

## Two-way Bikeways on Both Sides of the Street

Separated bike lanes and shared use paths can both provide two-way travel for bicyclists. In some situations two-way separated bike lanes or shared use paths on both sides of the street (i.e., a two-way pair) may be warranted. The general application for this facility type is along wide, higher-speed, higher-volume streets with limited crossing opportunities where destinations exist on both sides of the street. Two-way bikeways on both sides of the street minimize the need to cross wide roadways, travel excessive distances to cross at a safe location, and improve access and network connectivity to both sides of the street.

Conversely, two-way bikeways on one side of the street and one-way separated bike lanes on both sides of the street limit access for bicyclists. A single two-way bikeway, while potentially beneficial to connect to certain destinations or connecting bicycle facilities, can require bicyclists to cross the roadway twice to reach their destinations and limits access to the other side of the street. This may lead to wrong way riding at locations where the main road is perceived as a barrier to cross or results in excessive delay to cross. Similarly, a pair of one-way facilities on each side of a street may present a problem if a bicyclist's destination is on the opposite side of the street from his direction of travel. This requires the rider to either cross the street twice to access the destination, or it may lead him to ride against traffic on the side of the street where his destination is located.

By providing a two-way facility on each side of the street, Montgomery County will enable bicyclists to complete trips to their destinations with minimal conflicts and delay and encourage more “interested but concerned” riders to consider choosing bicycling.

### Domestic Examples

Domestic examples of two-way bikeways on both sides of the street are uncommon. Hiawatha Avenue in Minneapolis, a high-speed six-lane limited-access highway, is bound by two shared use paths between E 24<sup>th</sup> Street and E 26<sup>th</sup> Street. This bike facility configuration enhances network connectivity significantly by directly connecting the non-motorized overpasses at these cross streets to the north-south Hiawatha Bike Trail and the east-west Midtown Greenway. Bicyclists avoid crossing Hiawatha Avenue at-grade entirely, eliminating conflicts with vehicles and creating a comfortable bicycling environment.



*Redesigned Casey Arborway (path connections in blue)*

Two-way facilities on both sides of the street are currently under construction in Boston as part of the Casey Arborway Project. The completed Arborway will span at least six lanes of heavy motor vehicle

volumes, and is located alongside regional path connections. The two-way bikeways on both sides of the street will minimize the need to cross the Arborway while upgrading existing connections to the Southwest Corridor and creating new east, west, and south non-motorized path connections.

### **International Examples**

Two-way facilities on both sides of the street are more common abroad. The Dutch, in particular, make extensive use of this arrangement inside built-up areas where dense bicycle networks are the norm. Typically, two-way facilities on both sides of the street are limited to divided roadways with raised medians (often occupied by light rail tracks) and higher motor vehicle speeds and volumes.

Vierhavensstraat in Rotterdam was recently reconstructed as part of a redevelopment effort and includes two-way facilities on both sides of the street.



*Vierhavensstraat, Rotterdam, Netherlands*

For the Dutch, the implementation of two-way facilities on both sides of the street is a logical outcome of the development of bicycle networks. This comprehensive planning process is guided by five fundamental requirements in the Netherlands: cohesion, directness, safety, comfort and attractiveness:

- **Cohesion:** Does the bicycle network connect origins and destinations, and align with existing bicycle travel patterns? Two-way bikeways on both sides of the street simplify and enhance access for bicyclists by eliminating the need to cross the street. They may be implemented to better align to existing bicyclist travel patterns, ensuring that the bicycle network serves at least 70 percent of all bicycle trips. The grid of the bicycle network should include facilities spaced at no greater than 250 meters (820 feet) apart.
- **Directness:** Does the bicycle network facilitate trips that are as direct and unimpeded as possible? Two-way bikeways on both sides of the street promote directness in distance and time by minimizing the need to unnecessarily cross the street and detour from the desire line. The detour factor—a comparison of route length and as-the-crow-flies distance—should be no

greater than 1.2 for main cycle routes and 1.4 for additional routes. Stopping frequency—stops per kilometer—should be minimized.<sup>1</sup>

- *Safety*: Are conflicts with crossing traffic avoided? Two-way bikeways on both sides of the street minimize the need to cross multiple lanes of higher speed traffic. This minimizes exposure to dangerous conflicts. The safest conflict is the one that doesn't exist.
- *Comfort*: Does the bicycle network prevent exposure to “traffic nuisance”, defined by the Dutch as negative impacts of interacting with automobiles, such as exhaust, noise pollution and conflicts resulting in delay? Two-way bikeways on both sides of the street minimize encounters with automobiles by separating bicycles and cars to a great extent within the same corridor.
- *Attractiveness*: Does the bicycle network attract continued use? Two-way pairs separate bicyclists from motor traffic to a greater extent and increase bicycle access and connectivity. This can make trips more convenient by bicycle. Two-way facilities also encourage side-by-side riding, which promotes social interaction and, ultimately, enjoyment.

### **Recommendations for Montgomery County**

A two-way bikeway on both sides of the street is intended to serve a unique function within the County's bicycle network. This facility type should only be recommended where *all* recommended criteria are met because of the significant level of investment needed to implement these facilities. Many locations that are good candidates for two-way facilities on both sides of the street will also have high pedestrian volumes owing to the density of destinations and likely coincidence of transit lines along the corridor. In most cases, this will mean separated bike lanes are preferred to help alleviate conflicts between pedestrians and bicyclists.

Recommended criteria for application of two-way bikeways on both sides of the street are:

- Long distances between safe, comfortable crossings (typically 800 to 1000 feet<sup>2</sup>)
- Wide cross section (four or more lanes), and
- Presence of destinations on both sides of the street.

Long distances between crossings where destinations are present on both sides of the street may lead bicyclists to undertake different unsafe behaviors based upon configuration of the bike facility provided:

- One-way pairs (conventional or separated bike lane): Bicyclists may ride against traffic in the one-way facility to avoid crossing the street to reach their destination. However, their movements would not be accommodated in the design of the facility either in width (for passing) or signage and marking (for alerting drivers).
- Two-way facility (shared use path or separated bike lane) on one side of the road: Bicyclists may cross at unmarked crossings which drivers will not expect and which poses a greater risk on wide, high-speed roads. Bicyclists may also ride on the sidewalk on the non-bicycle facility side

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<sup>1</sup> This logic becomes important for short trips, such as those the County may desire to capture within a mixed-use neighborhood. Undue delay on a quick run for errands will dissuade a resident from choosing to bike instead of drive.

<sup>2</sup> Lower thresholds may be considered where a high density of destinations exists on both sides of the street.

of the street leading to increased conflict with pedestrians in this limited space and to conflicts with automobiles entering/exiting from driveways where bicyclists are unexpected.

A street must have a wide cross section, four lanes or more, to consider this facility application. The width of the street makes crossing less safe through exposure to multiple lanes of traffic and likely higher speeds. Wider streets often also have longer signal phasing which presents further delay to bicyclists who may need to cross the street twice to reach their destination and continue a trip if a facility is only provided on one side of the street.

The criteria for crossing distances are only applicable where a bicyclist has a reason to access both sides of the street. A street that meets the other criteria would not warrant two-way facilities on both sides if it abuts a large private property or a park with one entrance, for instance. Corridors with destinations on both sides of the street are likely to have commercial or mixed-use land use.

It should be noted that a two-way pair may be used for a short segment within a commercial area and transition back to a two-way facility on one side of the street outside of this area. These segments can provide critical connections and access for bicyclists on major streets that may otherwise create a barrier.

#### **Example Application in Montgomery County: Rockville Pike**

Rockville Pike is perhaps the quintessential example of a street that is well-suited to a two-way pair facility. The White Flint Separated Bike Lane Network calls for a separated bike lane on Rockville Pike, but this planning documents does not specify cross sections for these recommendations.

Rockville Pike is a six-lane street in this segment, though turn lanes increase this width at every intersection, and this width creates a major barrier to accessing both sides of the street. Safe, comfortable crossings are farther apart than is practical for bicyclists making short neighborhood trips in this area. Crossings are, on average, 850' apart from one another, a distance which slightly exceeds the threshold stated above. Commercial destinations are located on both sides of the road throughout White Flint today, and anticipated redevelopment will only intensify these land uses and bring a greater number of residents to the area. Businesses front on Rockville Pike, and while some access may be possible from side streets in the network, two-way facilities on both sides of the street will enable bicyclists (and non-bicyclists) to conceptualize arriving at these businesses by bicycle.

The two-way pair would be recommended to begin at Flanders Avenue—the beginning of commercial use on both sides of the street—on the south end, and continue to meet the two-way pair at the Rockville city line. On Rockville Pike and at other locations in the county, trade-offs would need to be made to accommodate the increased space needs for two-way facilities on both sides of the street. If two-way bikeways are not provided on both sides of the road through the White Flint area, it can be expected that people will be less likely to choose to bike for their trip, bicycle on the sidewalk, or bicycle in the wrong direction on a one-way bikeway. These possible outcomes are in conflict with the County's

DRAFT – 3/31/2016

goals for providing a safe, connected, low-stress network that attracts more residents and visitors to choose bicycling.