

Work Zone Safety

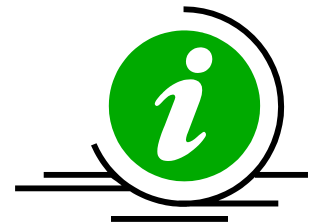
A Look At Best Practices

AASHTO – SCOTE

June 6, 2016

Work Zone Safety Innovations

- Positive Protection Measures
- Pedestrian Accommodations
- Temporary Bicycle Facilities
- Work Area Lighting
- Sequential Drum Lights
- Temporary Portable Rumble Strips
- Smart Work Zone Applications
- Work Zone Intrusion System
- Automated Enforcement



Why Change Work Area Protection



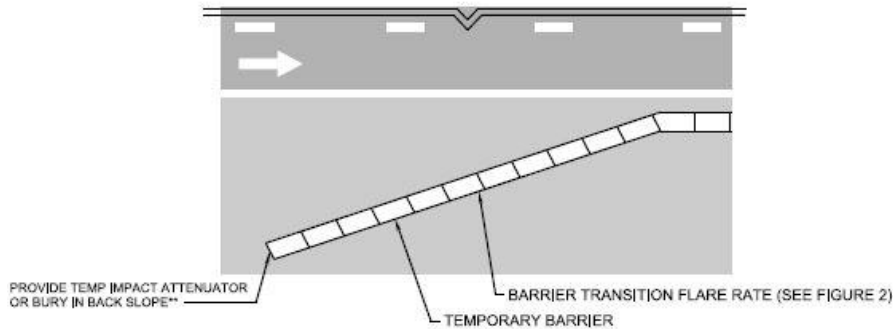
Positive Protection/Worker Safety

- Develop provisions to protect motorists from drop-off conditions and workers from vehicle intrusion
- Provide design engineers and contractors with guidance on how & when to protect the work area
- Give clear direction on when restrained barrier is required for drop-off conditions
- Define proper clear-zone and barrier flare rate requirements
- Establish standard safe work area entry/exit details

Positive Protection Examples



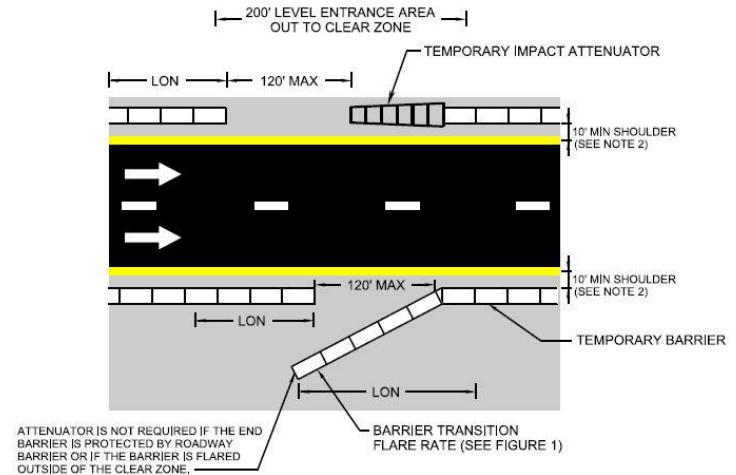
Temporary Barrier Details



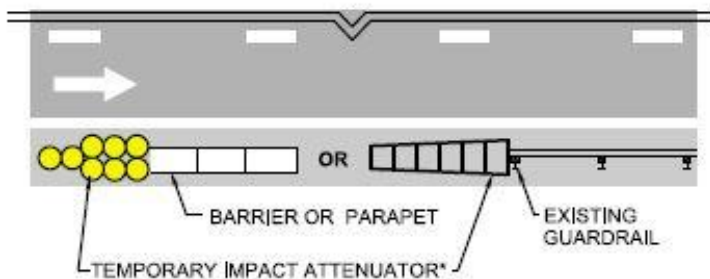
BARRIER TRANSITION FLARE RATE	
70 MPH	= 22:1
65 MPH	= 20:1
60 MPH	= 19:1
55 MPH	= 17:1
50 MPH	= 16:1
45 MPH	= 14:1
40 MPH	= 13:1
35 MPH	= 11:1
30 MPH	= 10:1
& BELOW	= 10:1

NOTE: BARRIER TRANSITIONS SHOULD BE PLACED ON HMA OR CEMENT CONCRETE SURFACES ONLY.

Transition Flare Rates
updated based on the
posted speed limit



In-line Transition Details



Safe Entry/Exit Details



Pedestrian Hazards

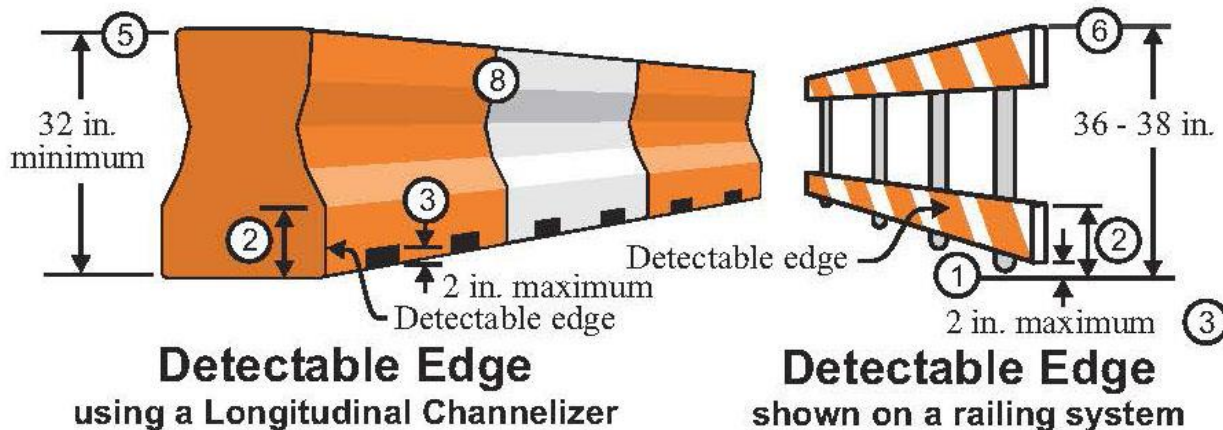


Pedestrian Accommodations

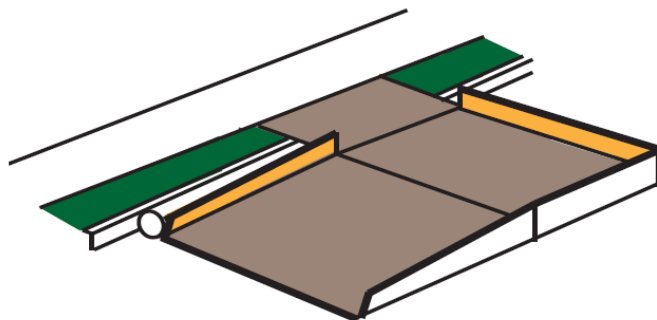
- It is undesirable to close sidewalks or pathways during construction, however if unavoidable, use channelizing devices to delineate a temporary route
- Clearly define detour routes and place advance signs at intersections rather than midblock locations
- Maintain a minimum width and smooth surface for wheelchair access, including providing ADA compliant ramps if pedestrians are channeled from the sidewalk into the street
- Protect pedestrians from hazards, such as holes, cracks or construction debris

Visually Impaired Pedestrians

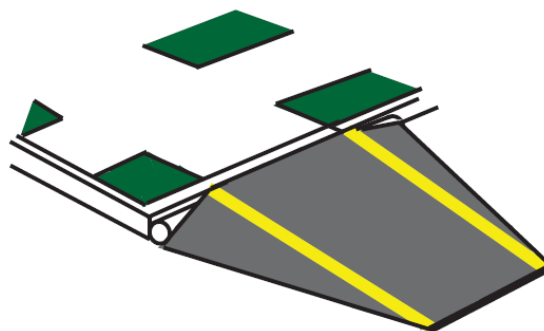
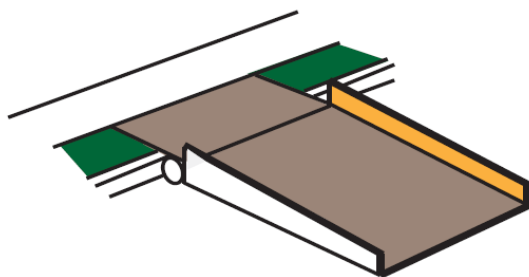
- To accommodate visually impaired pedestrians effectively the traffic control devices should NOT:
 - Present a tripping hazard at entry or along a travel route
 - Present an injury hazard when trailed by hand
 - Present an entrapment hazard in continuous cane use
 - Present a hazard to pedestrians with a cane or guide dog



Temporary Curb Ramps



Parallel to Curb



Perpendicular to Curb

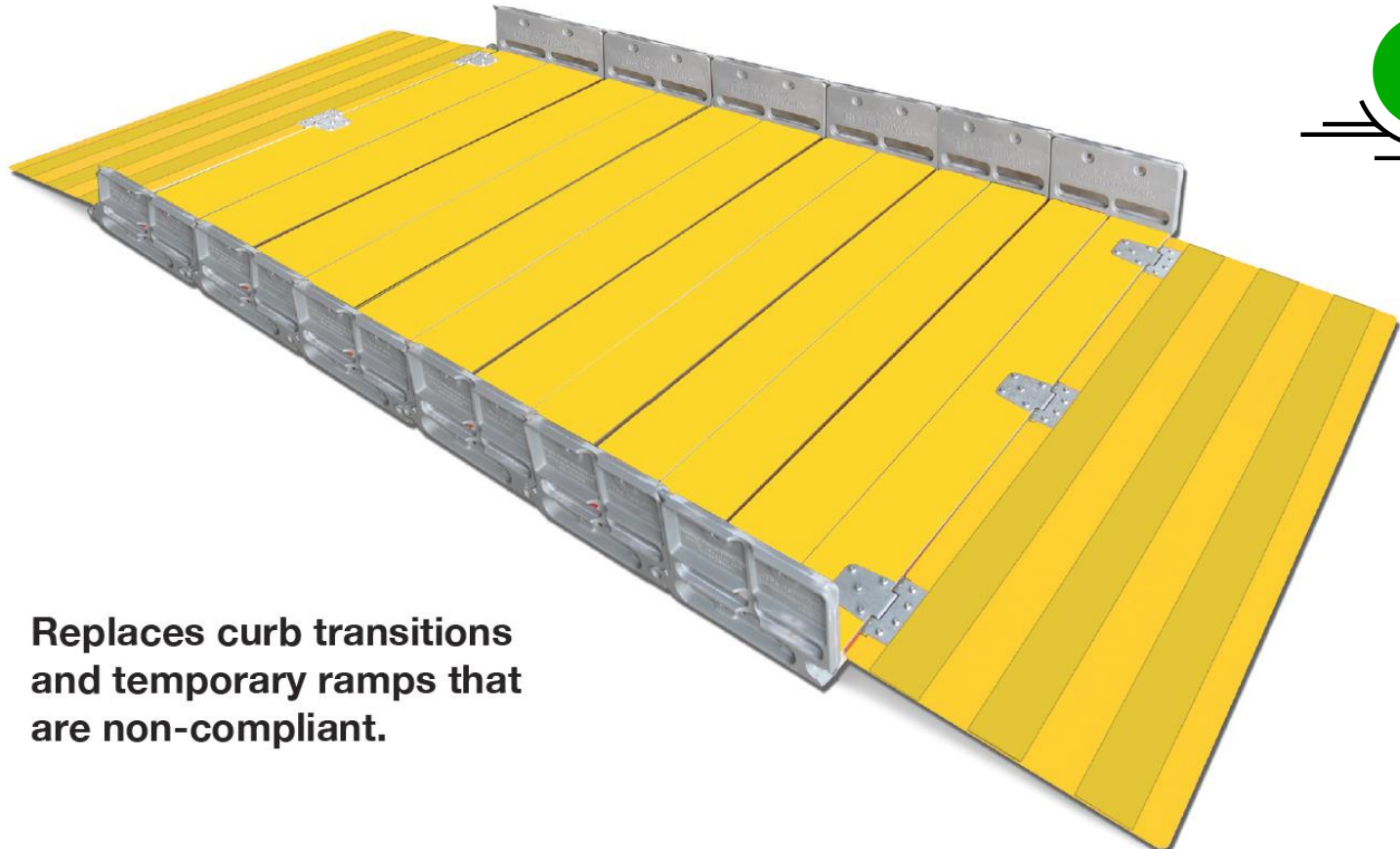
Source: Virginia DOT

Follow standard ADA requirements

Manufacturers are starting to develop ADA compliant WCR devices

Recommend use contrast color on edge of walkway ramp/path

Temporary Pedestrian Modular Ramp



**Replaces curb transitions
and temporary ramps that
are non-compliant.**

**Manufactured by Plastic Safety Systems*



Bicycle Hazards

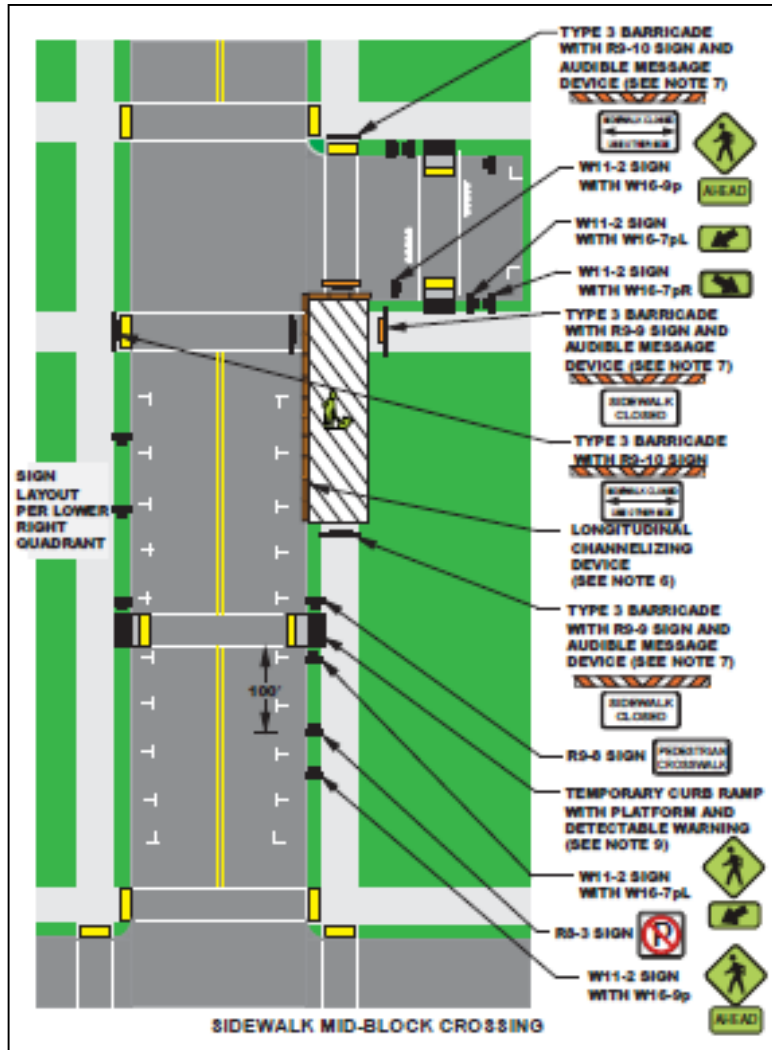


Bicycle Accommodation

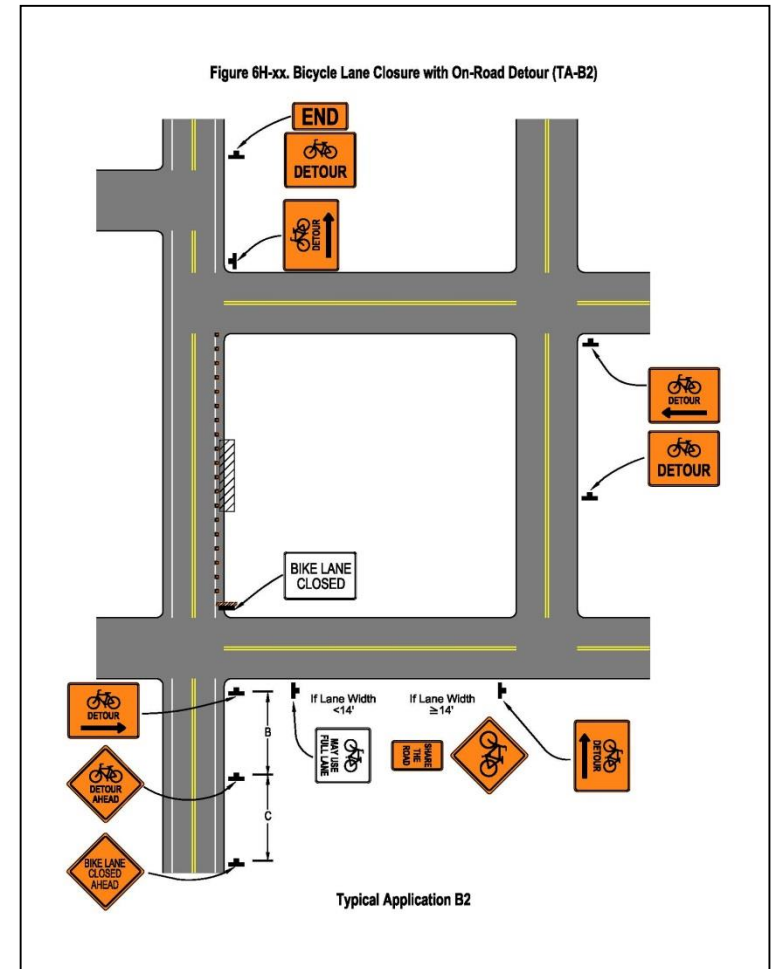
- Guidance for how bicycles should be accommodated based upon “stress level”
- Temporary facilities should not be a lower facility type unless no reasonable alternative is available
- Define recommendations based upon facility type (multi-use paths, bike lanes, shared lanes, etc.)
- Rules for surface conditions, maintenance recommendations, drainage, and detours



Bicycle Typical Applications



Source: Virginia DOT



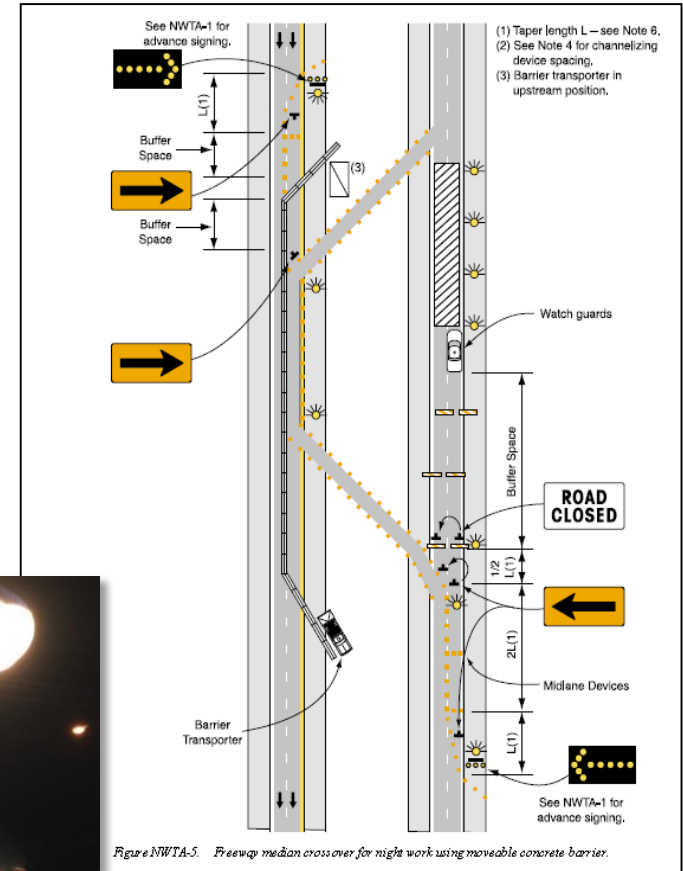
Source: MassDOT



Work Area Lighting



- Glare-free light increases the personal safety of night-time road work crews and drivers
- New technology is visually as bright and effective as conventional diesel towers



Source: NCHRP Report 476

Sequential Drum Lights

- MassDOT will be testing out lighting the taper for lane closures using the sequential drum lights
- These lights automatically synch with each other and when lit they will provide additional guidance similar to an arrow board



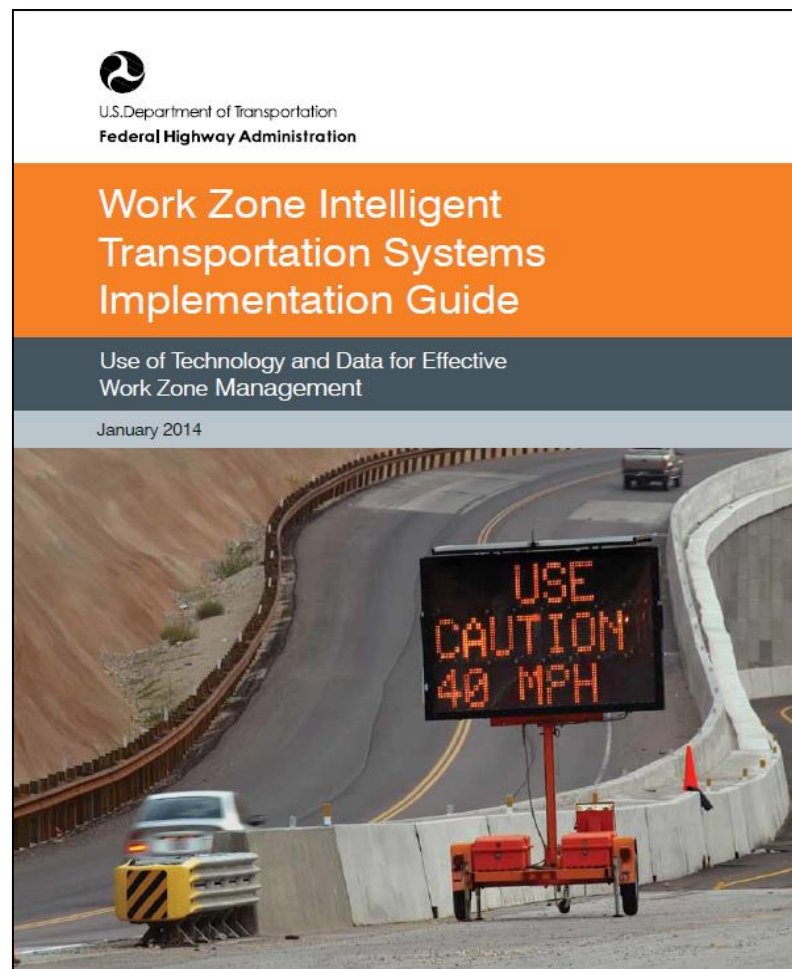
Temporary Portable Rumble Strips

- MassDOT will be testing out using temporary portable rumble strips for lane closures to alert motorists and encourage speed reduction
- A typical application has been developed for use of the TPRS based on the speed of the roadway



Smart Work Zones

- SWZs are portable combinations of ITS equipment designed for flexible deployment in work zone environments and used to monitor and report out on traffic operations
- FHWA's Every Day Counts program is targeting more SWZ utilization for mobility

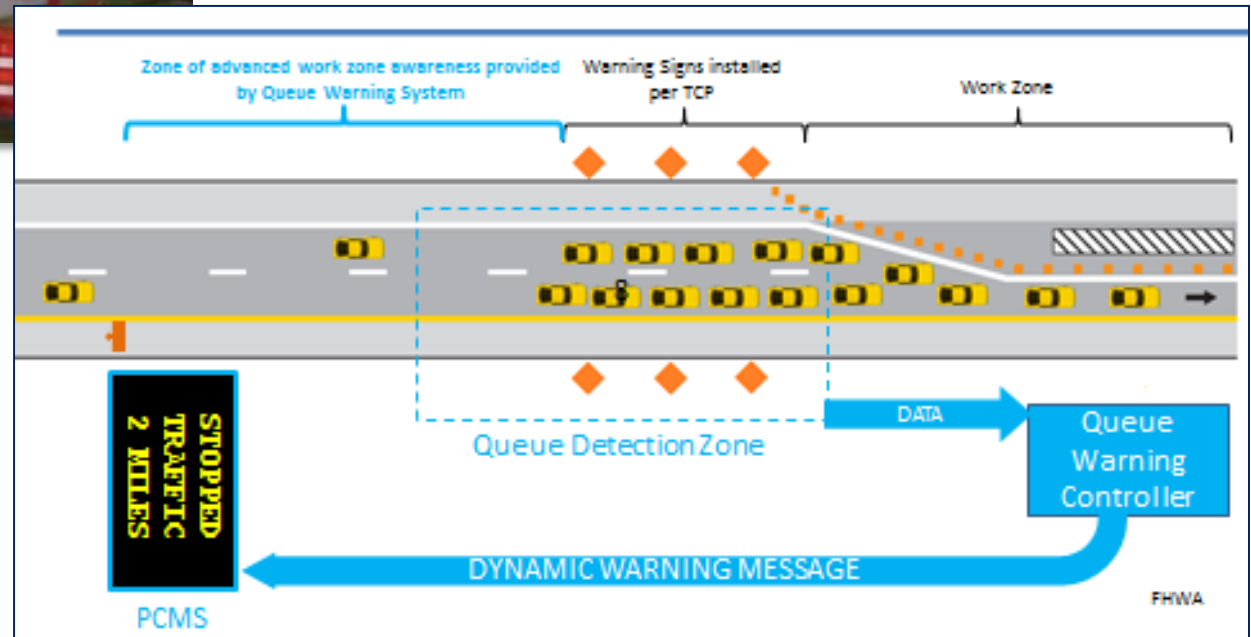


Queue Warning System

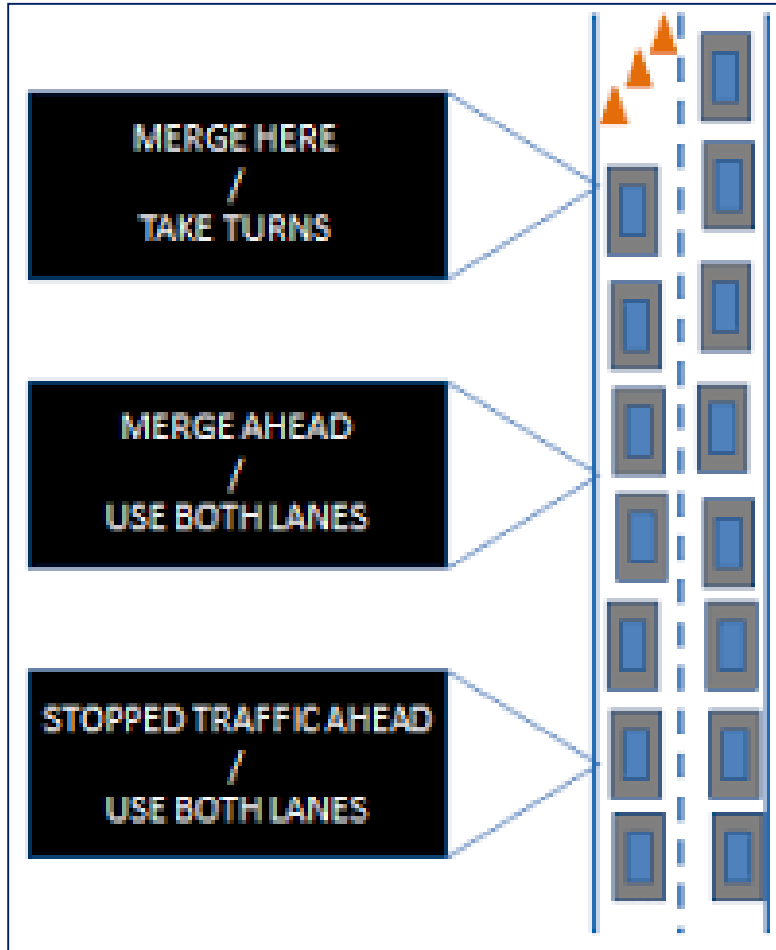


- Used to alert motorists of stopped traffic before they reach the back of queue

- Helps to prevent rear-end crashes before they happen



Dynamic Merge System



- **Early merge:** In low-volume conditions reduces the occurrence of high-speed merging at the point of lane closure
- **Late merge:** In high-volume conditions reduces the length of the queue



Work Zone Safety



FHWA Operations



Lane Closure System

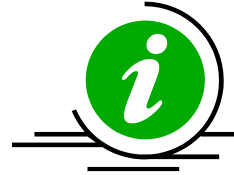
SwiftGate/SwiftSign

- Permanent or short-term
- Sign Module
- Remote Operation



Driveway Assistance Device

- Developed by Horizon Traffic Signal & TTI
- Used to control driveway access for a one-lane bidirectional work zone
- FHWA Experimentation
 - Michigan DOT
 - Others expressed interest as well
- Developed with TTI



Work Zone Intrusion System



Traffic
Intrusion

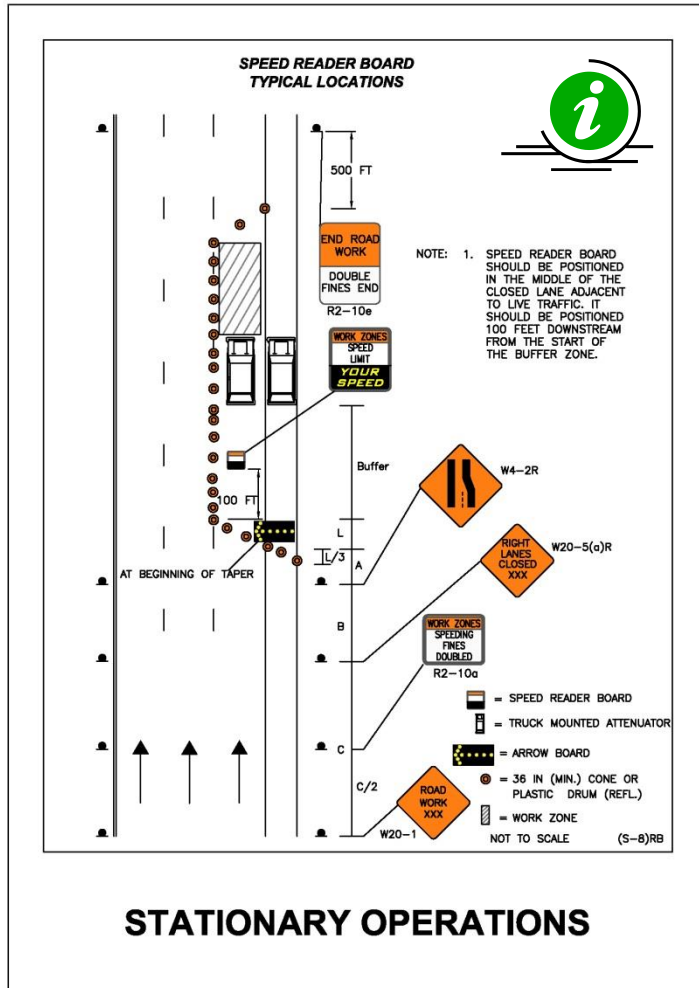
WorkTrax
Broadcast

Light
Activation

Siren
Activation




Speed Feedback Signs



Flashers: Use Only if Workers Present

Automated Enforcement

- Speeding and driver distraction are major issues for work zone safety and MassDOT is looking towards technology to help address the issue 
- MA is considering a pilot test of automated speed enforcement in work zones for improved worker and motorist safety (*in-use IL & MD*)



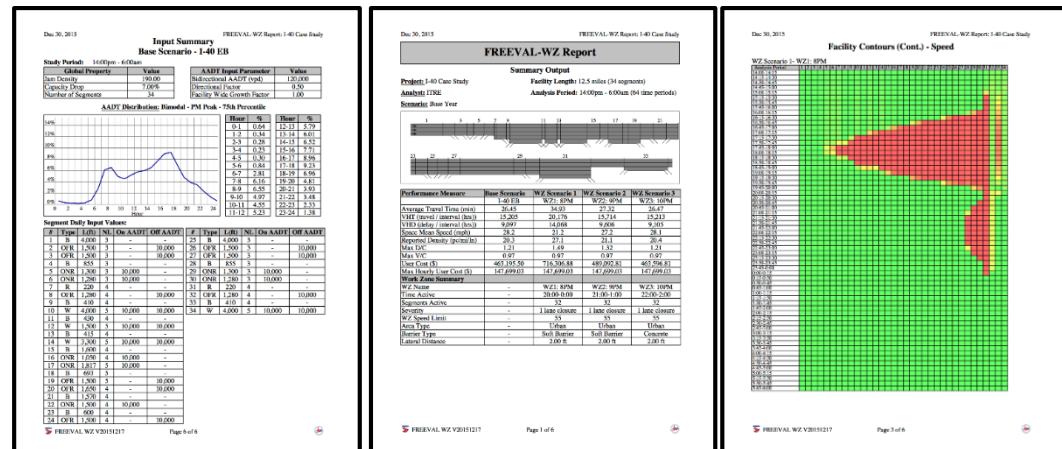
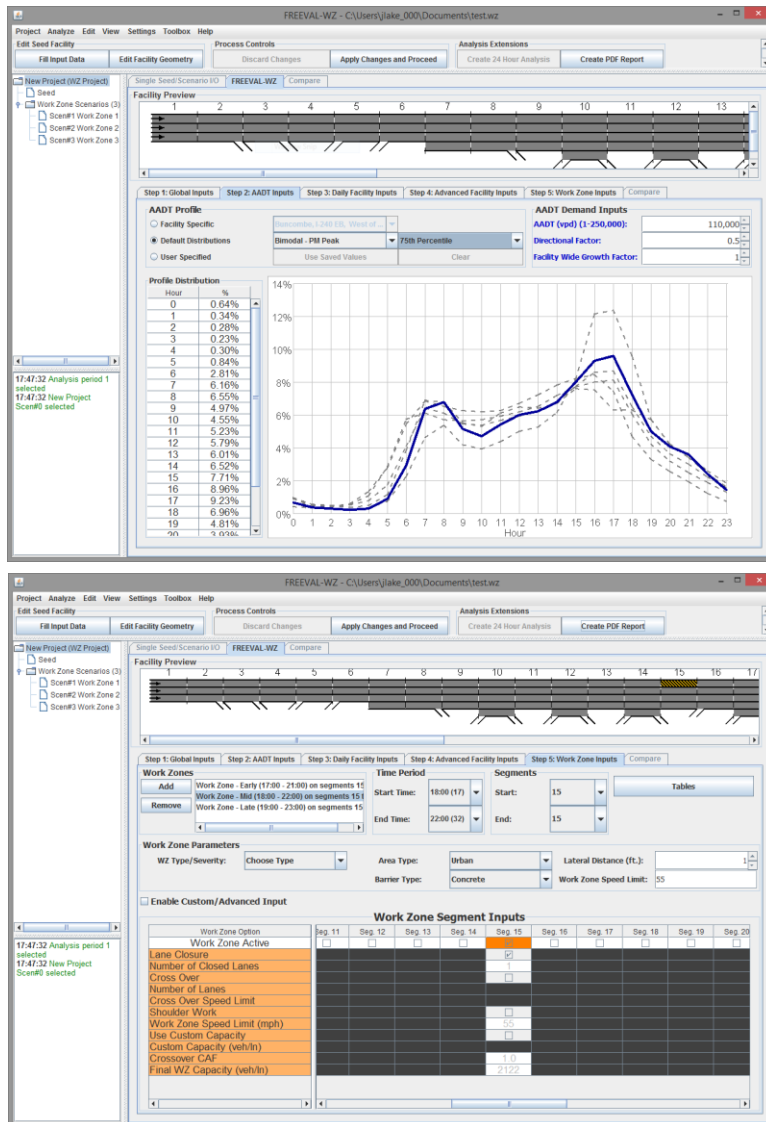
*Note: Use of photo/video enforcement is not currently legal in Massachusetts**



WZ Operational Analysis

NCDOT Planning-Level Work Zone Corridor-Level Analysis Tool: FREEVAL-WZ

Work zone capacity (NCHRP 03-107), analysis that can readily predict the impacts of a freeway work zone



and finally...Red Light Running Camera
Enforcement – Who is having success?



Contact Information

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