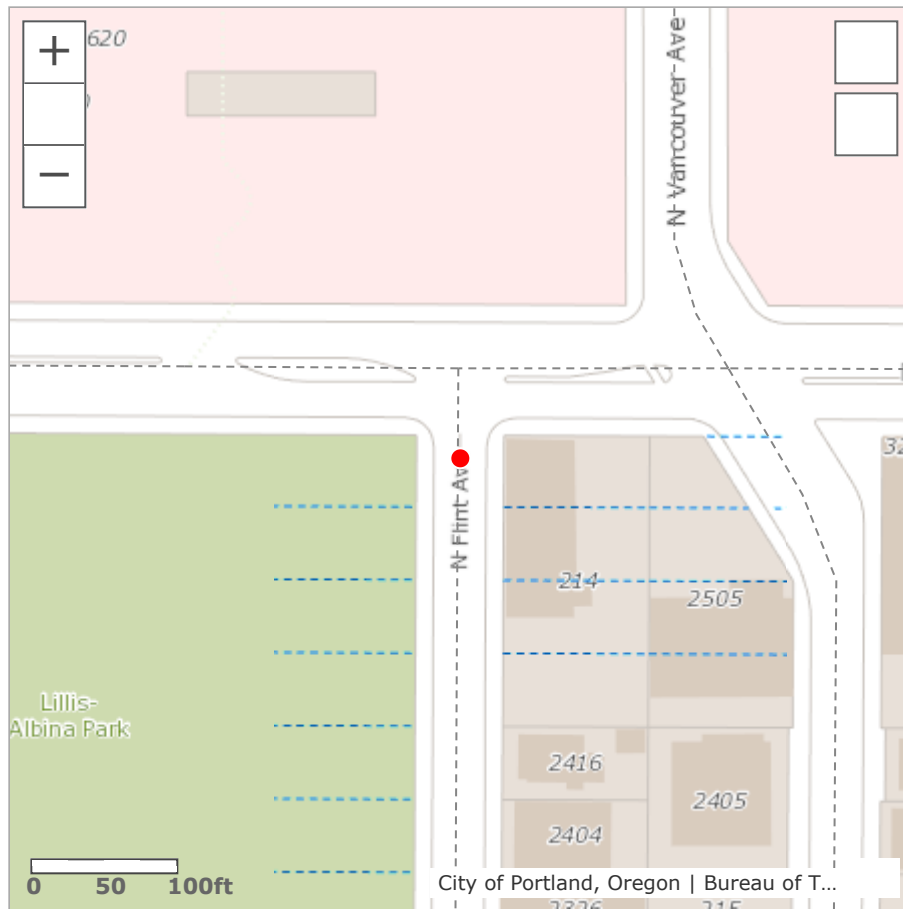
Created By TrackIT

Status Closed

Device

Description Is this a new trap for cyclists? Maybe consider putting some delineator posts along this obvious hazard. If you'd prefer that cyclists use Flint, resign the bike route on Vancouver. WTF PBOT ?????

Problem Location System Verified: 2300-2599 N FLINT AVE ([Google](#), [Bing](#))  
ELIOT, PORTLAND



**Location Description (ie., NE corner, southside, etc.)**

**Comments**

**How did you hear about this program?**

**Call Back Requested** No

**Attachments**




**Is this related to an ADA issue or concern?**

**ADA Issue comments - Describe the issue.**

**ADA Issue Resolution**

**Kelly, Matthew**

**From:** [REDACTED]  
**Sent:** Thursday, December 19, 2019 4:59 PM  
**To:** Kelly, Matthew  
**Cc:** [REDACTED]  
**Subject:** Re: New intersection design in your neighborhood

 The City's email systems have identified this email as potentially suspicious. Please click responsibly and be cautious if asked to provide sensitive information.

Hi, Matt Kelly

I've just been up to see the new left-turn bumpers. It seems they steer drivers into making turns that are more right-angled than in untreated intersections. The drivers have to slow down in order to make that sharper turn around the end of the bumper. I believe that PBOT has made this scary intersection much safer for all modes. THANK YOU!

Best wishes,

[REDACTED]