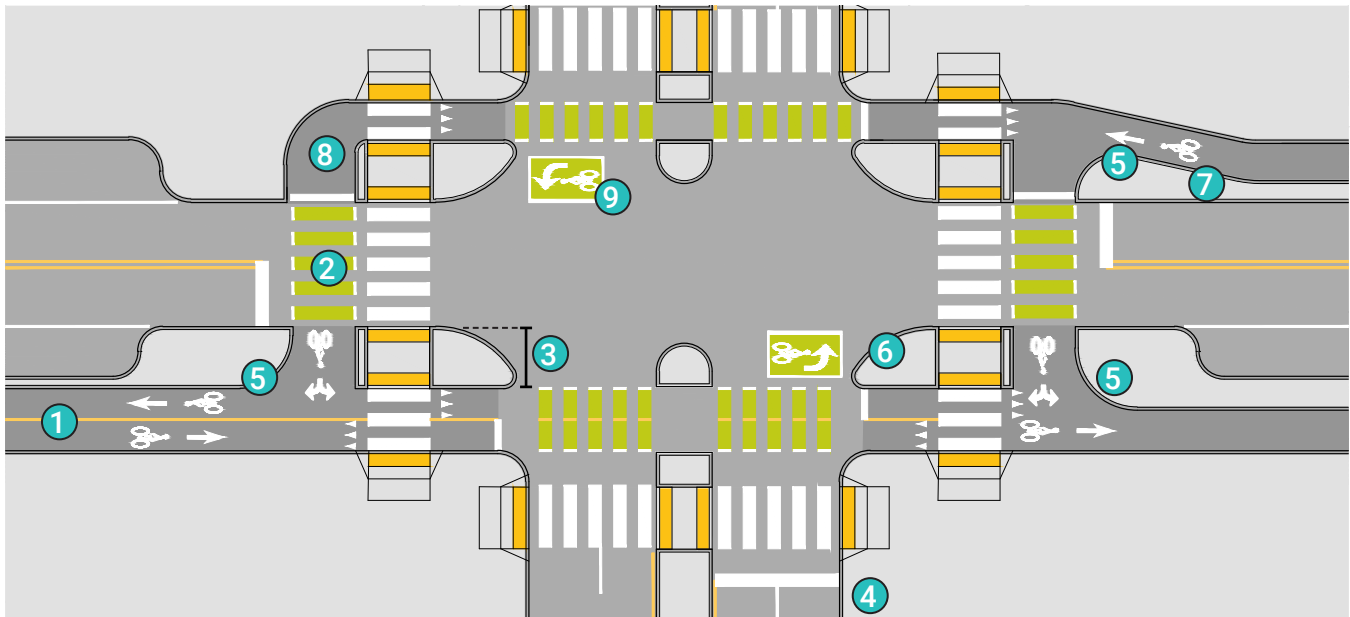


Separated Bike Lanes: Two-Way to One-Way Transitions

This treatment provides a transition from two-way separated bike lanes to one-way separated bike lanes on the same street.



Typical Application

All transitions between two-way and one-way separated bike lanes on the same street.

Guidance

- ① For separated bike lane widths, see page XX.
- ② For crossings, see page XX.
- ③ Bicycle crossing is offset from the outside travel lane edge by 6 feet (min) and 16.5 feet (preferred).
- ④ Use "No Turn on Red" sign restrictions where bicycle turn queue box is present.
- ⑤ Provide minimum 10-foot curb radius to allow left-turning bicyclists to enter bike lane.
- ⑥ Construct outside curb radii to minimize turning motorist speeds to 15 mph or less.
- ⑦ Separated bike lane should taper to create more space between turning vehicles and bicycle crossing.
- ⑧ Provide bicycle queuing space to enable transition to two-way bikeway.
- ⑨ Optional two-stage turn-queue box, see page XX.

Considerations

This treatment may be used at intersections with all types of traffic control.

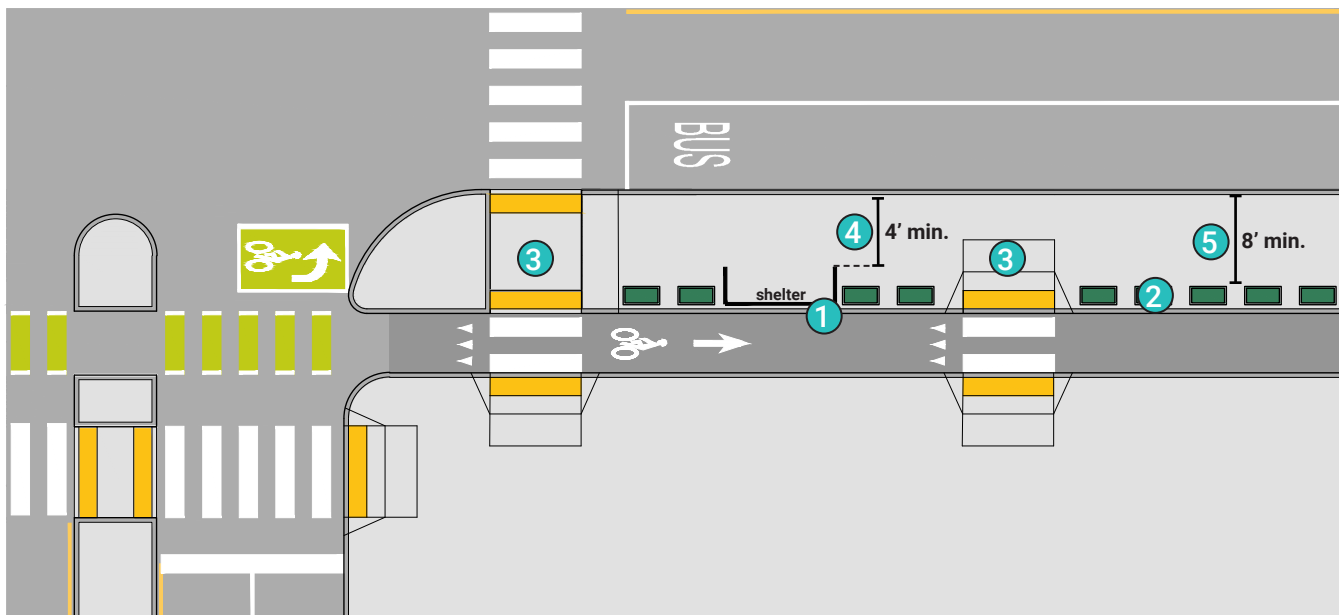
- At signalized intersections, there should be opportunities on both sides of the intersection to transition from one-way to two-way separated by lanes to reduce bicyclist delay:
 - Bicyclists in the one-way separated bike lanes approaching the intersection at a red signal can use the near-side crossing to make the transition.
 - Bicyclists in one-way separated bike lanes approaching the intersection at a green signal can proceed through the intersection using the far-side crossing to make the transition.

REFERENCES

AASHTO. *Guide for the Development of Bicycle Facilities*. 2019

Floating Transit Island

Where feasible, separated bike lanes should be located behind bus stops to eliminate conflicts between bicyclists and buses. This treatment is compatible with near-side, far-side and mid-block bus stop locations.



Typical Application

Floating transit islands eliminated the conflict between bicyclists traveling in conventional bike lanes and buses that must pull into the conventional bike lane to load and unload passengers.

Guidance

- 1 Provide a buffer of 6"-12" between the bus shelter and the bike lane.
- 2 Channelizing railings, planters, or other treatments can be used to help direct people to the crossing location(s).
- 3 Two pedestrian crossings are recommended, but not required.
- 4 Provide a minimum 4-foot-wide walkway between the curb and the transit shelter.
- 5 Minimum 8-feet of clear width at the location where the bus doors will open to accommodate persons in wheelchairs.

Considerations

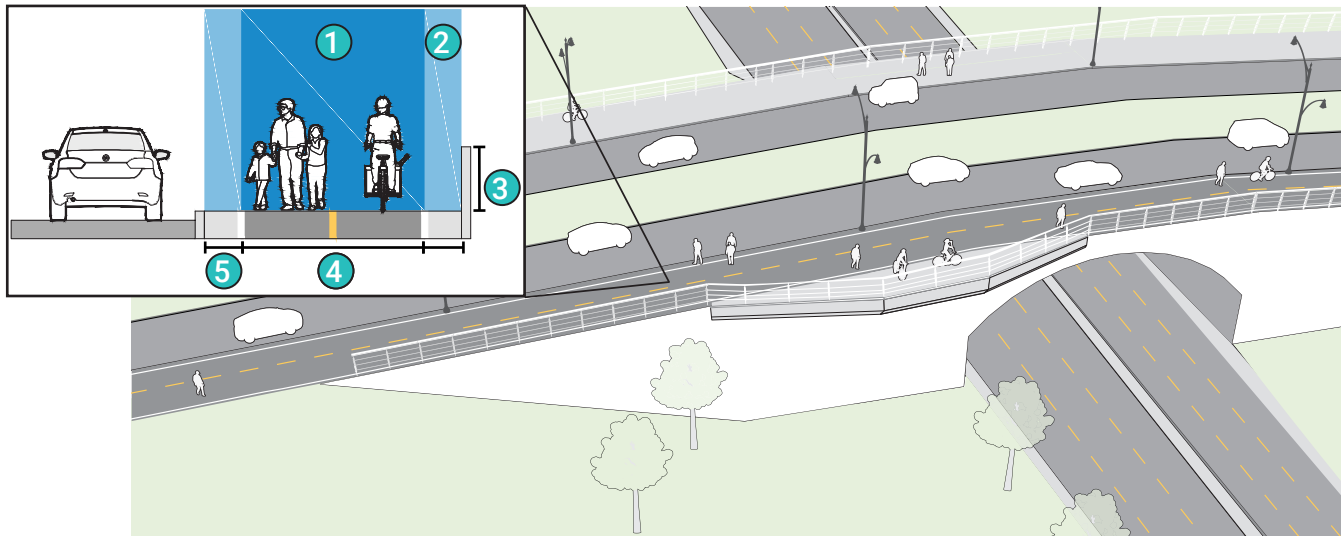
- The space between the bike lane and the sidewalk must have a detectable edge so pedestrians with vision disabilities can distinguish between the two. The following design treatments can help provide this tactile cue:
 - Street furniture or other vertical objects.
 - Curb height changes.
 - Continuous low landscaping.
 - A curb.
 - A directional indicator (in accordance with International Standard 23599) installed linearly on the sidewalk adjacent to the edge.
- Consider bus queuing and bus length to determine island length and pedestrian crossing placement.
- Visibility between bicyclists and pedestrians for safety.

REFERENCES

AASHTO. *Guide for the Development of Bicycle Facilities*. 2019
MassDOT. *Separated Bike Lane Planning and Design Guide*. 2015.

Overpass/Underpass Between Interchanges Along an Existing Road

This treatment indicates how bikeways can cross an interstate adjacent to a roadway, such as Wootton Parkway at Interstate 270.



Typical Application

- The preferred way to cross an interstate where a bikeway parallels an existing roadway.

Considerations

- When connecting through an underpass, lighting can be necessary even during daylight hours and can provide a sense of personal security.
- Overpasses freeze before facilities on ground and underpasses do not get the benefit of sunlight to melt ice.

Guidance

- 1 Bicycle operating space.
- 2 Provide 2' min. clear space from wall or railing.
- 3 Provide 42" min. wall or railing height.
- 4 For separated bike lane width, see page XX.
- 5 Provide 2' min. (6' desirable) buffer.

REFERENCES

AASHTO. *Guide for the Development of Bicycle Facilities*. 2019

Overpass/Underpass Between Interchanges on a Trail

This treatment indicates how bikeways can cross an interstate on a trail, such as the Bethesda Trolley Trail at Interstate 495.



Typical Application

The preferred way to cross an interstate where a bikeway is planned to cross an interstate away from a roadway.

Considerations

- When connecting through an underpass, lighting can be necessary even during daylight hours and can provide a sense of personal security.
- Overpasses freeze before facilities on ground and underpasses do not get the benefit of sunlight to melt ice.

Guidance

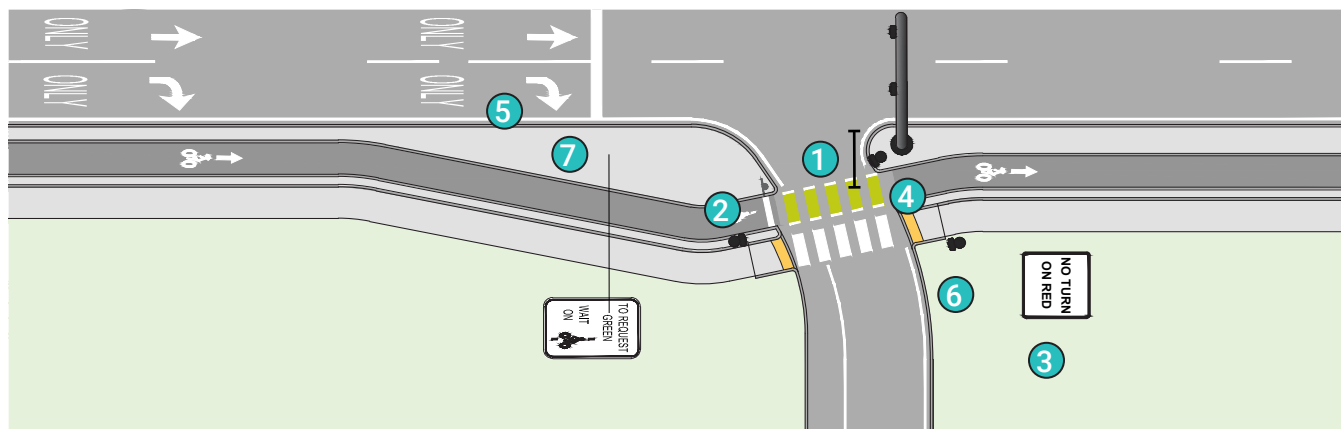
- 1 Bicycle operating space.
- 2 Provide 2' min. clear space from wall or railing.
- 3 For separated bike lane width, see page XX.
- 4 Maintain 8' min. (10' desirable) vertical clearance.

REFERENCES

AASHTO. *Guide for the Development of Bicycle Facilities*. 2019

Entrance Ramp: Signalized Treatments

This treatment indicates how sidewalks and separated bike lanes should cross signalized entrance ramps of interstates and other high-speed roadways.



Typical Application

Freeway and high-speed roadway entrances present significant difficulties for crossing bicyclists. Motorists expect to accelerate to freeway speeds at entrance ramps. The goal of signalizing entrance ramps is to minimize conflicts between motor vehicles, bicyclists and pedestrians while maximizing visibility between all modes in constrained right-of-way.

Guidance

- 1 The motorist yield zone should be 6 feet (min) and 16.5 feet (preferred) to create space for a turning motorist to yield to a through-moving bicyclist.
- 2 Provide Bicycle Detection.
- 3 Install No Right Turn on Red Sign.
- 4 Install Bicycle Signal.
- 5 Right-turning vehicles have a dedicated turn lane, which allows for queuing and separate signal phasing.
- 6 Install Pedestrian Signal.
- 7 Taper to create more space between turning vehicles and the bicycle crossing.

Considerations

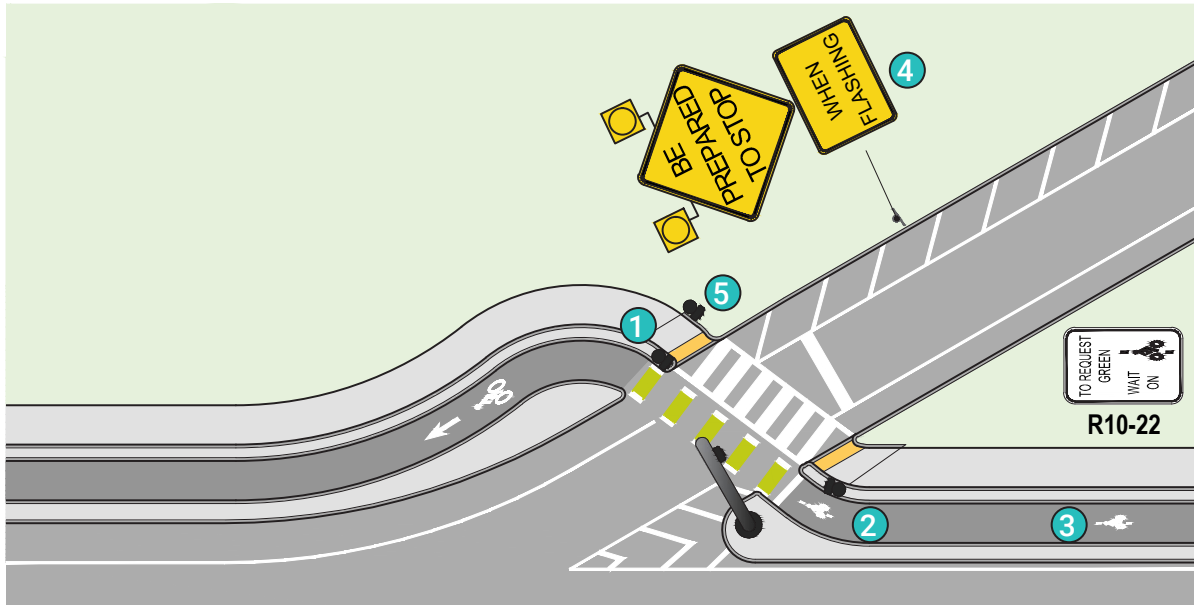
- Provide adequate signal timing for bicyclists to completely clear intersections before permitting conflicting movements to proceed.
- Right-turning vehicles and bicyclists should not occupy the crossing at the same time.
- A Rectangular Rapid Flash Beacon (RRFB), pedestrian signal, or traffic signal should be considered where multiple threat conditions are present, where motorists approach speeds are in excess of 30mph, where sight lines are restricted or where traffic volumes are high and gaps in vehicle traffic are insufficient.

REFERENCES

AASHTO. *Guide for the Development of Bicycle Facilities*. 2019
MassDOT. *Separated Bike Lane Planning and Design Guide*. 2015.

Exit Ramp: Signalized Treatments

This treatment indicates how sidewalks and separated bike lanes should cross signalized exit ramps of interstates and other high-speed roadways.



Typical Application

Freeway and high-speed roadway exit ramps present significant difficulties for crossing bicyclists. Motorists may be more focused on finding a gap to merge into traffic at exit ramps and less aware of bicyclists. The goal of signalizing exit ramps is to minimize conflicts between motor vehicles, bicyclists and pedestrians while maximizing visibility between all modes in constrained right-of-way.

Guidance

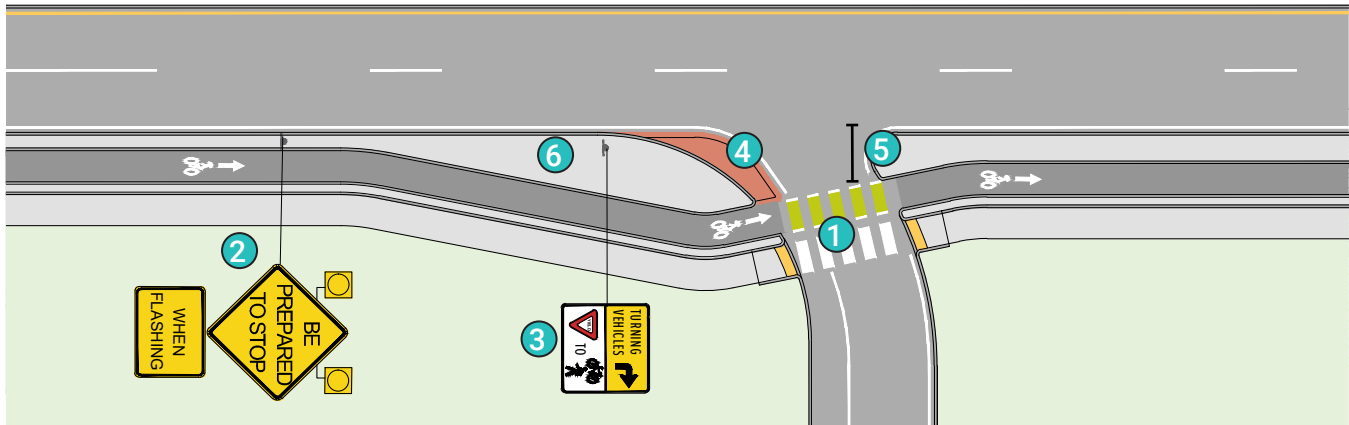
- 1 Install Bicycle Signal.
- 2 Install Bicycle Detection.
- 3 Provide Advance Bicycle Detection.
- 4 Provide (optional) Advance Warning Beacon.
- 5 Install Pedestrian Signal.

Considerations

- Provide adequate signal timing for bicyclists to completely clear intersections before permitting conflicting movements to proceed.
- Right-turning vehicles and bicyclists should not occupy the conflict zone at the same time.

Entrance Ramp: Geometric Treatments

This treatment indicates how sidewalks and separated bike lanes should cross unsignalized entrance ramps of interstates and other high-speed roadways.



Typical Application

Freeway and high-speed roadway entrances present significant difficulties for crossing bicyclists. Motorists expect to accelerate to freeway speeds at entrance ramps. The goal of geometric changes is to minimize conflicts between motor vehicles, bicyclists and pedestrians while maximizing visibility between all modes where signalization is not feasible.

Considerations

- Prioritize the shortest crossing distance rather than a direct path of travel.
- Minimize the turning speed of motor vehicles using shortest curb radii practicable. Consider the use of a mountable truck apron where conflicts with bicyclists and pedestrians are likely and turning motorist speeds are not likely to result in yielding to people in crossings.

Guidance

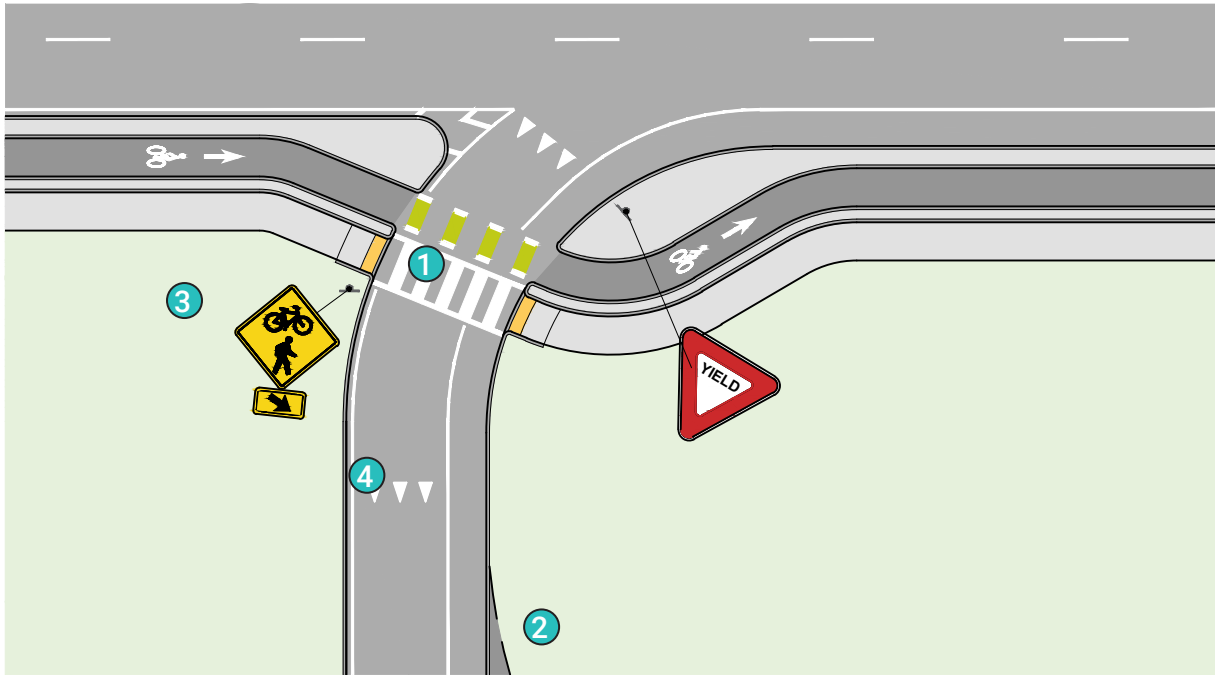
- 1 Provide (optional) raised crossing.
- 2 Provide (optional) active warning to increase likelihood of motorist yielding.
- 3 Install Turning Vehicles Yield to Bikes and Pedestrians Sign (R10-15).
- 4 Install Mountable Truck Apron.
- 5 Motorist yield zone should be 6 feet (min) and 16.5 feet (preferred) to create space for a turning motorist to yield to a through-moving bicyclist.
- 6 Taper to create more space between turning vehicles and the bicycle crossing.

REFERENCES

AASHTO. *Guide for the Development of Bicycle Facilities*. 2019

Exit Ramp: Geometric Treatments

This treatment indicates how sidewalks and separated bike lanes should cross unsignalized exit ramps of interstates and other high-speed roadways.



Typical Application

Freeway and high-speed roadway exits present significant difficulties for crossing bicyclists. Motorists may be more focused on finding a gap to merge into traffic at exit ramps and less aware of bicyclists. The goal of geometric changes is to minimize conflicts between motor vehicles, bicyclists and pedestrians while maximizing visibility between all modes where signalization is not feasible.

Guidance

- 1 Provide (optional) raised crossing.
- 2 Provide (optional) active warning to increase likelihood of motorist yielding.
- 3 Install Bicycles and Pedestrians Ahead signage (W11-15/W16-9P).
- 4 Install Yield Markings.

Considerations

- Design the bike lane to intersect the exit ramp at an angle between 60 and 90 degrees, which increases visibility and makes movements more predictable for all users.
- Prioritize the shortest crossing distance rather than a direct path of travel to reduce exposure to opposing traffic.
- Crossings should be located where the bicyclist and motorist have good lines of sight before the motorists' attention is entirely focused on merging with traffic.
- Minimize the turning speed of motor vehicles using shortest curb radii practicable. Consider the use of a mountable truck apron where conflicts with bicyclists and pedestrians are likely and turning motorist speeds are not likely to result in yielding to people in crossings.
- An acceleration lane may be helpful on high volume roads to reduce motorist ramp acceleration.