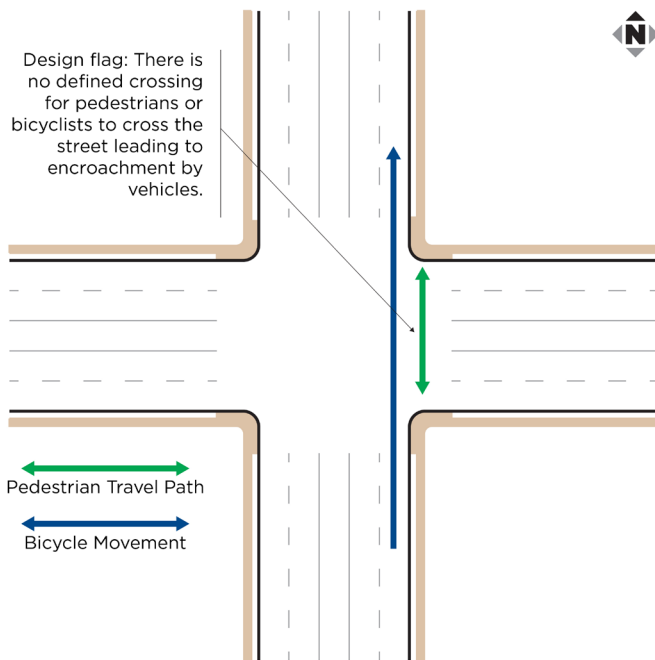


PRIMARY FLAG

NCHRP 948
Flag #9



FLAG DESCRIPTION

Unmarked crossings at an intersection can lower the level of comfort when walking or biking. Right-turning drivers are more likely to encroach on pedestrian and bicyclist paths when clear pavement demarcation is absent. Additionally, turning vehicles may not expect pedestrians or bicyclists at the downstream crossing point. This flag applies to both pedestrian and bicyclist movements.

MITIGATIONS TOOLBOX

1. *Striping biking pathways through an intersection to identify where drivers are entering the designated path of bike travel.*
2. *Installing marked crosswalks.*
3. *Continuing bicycle lanes through intersections.*
4. *Installing pedestrian signal head with actuation.*
5. *Where off-street bicycle facilities are provided, placing the bike crossing and the pedestrian crossing next to one another to reduce undefined space.*
6. *Designing two-stage left-turn queue boxes with queuing space for multiple bicyclists.*

MEASURE OF EFFECTIVENESS

Path markings and signal equipment

YELLOW FLAG THRESHOLD

Unmarked crosswalk at stop-controlled or signalized movement (pedestrian)

No bicycle lane markings through intersection (bicycle)

RED FLAG THRESHOLD

Unmarked crosswalk across movement not controlled by a stop sign, beacon or, signal

OR

Signalized movements without pedestrian signal head (pedestrians)

Bicycle lane ends at intersection (bicycle)

CONSIDERATIONS

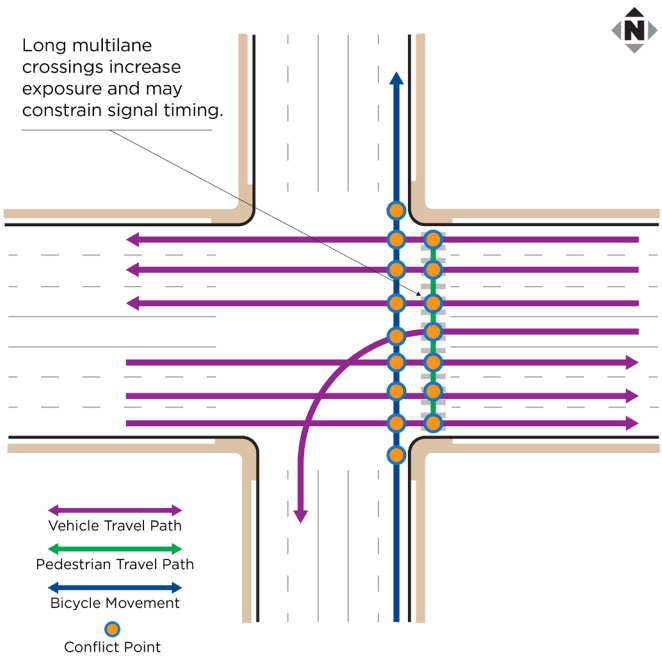
Bicycle lane markings that are present on both sides of the intersection but do not extend through the intersection are subject to a yellow flag.

Right-turn and left-turn bicycle movements are exempt from this flag.

This flag applies to roadways with bicycle facilities. If no on-street bicycle facilities exist, Flag M applies instead.

PRIMARY FLAG

NCHRP 948
Flag #7



FLAG DESCRIPTION

Long crossings, particularly with multiple lanes in both directions, are a source of stress and risk at intersections. Shorter crossings with median refuges, for crossing one direction of travel at a time, and for having raised separation between opposing directions of traffic are preferred for comfortable travel.

MITIGATIONS TOOLBOX

1. Reducing the number of travel lanes.
2. Providing refuge islands and two-stage crossings to reduce the number of lanes and travel directions crossed at one time.
3. Providing signalized or stop-controlled crossings.
4. Installing raised crosswalks to reduce vehicle speed.

MEASURE OF EFFECTIVENESS

Number of lanes crossed without refuge

		Crossing Traffic Control		
		Signalized	Beacon	Unsignalized
Pedestrian	Yellow	4 lanes	3-4 lanes	3 lanes
	Red	5+ lanes	5+ lanes	4+ lanes
Bicycle	Yellow	4-5 lanes	4-5 lanes	3-4 lanes
	Red	6+ lanes	6+ lanes	5+ lanes

CONSIDERATIONS

The number of lanes is irrespective of the direction of travel. Lane count is the maximum number of lanes of any direction, crossed between refuge areas.

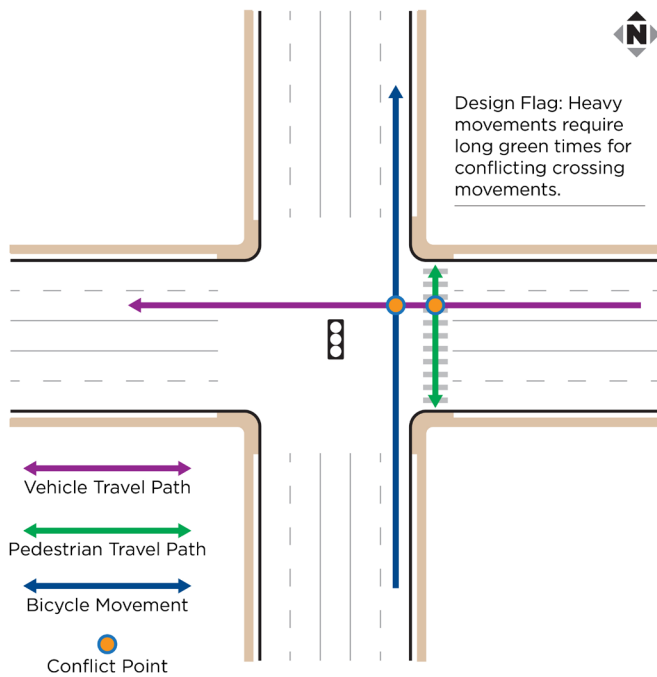
Bicycle lanes and parking lanes are not counted in this assessment.

This flag applies to roadways with and without bicycle facilities.

Lane counts for left-turning bicyclist includes the number of lanes crossed on the adjacent approach plus the number of lanes crossed on the opposing approach.

SECONDARY FLAG

NCHRP 948
Flag #8



FLAG DESCRIPTION

Long cycle lengths and phases can lead to extended delays for pedestrians and bicyclists. Multiple stage crossings, such as at median refuge islands or left-turning bicyclists via a bike box, are particularly susceptible to long red times.

A planning level estimation of delay can be made using the equation below and reference table below can be used to estimate red time.

MITIGATIONS TOOLBOX

1. Reducing the overall cycle length.
2. Modifying the phase sequence to reduce the total crossing time. This applies for priority movements in particular because improvements in travel time for one movement may result in longer crossing times for other movements.

MEASURE OF EFFECTIVENESS

Pedestrian and bicyclist delay

YELLOW FLAG THRESHOLD

30 seconds

RED FLAG THRESHOLD

45 seconds

EQUATION FOR PLANNING LEVEL ESTIMATE OF DELAY

$$Delay = \frac{r^2}{2C}$$

Where:

r = movement time (seconds)
 C = cycle length (seconds)

# Critical Phases	% Red Time of Cycle Length	
	Crossing with Major Vehicle Movement	Crossing with Minor Vehicle Movement
2	30%	70%
3	50%	75%
4	60%	85%

CONSIDERATIONS

For bicyclists, the delay is assessed for each turning movement.

Only signal delay, not extra distance traveled delay, should be included in the calculation of red time.

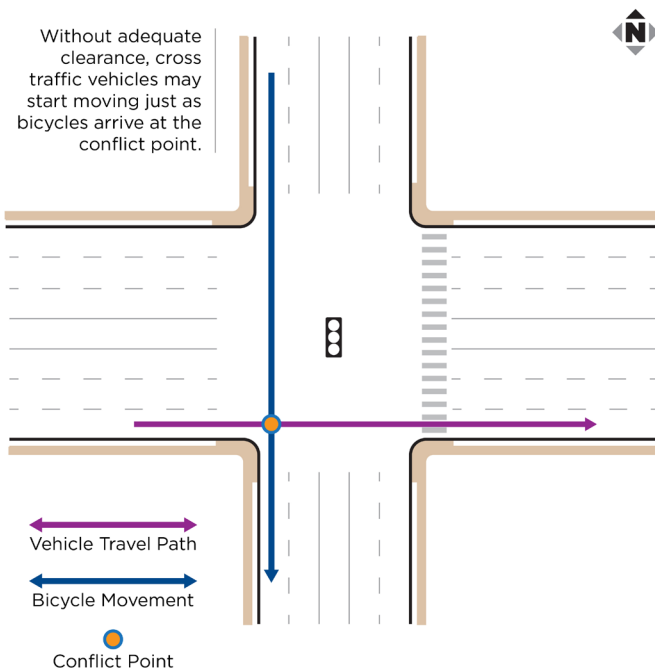
Total time is combined across all stages for pedestrians crossing an approach which requires multiple stages (e.g. due to a short flashing don't walk indication and a median refuge) and for bicycle movements redirected to multi-stage movements (e.g. through a bike box).

This flag applies to roadways with and without bicycle facilities.

SECONDARY FLAG

NCHRP 948
Flag #15

Without adequate clearance, cross traffic vehicles may start moving just as bicycles arrive at the conflict point.



FLAG DESCRIPTION

The clearance times calculated for motorists are likely insufficient for bicyclists to travel through the intersection during the yellow and red indications, exposing bicyclists to conflicting vehicles entering the intersection on a subsequent green indication. This clearance time difference is greater with higher vehicle speeds and at larger intersections.

MITIGATIONS TOOLBOX

1. Reducing the number of lanes to cross.
2. Reducing lane widths.
3. Reducing median widths.
4. Providing refuge for bicyclists.
5. Installing bicycle dilemma zone detection to extend the transition of signal phases when necessary.
6. Providing a separate bicycle signal with a dedicated indication of required clearance time.

MEASURE OF EFFECTIVENESS

Vehicle speed and clearance zone length

YELLOW FLAG THRESHOLD

<35 mph and 36 - 72 feet
OR >35 mph and 24 - 60 feet

RED FLAG THRESHOLD

<35 mph and >72 feet
OR >35 mph and >60 feet

Note: mph = Miles Per Hour

CONSIDERATIONS

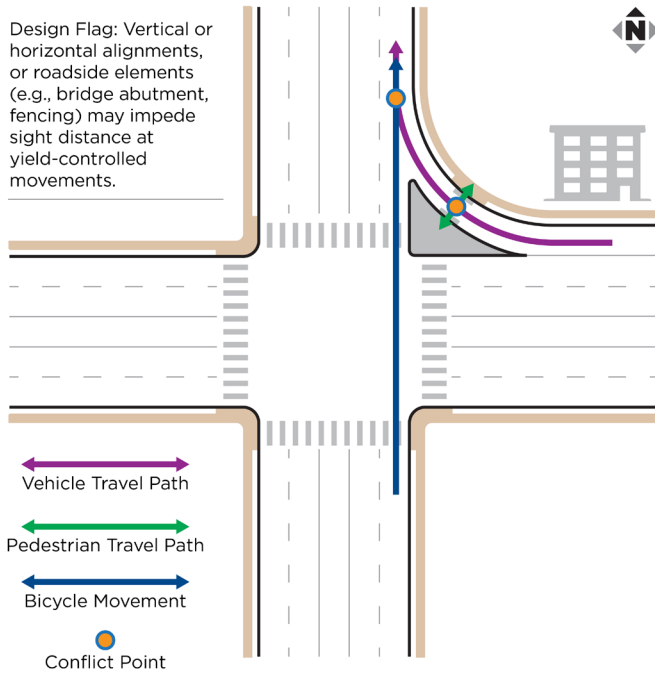
Clearance zone length should include the full distance from the upstream stop bar through the furthest downstream conflicting movement.

This flag applies to roadways with and without bicycle facilities.

SECONDARY FLAG

NCHRP 948
Flag #12

Design Flag: Vertical or horizontal alignments, or roadside elements (e.g., bridge abutment, fencing) may impede sight distance at yield-controlled movements.



FLAG DESCRIPTION

Sight distance must be provided in all aspects of an intersection design. Sight distance includes stopping sight distance, intersection sight distance, decision sight distance, and view angles.

MITIGATIONS TOOLBOX

1. Designing vertical obstructions, such as bridge abutments, tall landscaping, buildings, fences, and signal cabinets to be positioned outside of necessary sight triangles.
2. Establishing horizontal and vertical alignments that provide the necessary sight distance.
3. Reducing operational speed to suit available sight distance.

MEASURE OF EFFECTIVENESS

Sight distance

RED FLAG THRESHOLD

Less than required for vehicle speed

FLAG EVALUATION REFERENCES

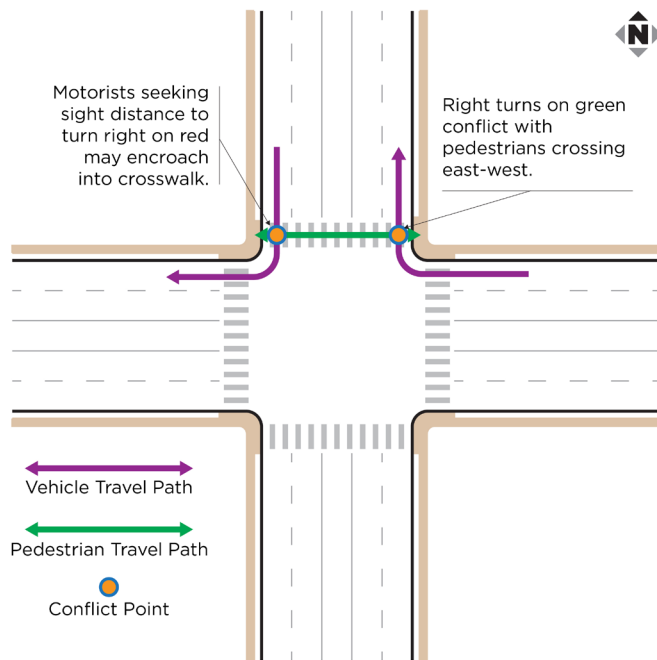
Sight distance requirements by vehicle speeds can be found in the AASHTO Green Book and NCHRP Report 834 for pedestrians.

CONSIDERATIONS

This flag applies to roadways with and without bicycle facilities.

PRIMARY FLAG

NCHRP 948
Flag #1



FLAG DESCRIPTION

Motor vehicle right turns on each approach create two separate conflicts with crossing pedestrians. Each leg is evaluated for a design flag based on the right-turn movement volume and speed. Speeds can be estimated using the speed-radius relationship found in the AASHTO Green Book, or based on field-collected speed data.

MITIGATIONS TOOLBOX

1. Add no right-turns-on-red restrictions.
2. Add raised crosswalk to reduce speeds below 10 mph (see image).

MEASURE OF EFFECTIVENESS

Turning vehicle speed and volume

YELLOW FLAG THRESHOLD

20 to 30 mph **AND** ≤ 300 vphpln

OR

>300 vphpln

OR

Right turn on red is permitted

RED FLAG THRESHOLD

>20 mph **AND** >300 vphpln

OR

>30 mph

Note: mph = Miles Per Hour; vphpln = Vehicle Per Hour Per Lane

CONSIDERATIONS

For pedestrian movements with multiple right-turning vehicle conflicts, the most severe flag is recorded. This typically involves vehicle exiting the intersection.

If the vehicle movement is stop controlled or signalized with no right-turns-on-red or speeds are below 10 mph (e.g., through a raised crosswalk), this flag is eliminated.

If channelized right turn lanes are present, vehicle speed is likely higher due to the larger radii.

At roundabouts, Flag J (Crossing Yield- or Uncontrolled Vehicle Paths) is generally more applicable. Use either Flag F or Flag J, but not both.

FLAG EVALUATION REFERENCES

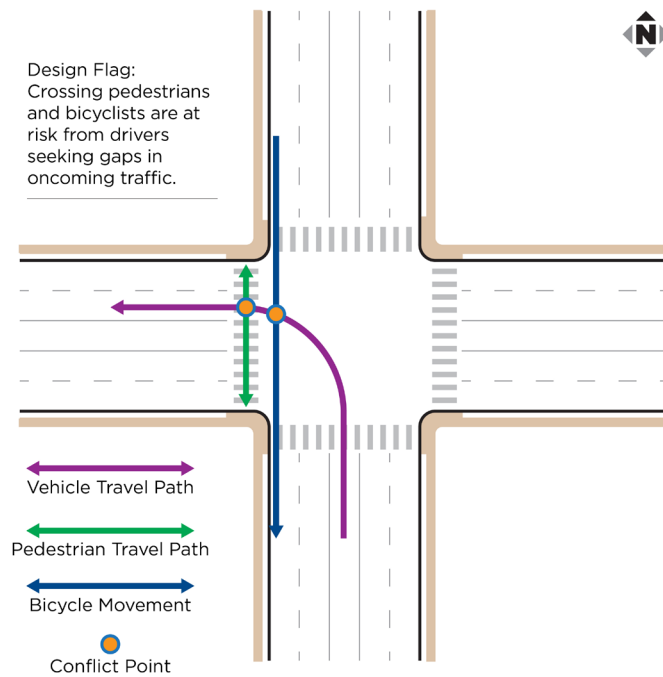
AASHTO Green Book relationship for cross-slope cross-slope of 2% corresponds with maximum radius of 100 feet for 20 mph turning speed.

$$V = 3.4415R^{(0.3861)}$$

V = predicted speed, mph; R = radius of curve, ft

PRIMARY FLAG

NCHRP 948
Flag #10



FLAG DESCRIPTION

Both permissive and protected motor vehicle left-turns can affect the safety and comfort of pedestrians and bicyclists. Drivers making permissive left-turns are often focused on finding a gap in oncoming traffic and may not be watching for nonmotorized road users crossing the side street. Pedestrians may not realize the conflicting leading protected left-turn has been given the green indication but the walk interval has not yet started.

MITIGATIONS TOOLBOX

1. Converting permissive left-turn movements into protected left-turn movements with a dedicated signal phase.
2. Implementing leading pedestrian interval.
3. Adding centerline hardening

MEASURE OF EFFECTIVENESS

Turning vehicle speed and volume for permissive left turns

YELLOW FLAG THRESHOLD

PERMISSIVE LEFT TURNS

20 to 30 mph **AND** ≤ 300 vphpln

OR

>300 vphpln (permissive left turns)

PROTECTED LEFT TURNS

Leading left (any volume/speed)

RED FLAG THRESHOLD

PERMISSIVE LEFT TURNS

>20 mph **AND** >300 vphpln

OR

>30 mph (permissive left turns)

Note: mph = Miles Per Hour; vphpln = Vehicle Per Hour Per Lane

CONSIDERATIONS

This flag does not apply to roundabouts or to crossings with vehicle speed below 10 mph, such as at raised crosswalks.

Movements with protected-only left turn phasing can only have a yellow flag.

This flag considers movements with protected and permissive phasing as permissive.

This flag applies to roadways with dedicated bicycle lanes or without exclusive bicycle facilities where bicyclists use the sidewalk or shared use path.

FLAG EVALUATION REFERENCES

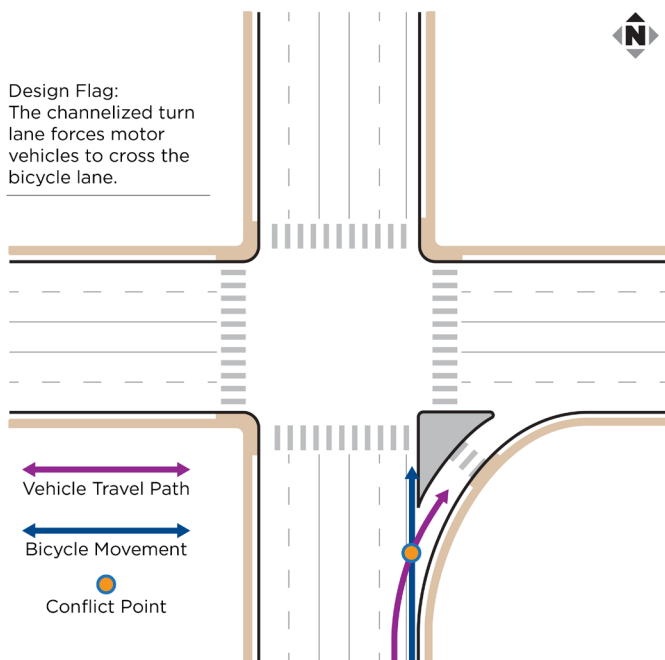
AASHTO Green Book relationship for cross-slope of 2% corresponds with maximum radius of 100 feet for 20 mph turning speed and 275 feet for 30 mph.

$$V = 3.4415R^{(0.3861)}$$

V = predicted speed, mph; R = radius of curve, ft

PRIMARY FLAG

NCHRP 948
Flag #18



FLAG DESCRIPTION

Motor vehicle lane changes across bicyclists' paths is fraught with complex conflicting maneuvers conducted at speed. This movement is subject to bicyclists being in a driver's blind spot and "right hook" crashes across the bicycle lane. Exclusive turn lanes provide more space to navigate this crossing conflict than shared through/right turn lanes.

MITIGATIONS TOOLBOX

1. Providing design treatments for vehicle storage between the pedestrian crossing and vehicle merge.
2. Installing a signal to control the channelized movement.
3. Designing channelization to manage vehicular speeds through the use of compound curves.
4. Implementing raised crossings at the location within the channelized turn where motorists speeds are lowest.
5. Removing channelization.

MEASURE OF EFFECTIVENESS

Motor vehicle lane configuration

YELLOW FLAG THRESHOLD

Exclusive turn lane

RED FLAG THRESHOLD

Shared through & turn lane

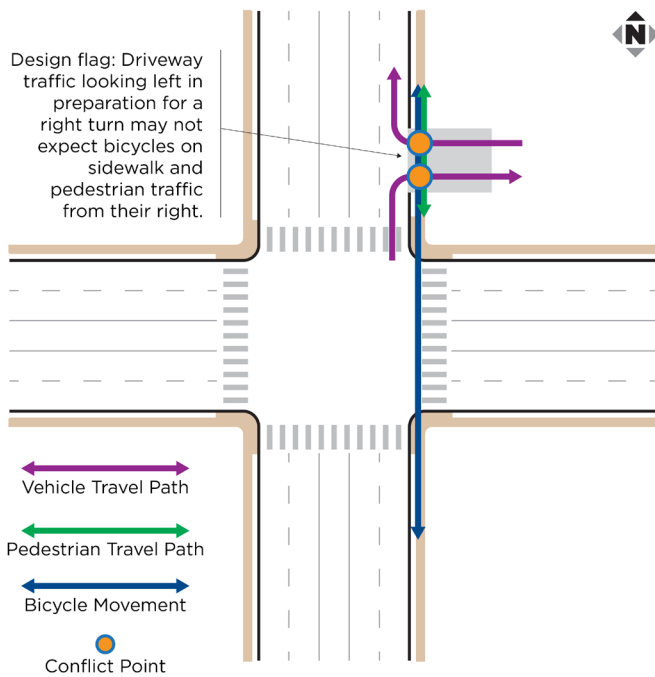
CONSIDERATIONS

This flag should not be double counted with Flag N.

This flag is applicable at both channelized and non-channelized locations.

SECONDARY FLAG

NCHRP 948
Flag #11



FLAG DESCRIPTION

Conflicting movements at driveways and side streets can result in an increased cognitive load and distractions for all users. Turning drivers may be more focused on seeking gaps in multiple traffic streams than monitoring crossing users in the immediate vicinity.

MITIGATIONS TOOLBOX

1. Reducing the number of driveways through access management.
2. Controlling vehicle speeds at driveways through curvature, tight curb radii, or vertical elements.
3. Providing signalized or stop-controlled crossings at driveways.
4. Daylighting driveways adjacent to on-street bike lanes

MEASURE OF EFFECTIVENESS

Number of access points in area of influence

YELLOW FLAG THRESHOLD

- 1 - 2 (pedestrians)
- 1 - 2 (one-way bicycles)

RED FLAG THRESHOLD

- >2 (pedestrians)
- >2 (one-way bicycles)
- >0 (two-way bicycles)

CONSIDERATIONS

An intersection's influence area is 250 feet in all directions from the center of the intersection

Given the increased concern of vehicle/bicycle conflicts on two-way bicycle facilities, any access points within the area of influence should be classified as a red flag.

This flag applies to roadways with and without bicycle facilities.

PRIMARY FLAG

NCHRP 948
Flag #4

FLAG DESCRIPTION

Yield-controlled and uncontrolled crossings lead to uncomfortable and potentially unsafe conflicts between bicyclists, pedestrians, and vehicles. Even if a crosswalk is marked, drivers may not perceive pedestrians and may fail to yield to them. This flag applies to both pedestrian and bicycle paths. Speeds can be estimated using the speed-radius relationship found in the AASHTO Green Book, or based on field-collected speed data.

MITIGATIONS TOOLBOX

1. Providing signalized crossing.
2. Providing stop-controlled crossing.
3. Reducing vehicle speed through curvatures.
4. Installing raised crosswalks to reduce vehicle speed.

MEASURE OF EFFECTIVENESS

Turning vehicle speed and volume

YELLOW FLAG THRESHOLD

20 to 30 mph **AND** ≤ 300 vphpln

OR

>300 vphpln

RED FLAG THRESHOLD

>20 mph **AND** >300 vphpln

OR

>30 mph

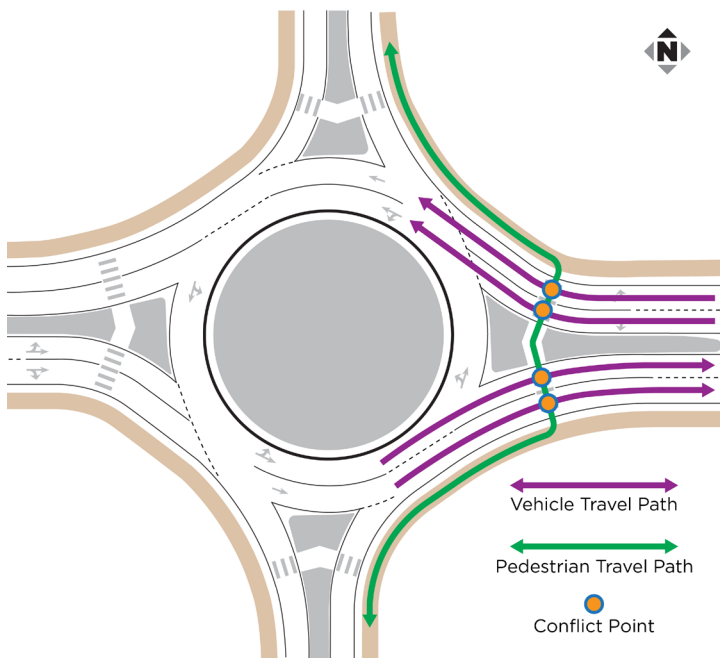
Note: mph = Miles Per Hour; vphpln = Vehicle Per Hour Per Lane

CONSIDERATIONS

For pedestrian and bicycle movements crossing multiple vehicle flows, the most severe flag is recorded.

Flag J can be used at roundabouts and is preferred over Flag F.

This flag applies to roadways with dedicated bicycle lanes or without exclusive bicycle facilities where bicyclists use the sidewalk or shared use path.



FLAG EVALUATION REFERENCES

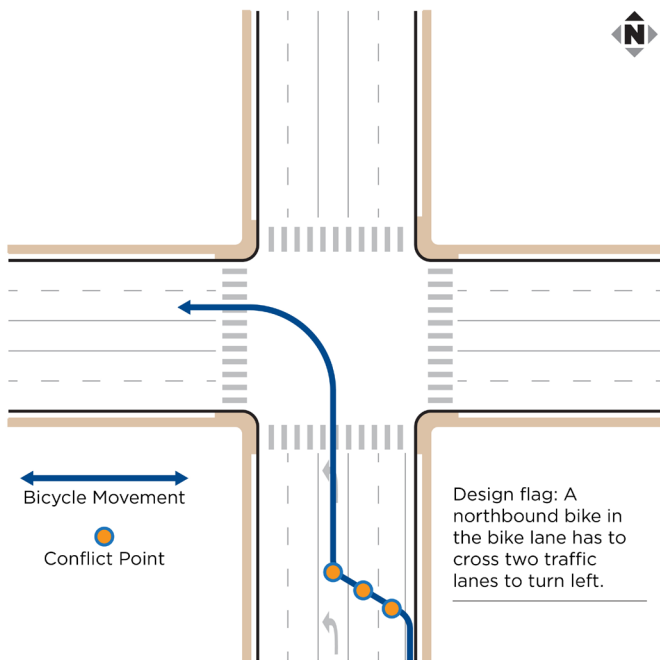
AASHTO Green Book relationship for cross-slope of 2% corresponds with maximum radius of 100 feet for 20 mph turning speed.

$$V = 3.4415R^{(0.3861)}$$

V = predicted speed, mph; R = radius of curve, ft

PRIMARY FLAG

NCHRP 948
Flag #16



FLAG DESCRIPTION

Bicycle movements that require lane changes or weaving over motor vehicle travel lanes are both a safety and comfort concern. Bicyclists have to look over their shoulders to assess available gaps for lane changes while maintaining their trajectory approaching the intersection.

MITIGATIONS TOOLBOX

1. *Designing for bicyclists to use ramps to sidewalks or shared-use paths and cross in a crosswalk.*
2. *Designing for bicyclists to use a two-stage bicycle left-turn queue box.*
3. *Clearly marking the entry to the crossover area.*
4. *Design for motorist speeds below 20 MPH through a crossover area by reducing radii or implementing speed-reducing treatments.*

MEASURE OF EFFECTIVENESS

Vehicle speed and vehicle volume

YELLOW FLAG THRESHOLD

25 - 35 mph

OR

3,000 - 7,000 vpd

RED FLAG THRESHOLD

>35 mph

OR

>7,000 vpd

Note: mph = Miles Per Hour; vpd = Vehicles Per Day

CONSIDERATIONS

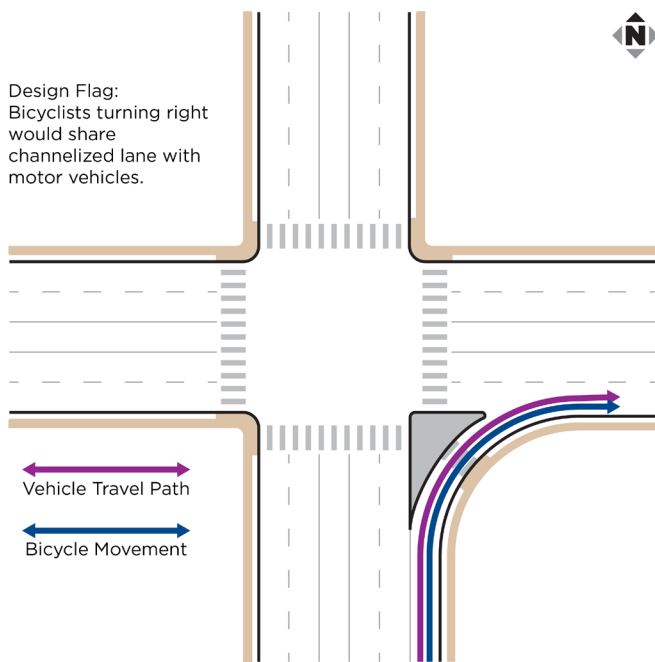
This flag should not be confused with those where motor vehicles cross bicycle lanes, such as Flag H.

In absence of operating speed data, design speed and engineering judgement can be used.

This flag applies to roadways with and without bicycle facilities.

PRIMARY FLAG

NCHRP 948
Flag #17



FLAG DESCRIPTION

For bicyclists, sharing a channelized lane with motorized traffic is both a safety and comfort concern. This flag applies to single-lane channelized lanes (narrow shared space between curbs) and multilane facilities.

MITIGATIONS TOOLBOX

1. Designing for bicyclists to use ramps to sidewalks or shared-use paths and cross in a crosswalk.
2. Clearly marking the entry to the crossover area.
3. Design for motorist speeds below 20 MPH through a crossover area by reducing radii or implementing speed-reducing treatments.

MEASURE OF EFFECTIVENESS

Vehicle speed and channelization length

YELLOW FLAG THRESHOLD

25 - 35 mph **AND** ≤ 50 feet

RED FLAG THRESHOLD

>35 mph

OR

>50 feet

Note: mph = Miles Per Hour

FLAG EVALUATION REFERENCES

AASHTO Green Book relationship for cross-slope cross-slope of 2% corresponds with maximum radius of 100 feet for 20 mph turning speed.

$$V = 3.4415R^{(0.3861)}$$

V = predicted speed, mph; R = radius of curve, ft

CONSIDERATIONS

Channelization length is defined a length of curbs on both side.

For multilane facilities, Flag N could be applied. It should not be double-counted.

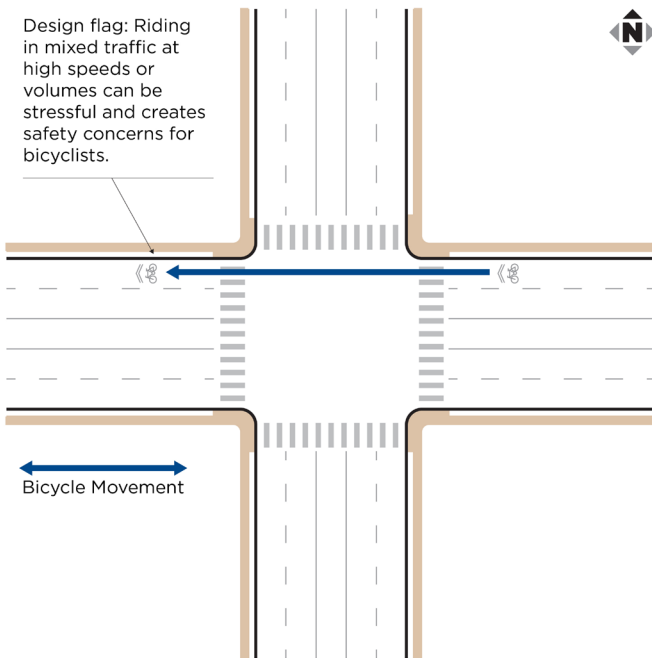
Does not apply to location where bicycle lane is between two lanes in a multilane channelized area or when channelization is provided by striping only.

This flag applies to roadways with and without bicycle facilities.

PRIMARY FLAG

NCHRP 948
Flag #14

Design flag: Riding in mixed traffic at high speeds or volumes can be stressful and creates safety concerns for bicyclists.



FLAG DESCRIPTION

Bicyclists sharing a lane with heavy volumes of higher speed vehicles can create a high level of stress for bicyclists and an increased likelihood of severe injury or death if a bicyclist-motorist collision occurs.

MITIGATIONS TOOLBOX

1. Separating bicyclists from motor vehicles through dedicated protected lanes.
2. Designing for lower motor vehicle speeds where bicyclists and motorists interact.

MEASURE OF EFFECTIVENESS

Vehicle speed and vehicle volume

YELLOW FLAG THRESHOLD

25 - 35 mph **AND** 3,000 - 7,000 vpd

RED FLAG THRESHOLD

>35 mph

OR

> 7,000 vpd

Note: mph = Miles Per Hour; vpd = Vehicles Per Day

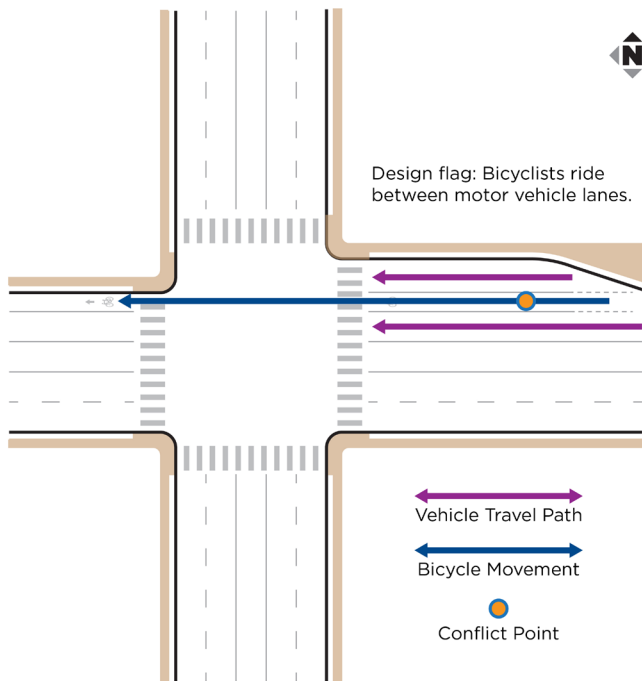
CONSIDERATIONS

In absence of operating speed data, design speed and engineering judgement can be used.

Buffered bicycle lanes are exempt from the yellow flag but subject to the red flag.

Separated and off-street bicycle facilities are exempt from both the yellow and red flags.

PRIMARY FLAG

NCHRP 948
Flag #19

FLAG DESCRIPTION

Bicyclists are often intended to travel between vehicle travel lanes, with traffic on both sides of the bicyclists. Two common occurrences that warrant this flag are 1) upstream of intersections, with a bicycle lane between the vehicle right-turn-lane and through lane(s) and 2) downstream of intersections, with a bike lane between a vehicle merge or acceleration lane and through lane(s).

MITIGATIONS TOOLBOX

1. Replacing merge areas with stop-or yield-controlled movements.
2. Constructing separate protected bicycle lanes or shared use paths.
3. Reducing vehicle speeds in conflict areas.

MEASURE OF EFFECTIVENESS

Motor vehicle lane configuration

YELLOW FLAG THRESHOLD

Motor vehicle lanes remain parallel or diverge

RED FLAG THRESHOLD

Motor vehicle lanes merge

CONSIDERATIONS

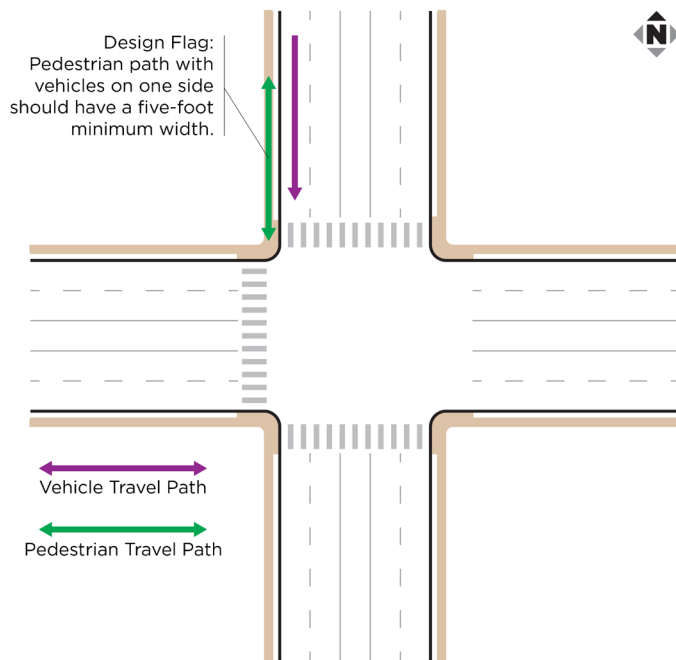
Less common flag.

Do not double count with Flag H. Where both apply, use only Flag H as the crossing movement has more severe risk. Exceptions include where the configuration is long (>300 feet) or otherwise significant, in which case both Flag H and N may be used.

This flag exists even if there is not a bicycle lane, such as if a bicycle lane is dropped before an intersection, but bicyclists are continuing straight.

SECONDARY FLAG

NCHRP 948
Flag #2



FLAG DESCRIPTION

Most sidewalks are used for two-way pedestrian traffic, so sufficient width for passing must be provided. Pedestrians avoid walking immediately next to other modes of traffic or buildings, reducing the usable width of the sidewalk.

MITIGATIONS TOOLBOX

1. Widening the sidewalk.
2. Illuminating the walking environment.
3. Increasing the size of channelization islands and corner areas.
4. Providing vertical separation between pedestrian and vehicles.
5. Providing horizontal separation (buffers) between pedestrians and vehicles.

MEASURE OF EFFECTIVENESS

Effective walkway width plus buffer space

YELLOW FLAG THRESHOLD

- <5 feet if traffic present on one side
- <10 feet if traffic present on two sides

CONSIDERATIONS

This design flag can only be yellow and primarily applies to pedestrians, but can be applied to bicyclists on shared use paths.

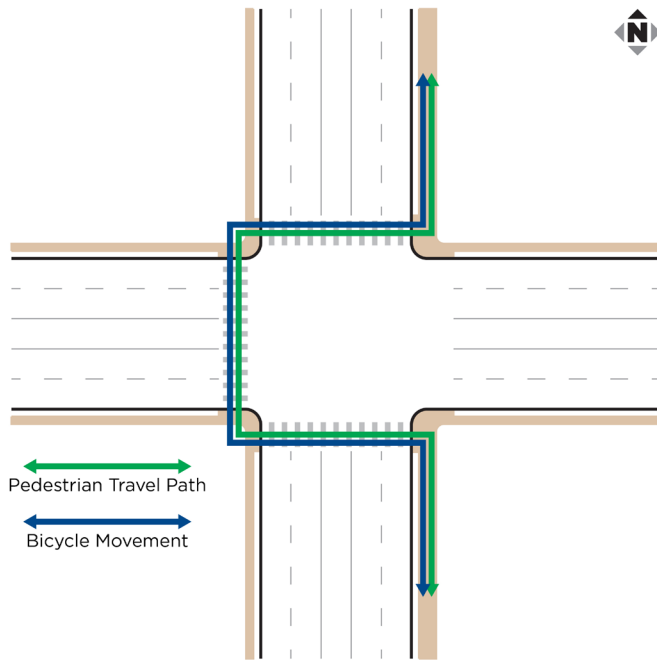
Channelizing islands is an example of an environment with traffic present on more than one side.

ADA requirements must still be met.

If used for a shared-use path next to a vertical object, the effective width of the path is reduced by two feet to account for the shy distance.

SECONDARY FLAG

NCHRP 948
Flag #5



FLAG DESCRIPTION

Indirect, or out-of-direction, paths lead to inconvenience, delay, and exposure to more crossing risk for pedestrians and bicyclists. Paths that are inefficient may encourage pedestrians or bicyclists into risk taking behavior to use a more convenient path.

MITIGATIONS TOOLBOX

1. Direct crossing opportunities with a dedicated pedestrian phase.
2. Midblock crossing before the intersection to address an otherwise indirect path.
3. Grade-separated pedestrian and bicycle facilities, depending on the context and the O-D patterns for pedestrians and bicyclists.

MEASURE OF EFFECTIVENESS

Out-of-direction travel distance

YELLOW FLAG THRESHOLD

90 feet (pedestrian)
450 feet (bicycle)

RED FLAG THRESHOLD

135 feet (pedestrian)
675 feet (bicycle)

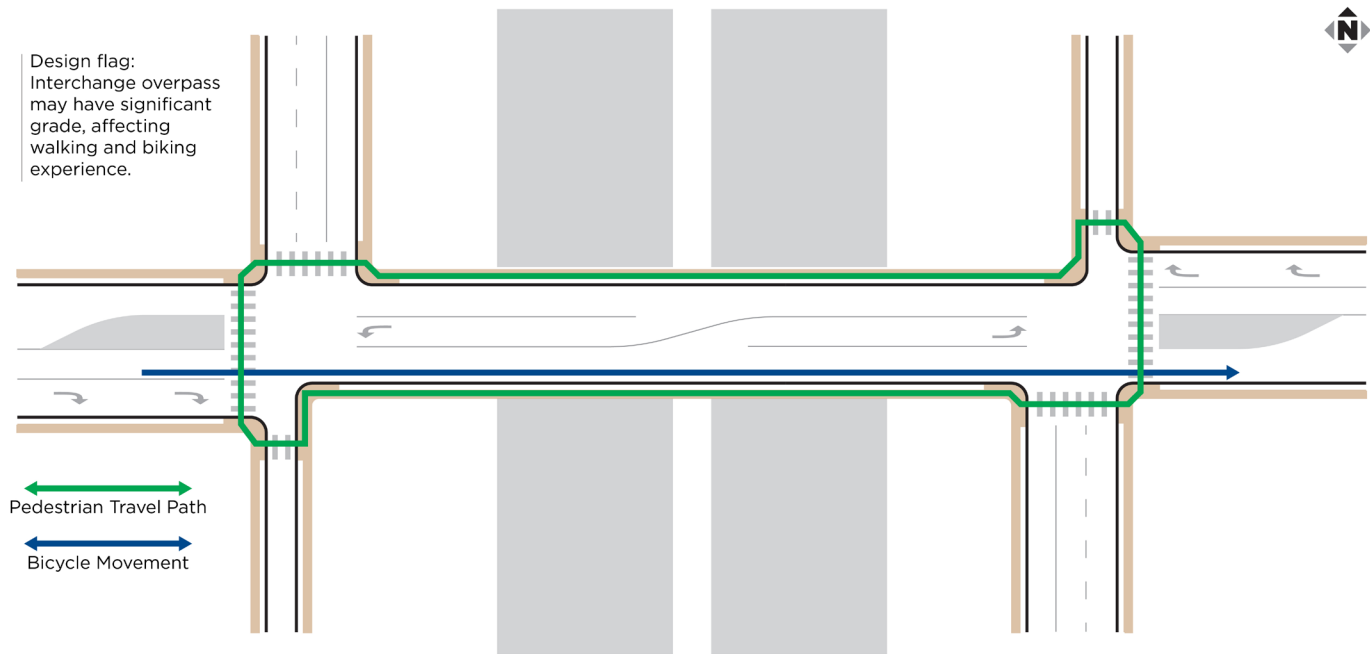
CONSIDERATIONS

For approaches with more than four legs, it may be appropriate to consider desire lines across multiple approaches rather than only desire lines between adjacent approaches.

This flag applies to roadways with and without bicycle facilities.

SECONDARY FLAG

NCHRP 948
Flag #13



FLAG DESCRIPTION

Grade changes within or immediately next to an intersection can create challenges for pedestrians and bicyclists. For example, initiating a movement uphill can be challenging for stopped bicyclists. Pedestrians may move slower when walking up hill.

MITIGATIONS TOOLBOX

1. Constructing a dedicated protected bike lane on grade sections.
2. Constructing a shared use path on grade sections.
3. Reducing vehicular speeds.

MEASURE OF EFFECTIVENESS

Percent grade

YELLOW FLAG THRESHOLD

+3% to +5%

OR

-3% to -5%

RED FLAG THRESHOLD

<-5%

OR

>+5%

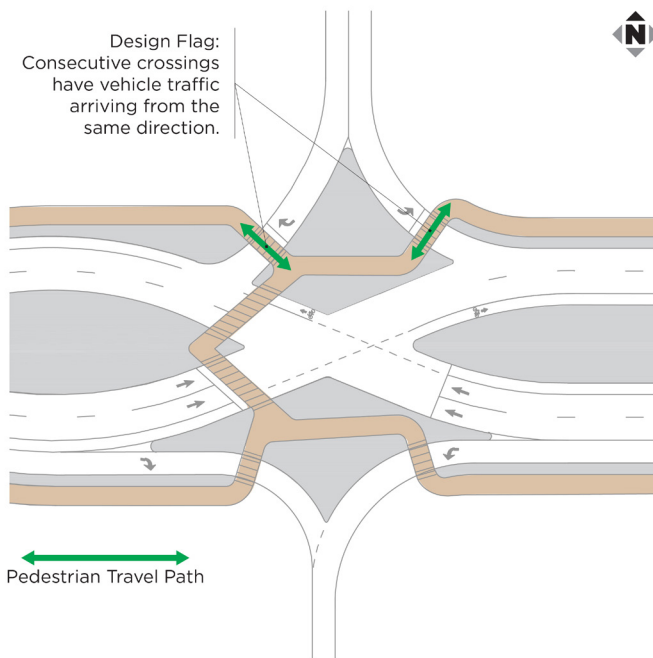
CONSIDERATIONS

The slope of curb ramps should not be considered in determining the steepest grade but should still conform to ADA requirements.

This flag applies to roadways with and without bicycle facilities.

SECONDARY FLAG

NCHRP 948
Flag #3



FLAG DESCRIPTION

When a pedestrian begins crossing the street, the normal expectation is that the first conflicting motor vehicle traffic approaches from the left followed by conflicts from the right. This flag identifies nonintuitive configurations that violate this expectation.

MITIGATIONS TOOLBOX

1. Designing the approaching path to face the initial direction of opposing traffic.
2. Providing wayfinding that is understandable to intended users, as well as appropriate speech messages for audible information devices.
3. Providing pavement marking at the entrance to the crossing indicating which direction a pedestrian or bicyclist should look.
4. Choosing different geometric features of the design to minimize movements from unexpected directions.

MEASURE OF EFFECTIVENESS

Vehicle acceleration profile at crossing location

YELLOW FLAG THRESHOLD

Vehicle decelerating

RED FLAG THRESHOLD

Vehicle accelerating or free-flowing

CONSIDERATIONS

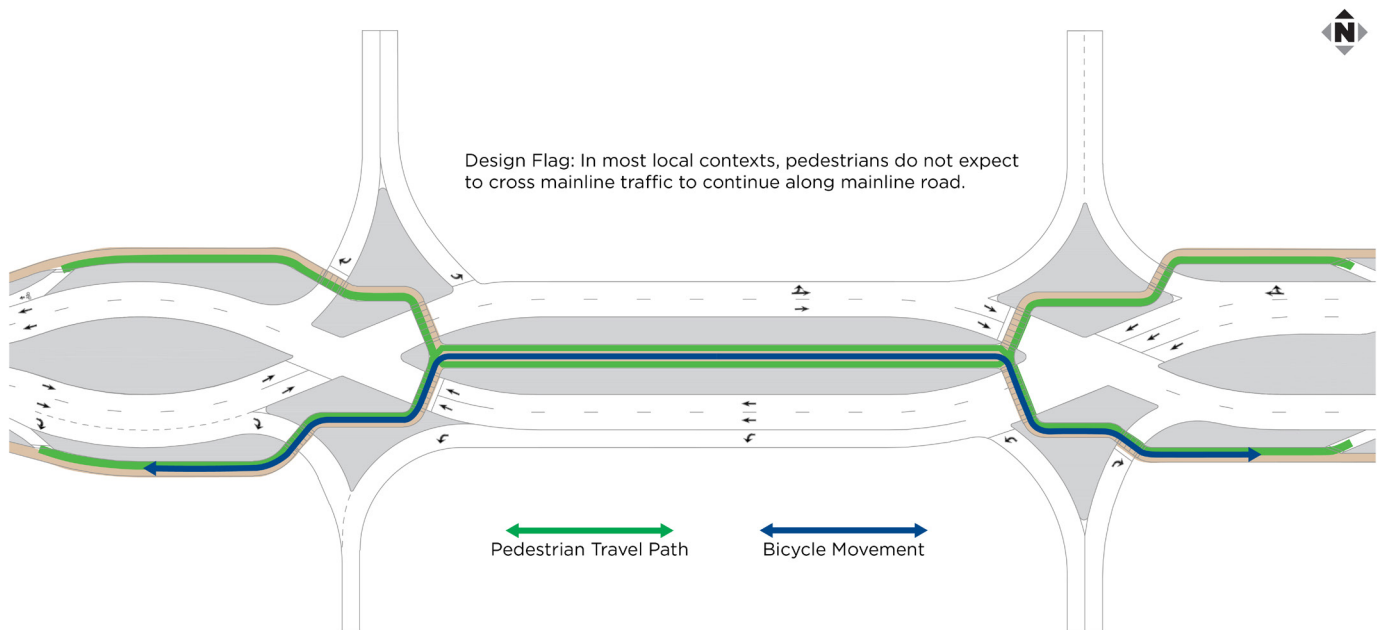
Less common flag.

Nonintuitive vehicle movements are common at interchanges.

This flag does not apply to stop-controlled crossings.

SECONDARY FLAG

NCHRP 948
Flag #6



FLAG DESCRIPTION

Roadway users have expectations for their travel paths and vehicle movements at intersections. This flag captures confusion or uncertainty users may experience when being unsure of how to continue on the desired path. This flag is most commonly seen at interchanges, one way streets, alternative intersections, intersections with channelized turns and multiple crossing stages.

MITIGATIONS TOOLBOX

1. *Re-aligning pedestrian/bicycle movement to make them more intuitive.*
2. *Constructing dedicated pedestrian or bicycle facilities*
3. *Following the design process to meet expectation for pedestrians and bicyclists.*

MEASURE OF EFFECTIVENESS

Compliance with local expectation

YELLOW FLAG THRESHOLD

This path does not match the expectation

CONSIDERATIONS

Less common flag.

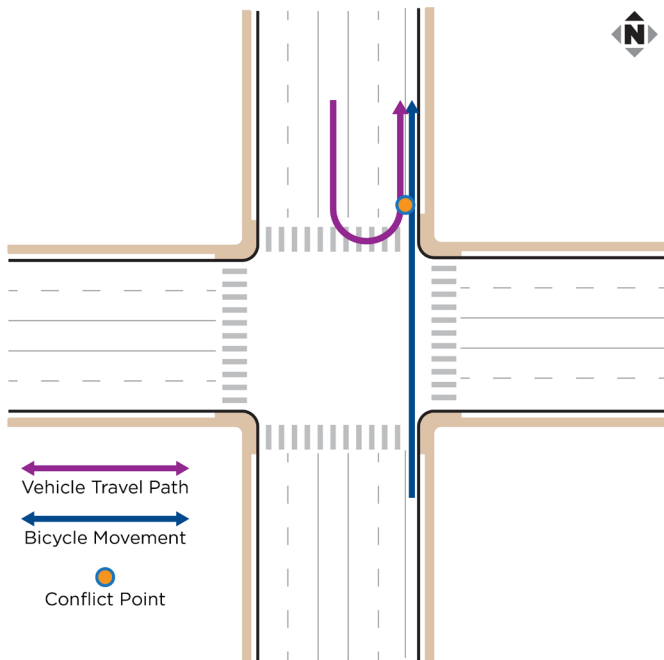
This design flag can only be yellow.

Determining if a movement is unusual likely relies on local context. It is not intended to cover common but undesirable movements.

A first-of-its-kind design in an area may qualify as an unusual movement until familiarity with the design becomes common.

SECONDARY FLAG

NCHRP 948
Flag #20



FLAG DESCRIPTION

Depending on curvature and lane widths, vehicles may off-track into adjacent lanes during u-turn or other turning maneuvers, resulting in a comfort and safety concern for cyclists. This situation is common for heavy trucks, intersections with u-turns or multiple left or right turn lanes, and for unprotected bicycle lanes on the inside of a curve.

MITIGATIONS TOOLBOX

1. *Constructing separate protected bicycle lanes or shared use paths.*
2. *Using striped vane islands to separate vehicle lanes.*

MEASURE OF EFFECTIVENESS

Design vehicle encroachment into bicycle lane

YELLOW FLAG THRESHOLD

Design vehicle can make turn without encroaching on bicycle lane

RED FLAG THRESHOLD

Design vehicle cannot make turn without encroaching on bicycle lane

CONSIDERATIONS

Less common flag.

Applicable only at locations where vehicle off-tracking may encroach into bicycle paths, particularly at conventional bicycle lanes without vertical barriers.