

List of Potential Safety Countermeasures

The following list of potential safety countermeasures is provided in order to assist staff in addressing identified safety concerns throughout the City of Hamilton. The most comprehensive resource is the Federal Highway Administration's (FHWA) Crash Modification Factors Clearinghouse, a database of studies on most safety countermeasures.

This list does not reflect details about the feasibility or appropriateness of a proposed countermeasure for a specific location. Location-specific constraints and existing facilities must be considered when determining the most appropriate countermeasure for a given location.

Signals

Pedestrian Countdown Heads: Signal head that provides pedestrian countdown, as opposed to traditional WALK/ DON'T WALK signal head.

Flashing Beacons (includes Rectangular Rapid Flash Beacons – RRFB): Flashing beacons highlighting stop signs, warning signs, pedestrian crossings and school zones through the addition of a flashing light. RRFB's provide a high visibility, brighter strobe-like flashing frequency.

Leading Pedestrian Phase/Leading Pedestrian Intervals: Traffic signals timed to allow pedestrians a short head start in crossing the intersection to minimize conflicts with turning vehicles.

Protected/Permissive Left-Turn Phasing Conversion: Protected left-turn phasing provides an exclusive phase for left-turning vehicles to enter the intersection separate from any conflicting vehicle or pedestrian movements. Permissive/protected left-turn phasing provides the exclusive left-turn phase in addition to a phase permitting left turns simultaneously with conflicting through movements.

Signal Timing Improvements: Modified signal cycle lengths and co-ordination, longer walk intervals.

Pedestrian Detection to Extend Crossing Time When a Pedestrian is Detected Within the Intersection: Sensors or push buttons that detect when pedestrians are present in a crossing and automatically increase crossing time when necessary.

Pedestrian Scrambles/Exclusive Pedestrian Phasing: Restricts all vehicular movements to provide an exclusive signal phase allowing pedestrians to cross in all directions, including diagonally.

Accessible Pedestrian Signals (APS): Pedestrian signals that provide audible or tactile cues to aid visually or cognitively impaired pedestrians in safely crossing the street.

New Traffic Signals: Traffic signal installed at previously unsignalized intersection.

Optimize Signal Timing for Bicyclists: Signal timing optimized for bicyclist speeds, reducing number of times bicyclists encounter red signals along a stretch of road.

Signal timing changes have been shown to reduce pedestrian and bicyclist injury collisions by 37%.

Additional countermeasures: The following countermeasures are currently being used in various municipalities throughout North America, but research is not yet available to indicate their effectiveness in reducing bicycle collisions.

- Bicycle Signal Detection (Push Button, Loop Detector)
- Bicycle Scramble
- Bicycle Signal Heads
- Leading Bicycle Interval
- Separate Bicycle Signal Phase

Geometrics

Painted Medians: Pavement striping that separates lanes of traffic but does not provide a raised surface.

Raised Pedestrian Crossing/Raised Crosswalks/Speed Tables and Raised Crosswalks: Pedestrian crossings that are elevated to the level of the sidewalk, with ramps on each vehicle approach.

Corner Bulb Outs and Curb Extensions: Raised devices, usually constructed from concrete and/or landscaping, that reduce the corner radius or narrow the roadway in order to reduce traffic speeds and shorten crossing distances.

Intersection Conversion to Roundabout: Roundabout installed at a previously unsignalized intersection or to replace a former traffic signal. Roundabouts are large circular islands, placed in the middle of an intersection, which direct flow in a continuous circular direction around the intersection.

Refuge Islands/Raised Median/Pedestrian Refuge Islands: Curbed sections in the center of the roadway that are physically separated from vehicular traffic. Raised medians or refuge islands shorten crossing distances across wider roadways.

Closed Crosswalk Removal/New Crosswalks: Removal of existing crosswalks, or installation of new crosswalks.

On-Street Parking Reconfiguration: Removing on-street parking near intersections and driveways, or reconfiguring parking to minimize conflict points with bicyclists.

Roadway Cross Section Reduction (Road Diet): Reduction in number of travel lanes in roadway.

Separated Bike Lane (Cycle Track): Designated bicycle lanes, separated from vehicle traffic, by a physical barrier, usually bollards, landscaping, parked cars, or through elevated separation.

Separate Shared-use or Bicycle Path: Off-street path, either for exclusive use by bicyclists or both bicyclists and pedestrians, usually with minimal street crossings, and designated by signs and/or pavement markings.

Wide Curb Lane: Provision of a wider curb lane that accommodates bicyclists and vehicles, where a dedicated bike lane or other bicycle facility is not possible.

Traffic Diverters: Physical barrier placed diagonally across an intersection, which restricts the flow of vehicular traffic, but allows for pedestrians and bicyclists to cross the intersection.

Additional countermeasures: The following countermeasures are currently being used, but industry research is limited to indicate the effectiveness in reducing collisions.

- Lane Narrowing
- Rumble Strips
- Paved Shoulder
- Curb Radius Reduction
- Mini-Circles
- Chicanes
- Full or Partial Street Closures

Signs, Markings, Regulatory

Intersection Lighting/Crosswalk Lighting: Lighting between the crosswalk and oncoming vehicles, usually beginning 3 to 4 metres before the crosswalk.

Segment Lighting: Quality and consistent placement of streetlights for drivers, as well as pedestrian scale lighting for sidewalks.

Right Turn on Red Restriction: Right turns prohibited on red to reduce conflicts between pedestrians and right-turning vehicles.

Left Turn Restriction: Left turns prohibited to reduce conflicts between pedestrians and left-turning vehicles.

Parking Restriction Near Intersections: Parking spaces removed near crossing locations to allow for improved sightlines for both pedestrians and drivers.

Pavement Friction (Textured Pavement): Textured pavement or a textured overlay on pavement to provide additional cues to drivers that they are reaching a pedestrian crossing, or other key area such as a tight radius corner.

High-Visibility Crosswalk: Distinct pavement markings, such as a continental, zebra or ladder pattern, or a reflective inlay or thermoplastic tape.

Pedestrian Warning Signage: Signs such as "Yield Here to Pedestrians" or "Stop Here for Pedestrians" that can be placed at the roadway surface level in advance of the crosswalk, on posts, or overhead.

Shared Bus-Bike Lane: Lanes designated for use only by public transit buses, bicycles and usually right-turning vehicles.

Shared Lane Markings: Pavement markings on travel lanes, also called a sharrow, which indicate that the road space should be shared between bicycles and vehicles.

Bike Lanes: Five to seven foot wide designated lanes for bicyclists adjacent to vehicle travel lanes, delineated with pavement markings.

Warning and Regulatory Signs for Drivers ("Share the Road," "No Parking in Bike Lane"): Posted signs that provide warning and regulatory messages alerting drivers to the presence of bicyclists and shared roadway facilities.

Buffered Bike Lanes: Designated lanes for bicyclists, 1.2 to 1.5 metres wide, separated from vehicle travel lanes and/or parked cars by pavement markings, usually 1 metre wide and with a double-line, chevron or diagonal line pattern.

Bike Box: Designated area for bicycles to wait at red traffic signals in front of queuing vehicles, usually marked with green pavement, with the intent of reducing delay at signals, increasing visibility of bicyclists, and in some cases, facilitating left-turn positioning for bicyclists.

Green Colored Pavement Markings: Green markings, created with paint, epoxy, thermoplastic, or colored asphalt, used to designate bike lanes, cycle tracks, bike boxes, conflict zones or intersection crossings.

Speed Control Measures, Miscellaneous

Speed Limit Reductions: Speed limit reductions performed street by street or implemented as part of a speed reduction zone (often found near schools and parks) or bicycle boulevard program.

Speed Tables, Humps, and Cushions: Asphalt protrusions 30-40 cm high that extend the width of the roadway, varying in length depending on type. Speed humps are rounded, while speed tables have a flat top.

Portable Speed Trailer/and Radar Speed Display Signs: Portable speed trailers that display the speed limit as well as the speed of the approaching vehicle in real-time, and in some cases have changeable message display boards.

Hazard Identification and Response Program: Publicly-run program that allows for two-way communication between jurisdictions and the public, including temporary signage alerting bicyclists to potential hazards, as well as technology solutions that allows the public to submit real-time information (often via cell phone) on hazards, such as debris in the road.

Red Light Camera's: Use of digital camera's at locations with identified collision concerns and specifically angle collisions that potentially occur as a result of motorists running a red signal.

Automated Speed Enforcement: Use of digital cameras at locations identified with high operational speeds or community sensitive areas, schools, parks, senior centers, heavy pedestrian areas.