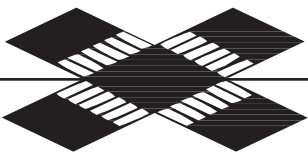


Intersections



Restricted sight distance

- Remove sight obstructions
- Provide adequate channelization
- Provide adequate tapers
- Provide left/right turn lanes
- Offset left-turns
- Install warning signs
- Install STOP signs
- Install signal/roundabout
- Install advance markings to supplement signs
- Install STOP bars

Large volume of left/right turns (from side street)

- Widen road
- Channelize intersection
- Install STOP signs
- Install signal/roundabout
- Increase curb radii

Crossing pedestrians/

Large total intersection volume

- Install / improve ped signing/markings
- Install signal
- Add traffic lane
- Curb extension
- Refuge Island

Large volume of turning vehicles

- Provide left/right turn lanes

Lack of adequate gaps

- Install signal/roundabout
- Install STOP signs

Slippery surface

- Improve skid resistance
- Improve drainage

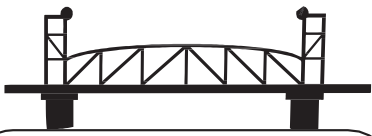
Poor visibility of signals

- Upgrade traffic control devices
- Install/enhance advance warning signs
- Install overhead signals
- Install 12" LED signal lenses
- Install visors/backplates
- Relocate signals to far side of intersection
- Remove sight obstructions
- Add illuminated/ retro-reflectorized signs

Lack of lane discipline w/in intersections

- Add guide striping

Bridges



Alignment/Narrow Roadway

- Realign bridge/roadway
- Widen structure
- Improve delineation
- Install signing/signals

Visibility

- Remove obstruction
- Install advance warning signs

Vertical Clearance

- Rebuild structure/adjust roadway grade
- Provide height restriction/warning

Slippery Surface

- Improve skid resistance
- Improve drainage

Rough Surface

- Rehabilitate joints
- Regrade approaches

Inadequate barrier system

- Upgrade approach rail/terminals
- Upgrade bridge -approach rail connections

 **FHWA Proven Countermeasure**

Roadway Departure (Run-off-road)



Slippery pavement/ponded water

- Improve pavement condition/skid resistance

- Improve drainage

Inadequate road design/maintenance

- Improve superelevation through treatment

- Improve shoulders

- Eliminate shoulder drop-off

- Install/improve traffic barriers

- Install/upgrade double arrow

- Install advanced warning signs

- Enhance signing

- Widen lanes

- Flatten slopes/ditches

- Improve alignment/grade

- Remove/Reduce/ Delineate roadside hazards

Poor delineation

- Install roadside delineators

- Install advance warning signs

- Improve/install pavement markings

Poor visibility

- Increase sign size

- Install lighting

- Evaluate sight distance

- Longitudinal rumble strips/stripes

Right Angle



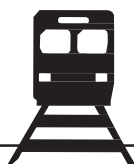
(Unsignalized Intersection) Restricted sight distance

- Install warning signs
- Install STOP signs
- Install yield signs
- Remove sight obstructions
- Install signal/roundabout
- Install lighting
- Reduced left turn conflict intersection
- Road Diet

(Signalized Intersection) Poor visibility of signals

- Install advance warning signs
- Install back plates
- Remove sight obstructions
- Add signal heads
- Upgrade to 12" LED heads
- (Signalized Intersection) Inadequate signal timing
- Provide protected only left turn phase
- Adjust amber phase (yellow change interval)
- Provide all-red clearance interval
- Install detection
- Improve signal coordination

Railroads



Restricted Sight Distance

- Install/enhance advance warning signs
- Install/enhance pavement marking
- Remove sight obstructions
- Provide preemption
- Install gates

Pedestrians & Bicyclists



Lack of Facilities/Separation/ Poor Visibility

- Remove sight obstructions
- Install pedestrian crossing signs and pavement markings
- Install median for refuge
- Install lighting
- Install advance warning signs
- Reduce speed limit
- Install/Improve sidewalks/multi-use bicycle paths/arrows
- Road Diet
- Leading Pedestrian Interval
- Pedestrian Hybrid Beacon
- Poor Crossing Conditions
- Add "WALK" phase
- Bicycle may use full lane
- Rapid Rectangle Flashing Beacon
- Raised Crosswalk
- Paved Shoulders
- Separated/buffered bike lane
- Green bike lane
- Improve/update curb ramp
- Curb radius reduction
- Refuge Island

Access Related



Left-turning vehicles

- Install median
- Install/lengthen left turn lanes
- Improperly located driveway
- Move driveway to side street
- Install channelizing islands to define driveway location
- Consolidate adjacent driveways

Right-turning vehicles

- Provide right turn lanes
- Increase width of driveways
- Widen through lanes
- Increase curb radii

Large volume of through traffic

- Move driveway to side street

Large volume of driveway traffic

- Construct a local service road
- Signalize driveway
- Provide accel/decel lanes
- Channelize driveway
- Construct a local service road

Restricted sight distance

Inadequate lighting

- Remove obstruction
- Install lighting

Median Crossover Issues

- Improve crossover spacing
- Add turn-lanes

Nighttime, Overturn, & Wet Weather



Nighttime - Poor Visibility

- Install or enhance advance warning signs
- Install or enhance pavement markings

- Install lighting

Overturn - Roadside Features

- Flatten slopes/ditches
- Relocate drainage facilities
- Extend culverts
- Provide traversable culvert end treatments

- Install/improve traffic barriers

Overturn - Inadequate Shoulder

- Widen shoulder
- Upgrade shoulder surface

- Remove curb/obstruction

Overturn - Pavement

- Eliminate edge drop-off

- Improve pavement

Wet Weather/Slippery Pavement

- Improve pavement condition

- Install high friction surface treatment

- Improve drainage

Wet Weather - Poor Visibility

- Install raised pavement markers

- Improve pavement marking

Side-swipe or Head-on



Inadequate road design and/or maintenance

- Perform necessary road surface repairs
- Install median or guardrail
- Reevaluate no passing zones
- Provide roadside delineators
- Improve alignment/grade
- Widen lanes
- Provide passing lanes
- Improve shoulders
- Install rumble strips

Excessive vehicle speed

- Set speed limit based on speed study

Inadequate pavement markings

- Install/improve centerlines, lane lines, edge lines
- Install reflectorized markers

Inadequate signing

- Provide advance direction and warning signs
- Add illuminated street name signs
- Superfluous signing
- Limit signs to meet standards
- Road Diet

For more information, please go to: www.destinationzerodeaths.com

SHSP/HSIP:



Infrastructure & Operations

Possible Causes of Crashes & Potential Countermeasures



SOURCE: ITE Transportation Engineering Handbook w/ Edits by DOTD Highway Safety

Updated: 6/6/2018