



TWO-STAGE TURN QUEUE

A two-stage turn queue (TSTQ) box provides a protected area for bicyclists to move out of the through traffic lane on the right hand side of a street and wait for the green cycle of the intersecting road before proceeding across to complete the turn. Two-stage turn queues reduce bicycle/vehicle conflicts and provide a less stressful left-turn option. The two separate stages for a bicyclist to complete a left turn increases travel time for bicyclists, although the benefit of comfort may outweigh the time penalty. Even where two-stage turn queues are provided, their use is optional. Bicyclists may still lawfully complete a left turn from the left-most travel lane where vehicular left turns are also permitted.

USE

- Two-stage turn queue boxes may be used on any street type, but are especially appropriate where there are significant volumes of turning bicyclists, along preferred travel routes where increased bicycling is encouraged, and/or where accommodation of less confident bicyclists is needed.
- Two-stage turn queue boxes are particularly beneficial on streets with more than one travel lane in any one direction including turn lanes.

- Two-stage turn queue boxes can be used at 4-legged intersections as well as “T” or 3-legged intersections.
- Two-stage turn queue boxes are commonly used to provide left turns where bicyclists typically travel on the right hand side of the street but may similarly be used to accommodate right turns from a left-side bicycle facility.
- Two-stage turn queue boxes are generally used in conjunction with other bicycle facilities, such as bicycle lanes or protected bicycle lanes, but may be used on any corridor where safe and comfortable accommodation of left-turning bicycles is needed.

DESIGN

- A two-stage turn shall consist of a “first stage” bicycle travel facility, a bicycle lane, and a “second stage” queue box that accommodates the bicyclist waiting for the signal prior to completing the turn.
- The two-stage turn queue box shall be at least 10 feet wide by 4 feet deep but may be increased in size based on the expected volume of queued bicyclists.
- The turn queue box for a second stage of the maneuver shall be in a protected location between the crosswalk and the closest through bicycle or travel lane. Two-stage turn queue should align with the right side travel lane or bicycle facility of the receiving street.

- Pavement markings in the two-stage turn queue shall signify a bicyclist and indicate proper direction and positioning.
- Right turns on red must be reviewed where turn boxes are used. Right turn on red restrictions or prohibition of turns shall be considered to avoid conflicts with queued and waiting bicyclists. If employed, appropriate signage shall be installed.
- Two-stage turn queue boxes should not be placed adjacent to transit stops as there may be a conflict between passengers boarding and bicyclists waiting in the queue.

OPERATIONS AND MAINTENANCE

- Two-stage turn queues result in additional pavement marking that will require maintenance. The use of green markings may add additional maintenance complexity. Placing markings between vehicle tire tracks may reduce wear and tear.
- Two-stage turn queues should be cleared of snow concurrent with all other street snow removal activities.

SPECIAL CONSIDERATIONS

- Use green pavement or pavement markings to increase visibility and legibility of the two-stage turn queue box.

- If bicycle lanes are present, use dashed lines to indicate bicycle lane through the intersection and ensure queued bicyclists stay clear of this travel facility.
- If detectable/actuated signals are used, ensure bicycles will be detected in the two-stage turn queue. Bicycles should not be required to use pedestrian actuation to gain crossing.
- Under constrained circumstances, crosswalks may be adapted to enable space for bicycle queuing. Alternatively, a standard bike box may be used. This, however, requires bicyclists to cross the pedestrian line of travel and should only be used where pedestrian volumes are low.
- Bulb-outs may be constructed on the far side of the intersection to enhance the protection of people waiting in the queue box, especially if drivers frequently pass slowed or stopped vehicles on the right side.

REFERENCES

- NACTO: Urban Bikeway Design Guide, Second Edition, 2014
 - Intersection Treatments: Two-Stage Turn Queue Boxes <http://nacto.org/publication/urban-bikeway-design-guide/intersection-treatments/two-stage-turn-queue-boxes/>
- MMUTCD, 2011
 - Part 9 Traffic Control for Bicycle Facilities http://mdotcf.state.mi.us/public/tands/Details_Web/mmutcdpart9_2011.pdf

