

Boston Region Vision Zero

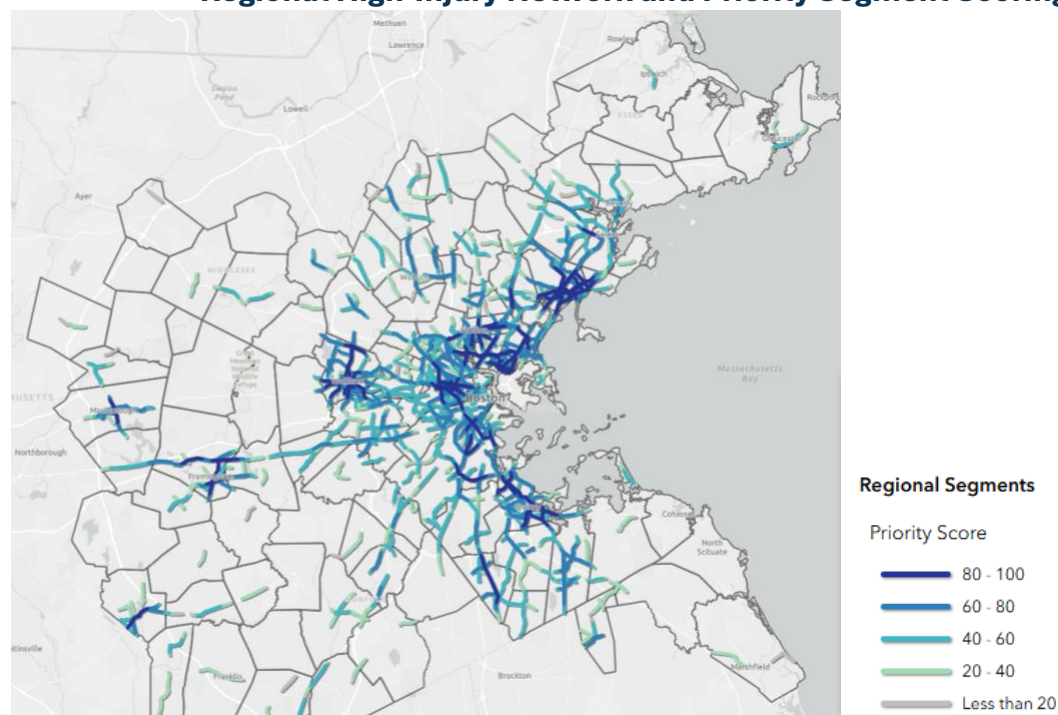
Strategy and Countermeasure Toolboxes

The Boston region's Vision Zero Action Plan is focused on improving locations on the roadway network where serious crashes have occurred and where there is a significant risk of more crashes occurring in the future. These locations are mapped as High-Injury and High-Risk Networks (HIN and HRN) in the Action Plan. To address some of the highest crash and highest risk locations on these networks, the Boston Region Metropolitan Planning Organization (MPO) has collaborated with seven municipalities from across the region to develop targeted safety countermeasure toolboxes that can inform strategies and serve as guidance for other municipalities facing similar roadway safety challenges.

Location Selection Process

Safety countermeasure toolboxes were developed for locations selected from an initial list of the top 100 highest scoring corridors of the regional High-Injury Network. Geospatial analysis of the HIN showed that the top 100 corridors had a priority score of 77 or greater. Figure 1 shows the priority scoring breakdown of the regional HIN. Appendix C of the Vision Zero Action Plan includes the full methodology for developing the HIN.

Figure 1
Regional High-Injury Network and Priority Segment Scoring



From the list of top priority corridors, the MPO staff focused on roadway segments with the following attributes:

- The roadway segments are under municipal jurisdiction.
- The municipalities do not have an active Vision Zero program.
- The roadway segments are not currently programmed in the MPO's Transportation Improvement Program (TIP) or part of an ongoing design project.

This process resulted in a list of 26 corridors in 12 municipalities. The MPO staff also selected a corridor and three intersections from the regional High-Risk Network.

Over six months, the MPO staff worked with seven municipalities to do in-depth safety analysis, create a safety countermeasure toolbox to address both corridor-wide and site-specific safety challenges, and develop a series of solutions that can be applied in specific high-crash and high-risk locations. Prioritized locations and their high-crash and high-risk data are summarized in Table 1.

Table 1
Selected High-Injury and High-Risk Locations

Municipality	Corridor	Corridor/Intersections Extents	Regional HIN Score	High-Risk Element
Marlborough	Bolton Street (State Route 85)	Hudson Street to Main Street (north of Granger Boulevard)	86	High-risk intersection at Main Street, Union Street, and Lincoln Street
Newton	Beacon Street	Tudor Road to Centre Street	76	High risk for vulnerable road users; high-risk intersection at Beacon and Summer Streets/Langley Road and Centre Street
Milton and Quincy	Squantum Street	Granite Avenue to Quincy line (before London Avenue)	92	High risk for large vehicles, lane departure; high-risk intersection at Squantum Street and Granite Avenue

Municipality	Corridor	Corridor/Intersections Extents	Regional HIN Score	High-Risk Element
Swampscott and Lynn	Essex Street	Bessom Street (in Lynn) to Swampscott Mall Driveway (in Swampscott)	94	High risk for large vehicles
Hingham	Main Street	North Street to Water Street/Garrison Street	NA	High risk for lane departure crashes and intersection crashes involving vulnerable road users
Hingham	Three Intersections	High Street at Ward/French Street Main Street at Cushing/South Pleasant Street	NA	High risk for speeding, lane departure, and intersection crashes

HIN = High-Injury Network. NA = not applicable.

Source: Boston Region MPO.

Table 2 summarizes some of the key operational and land use details of each of the prioritized locations.

Table 2
Key Operational and Land Use Details of Prioritized Locations

Corridor / Location	Length	Functional Classification	Posted Speed Limit	Land Use	Transit
Bolton Street (State Route 85) / Marlborough	1.1 miles	Minor Arterial	25 and 35 mph	Schools, single family residential, police station	MetroWest Regional Transit Authority bus service
Beacon Street / Newton	0.97 miles	Principal Arterial	25, 30, and 35 mph	Commercial, single and multifamily residential, gas stations, restaurants, historic sites	No bus service; Access to Green Line D Branch Newton Centre MBTA stop

Corridor / Location	Length	Functional Classification	Posted Speed Limit	Land Use	Transit
Squantum Street / Milton and Quincy	0.4 miles	Minor Arterial	25 and 30 mph	Single family residential, parks, elementary school	MBTA rapid transit station and bus service
Essex Street / Swampscott and Lynn	1.3 miles	Minor Arterial	20 and 30 mph	Single and multifamily residential, small business, high school, parks, quarry, shopping mall	MBTA commuter rail station and bus service
Main Street / Hingham	0.8 miles	Minor Arterial	25 and 30 mph	Commercial, single family residential, religious	MBTA bus service
High Street at Ward and French Streets / Hingham	NA	High Street: Minor Arterial Ward and French Streets: Collectors	30 mph	Single family residential, commercial service	MBTA bus
Main Street at South Pleasant and Cushing Streets / Hingham	NA	Main Street: Minor Arterial South Pleasant and Cushing Streets: Collectors	30 mph	Single family residential, parks and recreation, elementary school	None

Note: All of the roadways listed in the table have two lanes—one lane in each direction.
NA = not applicable. mph = miles per hour.
Source: Boston Region MPO.

Safety Assessments

The MPO staff facilitated in-person safety assessments. At the assessments, participants reviewed crash trends and discussed personal experiences and perspectives about the corridors. The study team led walking audits of the corridors and intersections, stopping at selected locations to observe safety issues and discuss crash patterns.

The audit participants offered a variety of perspectives about safety issues and potential interventions for the corridors and intersections. Viewpoints included those from engineering, public works, police, fire, and community development/planning departments, and from municipal elected officials and school department leadership.

Findings

As illustrated in Table 2, the MPO staff found that these high-priority locations had a number of shared attributes:

- Functional classification of arterial (mostly minor arterial)
- Speed limits of 25 to 35 miles per hour
- Two lane cross-sections for the majority of the corridor, except turn lanes at some intersections
- Land uses that attract vulnerable road users, including residential, educational, and recreational uses

The safety analysis and safety assessments revealed similar challenges among these locations:

- **Vehicle speeding and wide roadway width:** High vehicle speeds were observed as a central safety risk at all locations. Long, straight, excessively wide roadways encourage drivers to travel above posted speed limits.
- **Intersection geometry and turning movement conflicts:** Skewed intersection approaches, wide corner curb radii, and parked vehicles blocking sight lines create operational and safety challenges at intersections.
- **Deficiencies in accommodations for vulnerable road users increases risks:** Long crossing distances, missing or faded crosswalk markings, non-ADA-compliant curb ramps, and gaps in the sidewalk and bike infrastructure create conflicts between people walking, biking, driving, and taking transit.

Figure 2 shows existing conditions at a particularly wide intersection at Cherry Street and Essex Street in Lynn.

Figure 2
Wide Intersection Geometry at the Cherry Street and Essex Street Intersection in Lynn, Massachusetts



Countermeasures

Safety Toolbox

Based on the common safety issues identified across these priority high-crash and high risk locations, the MPO staff developed a safety countermeasures toolbox that can serve as guidance for municipalities to address common challenges with systemic, low-cost, high-impact solutions.

Table 3
Safety Countermeasures Toolbox

Safety Issue	Countermeasure	Crash Reduction Factor	Timeframe for Implementation	Cost
Speeding	Narrow vehicle travel lanes to 10 or 11 feet	42% reduction	Short-term	Low
Speeding	Install speed cushions or speed humps	40% reduction	Mid-term	Medium
Speeding	Install speed feedback signs	NA	Short-term	Low
Intersection Geometry	Reduce corner radii and harden corners at intersections	30% reduction	Short-term to Mid-term	Low to Medium
Intersection Geometry	Implement centerline hardening (quick-build)	NA	Short-term	Low
Pavement Markings and Signage	Refresh and add crosswalks, stop bars, and lane lines with high-visibility paint	40% reduction	Short-term	Low
Pedestrian Accommodations	Install rectangular rapid flashing beacons at crosswalks	47% reduction	Short-term	Low
Pedestrian Accommodations	Install curb extensions or pedestrian refuge islands at midblock crossings	30% reduction 56% reduction	Short-term	Low

Safety Issue	Countermeasure	Crash Reduction Factor	Timeframe for Implementation	Cost
Pedestrian Accommodations	Add advanced signage and pavements markings before midblock crosswalks	25% reduction	Short-term	Low
Pedestrian Accommodations	Install pedestrian refuge islands at mid-block crossings	56% reduction	Mid-Term to Long-Term	Medium to High
Pedestrian Accommodations	Install raised crosswalks	36% reduction	Short-Term to Long-Term	Medium to High
Traffic Signals	Add retroreflective backplates to signal heads	15% reduction	Short-Term to Mid-Term	Low to Medium
Traffic Signals	Add Leading Pedestrian Intervals (LPIs)	13% reduction	Short-Term	Low
Bicycle Accommodations	Implement separated or protected bicycle lanes	31–45% reduction	Mid-Term	Medium to High
Lighting	Install pedestrian-scale lighting at crosswalks and intersections	33% reduction	Mid-term	Medium

Note:

Time frame years:

- Short-Term: < 3
- Mid-Term: 3-5
- Long-Term: > 5

Cost range dollar amounts:

- Low: < \$25,000
- Medium: \$25,000-\$250,000
- High: > \$250,000

NA = not applicable.

Sources: Boston Region MPO; Massachusetts Department of Transportation Construction Project Estimator; Federal Highway Administration Proven Safety Countermeasures; Crash Modification Factor Clearinghouse; and Oregon Department of Transportation, Crash Reduction Factor Manual.

Recommendations and Next Steps

Through these efforts, the Boston Region MPO staff developed a process for conducting further analysis on high-priority corridors and for coordinating with municipalities to develop interventions. We identified common safety challenges and developed a toolbox of proven interventions that can be implemented at high-crash and high-risk locations throughout the region. The MPO staff will continue to work with municipalities to help apply this safety toolbox to address priority systemic and site-specific safety challenges.