THE BICYCLE MASTER PLAN

DRAFT LIFE SCIENCES CENTER BICYCLE NETWORK PROPOSAL

JANUARY 2016

THE MONTGOMERY COUNTY PLANNING DEPARTMENT

Draft Life Sciences Center Bicycle Network Proposal

January 2016

Abstract

This draft report proposes a network of separated bike lanes and long-term bicycle parking stations for the Life Sciences Center area and explains the reasons for its locations, designs and details. Separated bike lanes create a low-stress environment for cyclists because they provide physical separation between cyclists and vehicular traffic and pedestrians. Long-term bicycle parking stations provide secure bicycle storage at transit stations and other activity centers where commuters can leave their bicycles, thereby extending the reach of transit beyond the half-mile that most people will walk.

Source of Copies:
montgomeryplanning.org/bikeplan

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Indianapolis Cultural Trail

Bicycling as a mode of transportation is experiencing a resurgence throughout the United States, especially in urbanized areas.

Driven by changing travel patterns, investments in low-stress bicycling infrastructure and popularity of bikeshare programs, the number of trips by bicycling has grown steadily over the past 15 years.

Montgomery County continues to make substantial investments in bicycling infrastructure and is well-positioned to emerge as a leader in bicycling among suburban jurisdictions. A high-quality bicycling network is a critical component of achieving a number of County performance metrics, including non-auto driver mode share (NADMS) goals required in the staging elements of several master plans, and air quality and public health indicators. Furthermore, a separated bicycle network is increasingly a driver of economic activity and a way to expand the reach of the planned Corridor Cities Transitway stations beyond the typical half-mile that most people are willing to walk. Several surveys reveal that the public increasingly wants to live in walkable and bikeable places with convenient access to amenities and transit.

Bicycle Infrastructure

The Montgomery County Planning Department began working on the Bicycle Master Plan in July 2015 with the goal of developing a low-stress bicycle network that can make cycling a mainstream choice for the majority of the County's residents and workers. One component of this plan is evaluating bikeway types that were not a part of the planning toolkit when the Countywide Bikeways Functional Master Plan (a precursor to the current Bicycle Master Plan) was approved in 2005.

A one-way separated bike lane in Boulder, Colorado. (Source: denverurbanism.com)

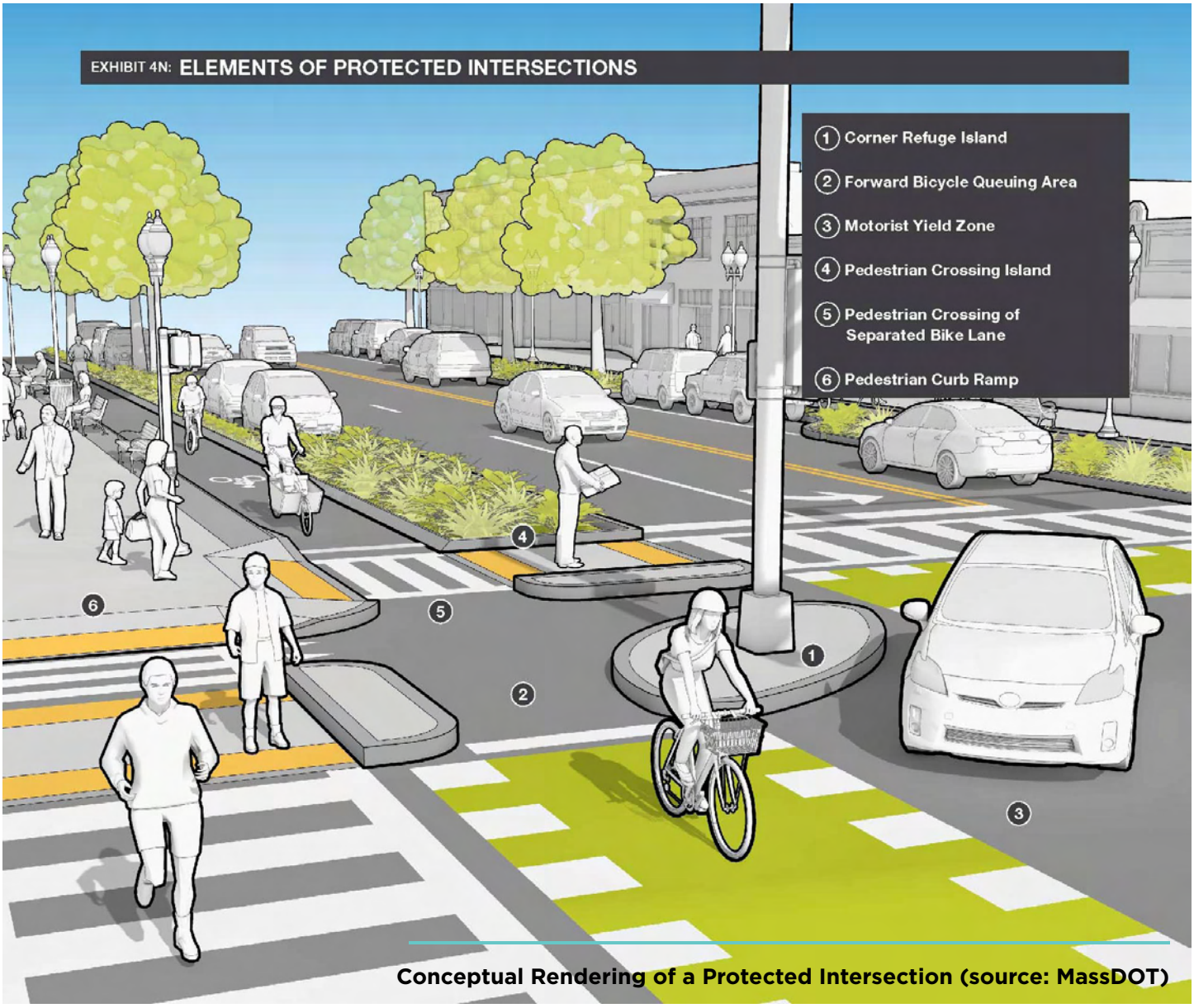
Separated Bike Lanes

Separated bike lanes (also known as cycle tracks or protected bike lanes) are preferred in many urban areas because they establish physical separation between cyclists and motor vehicles and pedestrians. This separation may be vertical, such as curbs or bollards; horizontal, such as a landscape panel or a parking lane; or a combination of both. Separated bike lanes may be in a one-way or a two-way configuration.

While this report is focused on separated bike lanes, the proposed network will connect to conventional bike lanes, buffered bike lanes, shared use paths and bicycle boulevards outside of the Life Sciences Center area as part of the larger network.

Protected Intersections

Protected intersections are an emerging innovation that extends the protection of a separated bike lane to the intersection and should be evaluated at all major crossings in the Life Sciences Center area. The first protected intersection in the United States opened in Davis, California, in August 2015. The benefit of protected intersections is that they physically separate bicyclists as they make right turns, simplify bicycle-through movements and left turns, increase the visibility of cyclists, provide a refuge for cyclists waiting to cross the street and provide cyclists with a head start as they cross the street.



Conceptual Rendering of a Protected Intersection (source: MassDOT)

Secure Bicycle Parking

Another component of the Bicycle Master Plan is evaluating the potential for providing long-term, secure bicycle parking facilities at major transit stations and activity centers. Bicycling is a way to expand access to jobs and transit for people that live and work beyond the half-mile distance that most people will walk. But without secure options for storing their bicycle, many people are reluctant to leave their bicycle locked to a standard "inverted-u" rack for extended periods.

Capital Metro Bike Shelter, Austin, Texas (Source: Jeff Owen)

Communities and transit providers throughout the country are opening long-term, secure bicycle parking stations (not to be confused with Capital Bikeshare stations) as a means to increase bicycling to jobs and transit. In the metropolitan Washington region, bicycle parking stations exist at the Union Station, College Park and Wiehle-Reston East Metrorail stations and are under construction (as of September 2015) at the East Falls Church and Vienna Metrorail stations.

Life Sciences Center Loop

The Montgomery County Life Sciences Center (LSC) Loop is a proposed 3.5-mile loop trail that will serve as an organizing element and placemaking feature for the Life Sciences Center district. Much more than a standard shared use path, the LSC Loop Trail will function as an identifiable public amenity that helps make the Life Sciences Center an attractive place to live, work and visit. The trail will incorporate distinctive design elements—special paving, furniture, landscaping, art, signage and stormwater management features—as well as public amenity/park spaces adjacent to the trail route. A central feature of the Great Seneca Science Corridor Master Plan, the LSC Loop Trail also constitutes a major staging requirement for advancing implementation of the Master Plan and must be fully funded prior to opening Stage 2 of Master Plan development. The typical LSC Loop Trail cross-section includes a 12-foot-wide shared use path with planted buffers on both sides of the trail, with a 10-foot-wide shared use path in the most constrained trail segments.

Summary

Montgomery County residents and workers are more likely to bicycle in low-stress environments with secure bicycle storage, so improving bicycling throughout the County requires developing safe, low-stress connections between activity centers, transit facilities and neighborhoods, and providing long-term, secure bicycle parking options. Based on staff analysis, the bike recommendations proposed in the Great Seneca Science Corridor Master Plan (2010) are insufficient to create a low-stress bicycling network. The Life Sciences Center would benefit greatly from separated bike lanes, which would encourage cycling as a mainstream choice.

Due to the rapid pace of change in the Life Sciences Center area, the Planning Department is advancing work in this area so that meaningful opportunities to construct segments of the preferred bike network are not lost before the Bicycle Master Plan can be completed. This effort will enable coordination with development approvals and the design of the Corridor Cities Transitway (CCT).

This document identifies a network of separated bike lanes and bicycle parking stations that will enable employees and residents within and surrounding the Life Sciences Center area to access jobs, retail destinations and future CCT bus rapid transit stations. This network will also connect to existing bicycle facilities, such as the Carl Henn Millennium Trail in the City of Rockville, and the shared-use path network that exists (with gaps) on many of the major highways in the area (Great Seneca Highway, Key West Avenue and Darnestown Road, among others).

The proposed Separated Bike Lane network is composed of:

The Northway Separated Bike Lane:

- Alignment: East-west.
- Connections: Washingtonian Woods, Johns Hopkins University Belward Campus, Millenium Trail.
- Access to Future CCT Stations: LSC Belward and DANAC.

The Southway Separated Bike Lane:

- Alignment: East-west.
- Connections: Hunting Woods, Public Service Training Academy (PSTA) site, National Cancer Institute, Fallsgrove, Millenium Trail.
- Access to Future CCT Stations: LSC West and LSC Central.

The Midway Separated Bike Lane:

- Alignment: North-south.
- Connections: Shady Grove Adventist Hospital, Crown Farm.
- Access to Future CCT Stations: LSC Central DANAC.

The Lower Loop Separated Bike Lane:

- Alignment: Crescent-shaped corridor.
- Connections: Johns Hopkins University Belward Campus, PSTA site, Shady Grove Adventist Hospital.
- Access to Future CCT Stations: LSC West.

In addition to these routes, an additional separated bike lane would be constructed on Muddy Branch Road, between Great Seneca Highway and Darnestown Road. As currently planned, this facility would be a two-way separated bike lane on the east side of Muddy Branch Road to accommodate a future widening of the road from four to six lanes. However, the two-way bikeway provides challenges in connecting to the conventional bike lanes on Muddy Branch Road south of Darnestown Road and the planned bike lanes north of Great Seneca Highway. Since conventional bike lanes are planned on both sides of the road, a person traveling in the southbound direction on Muddy Branch Road would have to cross from the west side of Muddy Branch Road to the east side at Great Seneca Highway, travel south alongside the Belward Farm, and then cross back over to the west side of the road at Darnestown Road. Therefore, if it is determined at a later date that Muddy Branch Road does not need to be widened to six lanes, the separated bike lanes should be one-way on both sides of the road.

Bike Station Adjacent to the Union Station Metrorail Station in Washington, DC

Two long-term, secure bicycle parking stations should be located directly adjacent to the future LSC Belward and LSC Central stations of the CCT. These station locations were selected because:

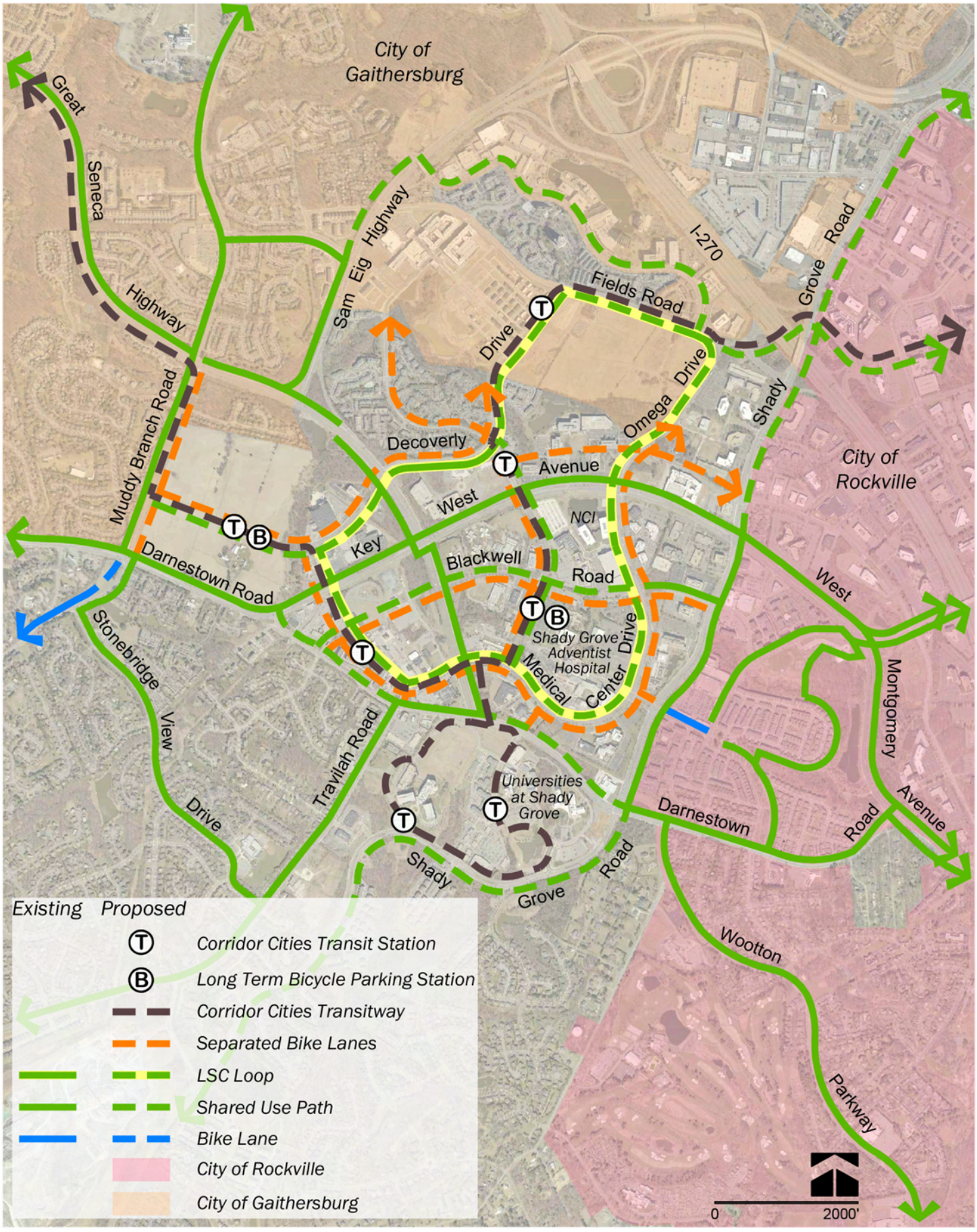
- They draw transit passengers from up to 3 miles away, expanding the reach of transit.
- They are located on either side of Key West Avenue, a major barrier for cyclists.
- They are spaced so as not to draw from overlapping areas.
- Potential LSC development could provide space for the bicycle parking stations directly adjacent to the CCT stations.

Each station would accommodate at least 100 bikes in a secure storage facility and provide bicycle support features, such as changing rooms, showers, fix-it stations and potential bicycle retail. A facility of this size would encompass roughly 1,600 square feet and a site of roughly 2,500 square feet is recommended that will include site access and other features.

A bicycle parking station is also recommended at the Shady Grove Metro Station, but is outside of the Life Science area and will be included in the overall Bicycle Master Plan update.

The map (right) shows the proposed separated bike lane network and long-term bicycle parking station locations.

PROPOSED SEPARATED BIKE LANE & PARKING NETWORK



STATUS OF PROPOSED SEPARATED BIKE LANE NETWORK

The following table (right) shows the location, distance and current status of each segment of the proposed separated bike lane network. Of the total 12 lane miles of separated bike lanes proposed in the Life Sciences Center area, 3.6 miles (or about 30 percent) are identified for implementation as part of the Corridor Cities Transitway or development projects.

BIKEWAY	STREET NAME	FROM	TO	PROPOSAL
NORTHWAY	Belward Campus Road	Muddy Branch Road	Johns Hopkins Drive	One-Way, both sides of street
	Belward Campus Road	Johns Hopkins Drive	Great Seneca Highway	One-Way, both sides of street
	Decoverly Drive	Great Seneca Highway	Diamondback Drive	One-Way, both sides of street
	Decoverly Drive	Diamondback Drive	City of Gaithersburg	One-Way, both sides of street
	Street B-2	Diamondback Drive	Omega Drive	One-Way, both sides of street
SOUTHWAY	Blackwell Road	Darnestown Road	Medical Center Drive Extended	One-Way, both sides of street
	Blackwell Road	Medical Center Drive Extended	Great Seneca Highway	One-Way, both sides of street
	Blackwell Road	Great Seneca Highway	Broschart Road	One-Way, both sides of street
	Blackwell Road	Broschart Road	Medical Center Drive	One-Way, both sides of street
	Blackwell Road	Medical Center Drive	Shady Grove Road	One-Way, both sides of street
MIDWAY	Broschart Road	Medical Center Drive	Blackwell Road	One-Way, both sides of street
	Broschart Road	Blackwell Road	Key West Avenue	One-Way, both sides of street
	Diamondback Drive	Key West Avenue	Decoverly Drive	One-Way, both sides of street
	Diamondback Drive	Decoverly Drive	City of Gaithersburg	One-Way, both sides of street
LOWER LOOP	Johns Hopkins Drive	Belward Campus Drive	Key West Avenue	One-Way, both sides of street
	Medical Center Drive Extended	Key West Avenue	Great Seneca Highway	One-Way, both sides of street
	Medical Center Drive	Great Seneca Highway	Broschart Road	One-Way, both sides of street
	Medical Center Drive	Broschart Road	Blackwell Road	One-Way, both sides of street
	Medical Center Drive	Blackwell Road	Key West Avenue	One-Way, both sides of street
	Omega Drive	Key West Avenue	City of Gaithersburg	One-Way, both sides of street
MUDDY BRANCH ROAD	Muddy Branch Road	Darnestown Road	Great Seneca Highway	Two-Way, east side of street

TECHNICAL DISCUSSION

The analysis in this report is based on an approach that quantifies the stress and anxiety that bicyclists feel when they ride close to vehicular traffic. This level of traffic stress (LTS) methodology was developed in 2012 by the Mineta Transportation Institute and San Jose State University.[2] It assigns a numeric stress level to streets (and other places where people can bicycle, like trails) based on attributes which include traffic speed, traffic volume, number of lanes, frequency of parking turnover, ease of intersection crossings and other characteristics. A quiet residential street with a 25 mph speed limit presents a low-stress setting for cyclists riding in the roadway, but a six-lane highway with a 40-mile-per-hour speed limit creates a high-stress environment for cyclists who must share the roadway with traffic.

The following proposed network of separated bike lanes would create a low-stress bicycling environment through much of the Life Sciences Center area.

[2]Mekuria, Maaza, Peter G. Furth and Hilary Nixon, Low-Stress Bicycling and Network Connectivity, San Jose, CA: Mineta Transportation Institute, 2012.

NORTHWAY SEPARATED BIKE LANE

The Northway Separated Bike Lane travels along the proposed Belward Campus Drive and Decoverly Drive between Muddy Branch Road and Shady Grove Road.

BELWARD CAMPUS DRIVE (FUTURE)

(MUDDY BRANCH ROAD TO JOHNS HOPKINS DRIVE)

Belward Campus Drive will be the main road through the future Johns Hopkins University Belward Campus. It will be a four-lane arterial with two additional lanes for the Corridor Cities Transitway in the median.

- **Number of Through Lanes:** 6 lanes planned at build-out (including 2 transit lanes).
- **Target Speed:** 30 mph.
- **On-Street Parking:** None.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 150 feet, including Corridor Cities Transitway.

Looking east toward the future alignment of Belward Campus Drive.

Level of Traffic Stress: Without a separated bikeway, bicycling on the future Belward Campus Drive would be a high-stress experience only acceptable to about 1-4 percent of the population, due to the speed and likely volume of traffic.

Status: The Montgomery County Planning Department, Montgomery County Department of Transportation (MCDOT) and Maryland Transit Administration (MTA) have agreed to pursue one-way separated bike lanes along Belward Campus Drive as part of the inconcept and the Johns Hopkins Belward Campus development. Implementation will be pursued as part of the development review process.

BELWARD CAMPUS DRIVE
(JOHNS HOPKINS DRIVE TO GREAT SENECA HIGHWAY)

Belward Campus Drive is an existing, stub road between Johns Hopkins Drive and Great Seneca Highway, where the road steeply drops. Today, it is a two-lane road with on-street parking, but the Great Seneca Science Corridor Master Plan recommends converting the on-street parking to two additional traffic lanes.


Looking east toward Great Seneca Highway.

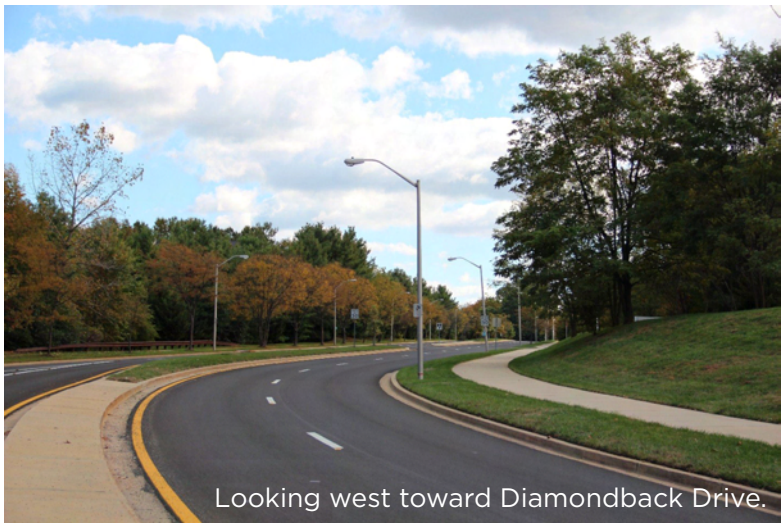
- **Number of Through Lanes:** 2 existing, 4 planned at build-out.
- **Target Speed:** 25 mph.
- **On-Street Parking:** Existing on both sides of street, but will be converted to additional traffic lanes.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 100 feet.

Level of Traffic Stress: Without a separated bikeway, bicycling on this segment of Belward Campus Drive will be a moderate-stress experience only acceptable to about 10 percent of the population, due to the speed and likely volume of traffic once the area is built-out.

DECOVERLY DRIVE
(GREAT SENECA HIGHWAY TO DIAMONDBACK DRIVE)

Decoverly Drive is an existing, four-lane road between Great Seneca Highway and Diamondback Drive.

- **Number of Through Lanes:** 4 existing.
- **Target Speed:** 30 mph.
- **On-Street Parking:** None.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 100 feet.


Looking west toward Diamondback Drive.

Level of Traffic Stress: Bicycling on Decoverly Drive is a high-stress experience only acceptable to about 1-4 percent of the population, due to the speed and number of traffic lanes.

DECOVERLY DRIVE
(DIAMONDBACK DRIVE TO CITY OF GAITHERSBURG)

Decoverly Drive is an existing, north-south road between Diamondback Drive and the City of Gaithersburg. Today, it is a two-lane road with on-street parking, but ultimately it will become a four- lane road with two additional lanes for the Corridor Cities Transitway running in the median. As of October 2015, this road remains blocked to through-traffic due to the Crown Farm development project.


Looking east toward the City of Gaithersburg.

- **Number of Through Lanes:** 2 existing, 6 planned at build-out (including 2 transit lanes).
- **Target Speed:** 30 mph.
- **On-Street Parking:** Existing on both sides of street, but will be converted to additional traffic lanes.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 100 feet, including Corridor Cities Transitway.

Level of Traffic Stress: Without a separated bikeway, bicycling on Decoverly Drive will be a high-stress experience only acceptable to about 1-4 percent of the population, once the extension to Crown Farm is open to traffic.

Status: The Planning Department, MCDOT and MTA have agreed to one-way separated bike lanes along Decoverly Drive. The northbound separated bike lane is reflected in the 30 percent design plans for the CCT. However, the northbound separate bike lane should be expanded into a two-way separated bike lane until the southbound separated bike lane can be implemented.

STREET B-2
(DIAMONDBACK DRIVE TO OMEGA DRIVE)

Street B-2 will connect Diamondback Drive to Omega Drive. It will be a two-lane road with a row of on-street parking. With a planned 60-foot right-of-way, it will be a challenge to incorporate a bikeway on this road.

- **Number of Through Lanes:** 2 planned.
- **Target Speed:** 30 mph.
- **On-Street Parking:** One side of the street.
- **Functional Classification:** Business District Street.

RESEARCH BOULEVARD
(OMEGA DRIVE TO SHADY GROVE ROAD)

Research Blvd is an existing four-lane street.

- **Number of Through Lanes:** 4 existing.
- **Target Speed:** 30 mph.
- **On-Street Parking:** none.
- **Functional Classification:** Industrial Street.
- **Master Planned Right-of-Way:** 80 feet.

Level of Traffic Stress: Without a separated bikeway, bicycling on Research Blvd will be a high-stress experience only acceptable to about 1-4 percent of the population.

SOUTHWAY SEPARATED BIKE LANE

The Southway Separated Bike Lane travels along the proposed Blackwell Road between Darnestown Road and Shady Grove Road.

BLACKWELL ROAD

(DARNESTOWN ROAD TO GREAT SENECA HIGHWAY)

Blackwell Road will be constructed from Darnestown Road to Great Seneca Highway as part of the Public Safety Training Academy (PSTA) redevelopment project. It will be a two-lane road with on-street parking.

- **Number of Through Lanes:** 2 planned.
- **Target Speed:** 30 mph.
- **On-Street Parking:** 2 sides of the street.
- **Functional Classification:** Business District Street.
- **Master-Planned Right-of-Way:** 70 feet.

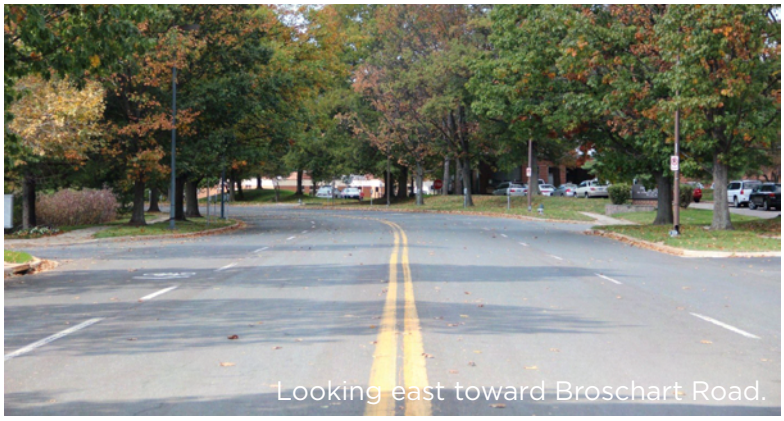
Level of Traffic Stress: Bicycling on Blackwell Road will be a moderate-stress experience only acceptable to about 10 percent of the population. Conventional bike lanes could create a low-stress bicycling environment, especially if on-street parking turnover is low. However, separated bike lanes are preferred because they would ensure a very low-stress bicycling environment that is suitable for most people and tie into the separated bike lane recommended to the east of Great Seneca Highway.

BLACKWELL ROAD

(GREAT SENECA HIGHWAY TO BROSCHART ROAD)

Blackwell Road is an existing, two-lane road with on-street parking between Great Seneca Highway and Broschart Road. The Great Seneca Science Corridor Master Plan recommends expanding it to a four-lane road with on-street parking.

- **Number of Through Lanes:** 2 existing, 4 planned at build-out.
- **Target Speed:** 30 mph.
- **On-Street Parking:** 2 sides of the street of existing parking.
- **Functional Classification:** Business District Street.
- **Master-Planned Right-of-Way:** 100 feet.



Looking east toward Broschart Road.

Level of Traffic Stress: Bicycling on Blackwell Road is currently a moderate-stress experience suitable for about 10 percent of the population. If the road is widened to four lanes, it will become a high-stress experience only acceptable to about 1-4 percent of the population.

BLACKWELL ROAD
(BROSCHART ROAD TO MEDICAL CENTER DRIVE)

Blackwell Road is an existing, two-lane stub road with on-street parking between Broschart Road and Medical Center Drive. The Great Seneca Science Corridor Master Plan recommends expanding it to a four-lane road with on-street parking.

- **Number of Through Lanes:** 2 existing, 4 planned at build-out.
- **Target Speed:** 30 mph.
- **On-Street Parking:** 2 sides of the street.
- **Functional Classification:** Business District Street.
- **Master-Planned Right-of-Way:** 100 feet.


Looking east toward Medical Center Drive.

Level of Traffic Stress: When Blackwell Road is completed as a through street with four lanes and on-street parking, it will be a high-stress experience only acceptable to about 1-4 percent of the population.

BLACKWELL ROAD
(MEDICAL CENTER DRIVE TO SHADY GROVE ROAD)

Blackwell Road is an existing, two-lane stub-road with on-street parking between Medical Center Drive and Shady Grove Road. The Great Seneca Science Corridor Master Plan recommends expanding it to a four lanes with on-street parking.

- **Number of Through Lanes:** 2 existing, 4 planned at buildout.
- **Target Speed:** 30 mph.
- **On-Street Parking:** 2 sides of the street exist.
- **Functional Classification:** Business District Street.
- **Master-Planned Right-of-Way:** 100 feet.

Level of Traffic Stress: When Blackwell Road is completed as a through street with four lanes and on-street parking, it will be a high-stress experience only acceptable to about 1-4 percent of the population.

MIDWAY SEPARATED BIKE LANE

The Midway Cycle Track travels along the proposed Broschart Road and Diamondback Drive between Medical Center Drive and the City of Gaithersburg.

BROSCHART ROAD

(MEDICAL CENTER DRIVE TO BLACKWELL ROAD)

Broschart Road is an existing, two-lane road with on-street parking between Medical Center Drive and Blackwell Road. The Great Seneca Science Corridor Master Plan recommends converting the on-street parking to two additional traffic lanes. The Corridor Cities Transitway will run along the east side of Broschart Road in this location.

- **Number of Through Lanes:** 2 existing, 6 planned at build-out (including two transit lanes).
- **Target Speed:** 30 mph.
- **On-Street Parking:** Existing, but will be replaced with two traffic lanes.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 150 feet, including Corridor Cities Transitway.

Looking north toward Blackwell Road.

Level of Traffic Stress: Bicycling on Medical Center Drive is currently a moderate-stress experience suitable for around 10 percent of the population, but will become a high-stress experience when the existing on-street parking is converted to traffic lanes.

BROSCHART ROAD
(BLACKWELL ROAD TO KEY WEST AVENUE)

Broschart Road is an existing four-lane road between Blackwell Road and Key West Avenue. The Corridor Cities Transitway will run along the west side of Broschart Road in this location.


Looking north toward Key West Avenue.

- **Number of Through Lanes:** 4 exisiting, 6 planned at build-out (including 2 transit lanes).
- **Target Speed:** 30 mph.
- **On-Street Parking:** None.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 150 feet, including Corridor Cities Transitway.

Level of Traffic Stress: Bicycling on Medical Center Drive is currently a high-stress experience only acceptable to 1-4 percent of the population, due to the posted speed limit and the number of traffic lanes.

DIAMONDBACK DRIVE
(KEY WEST AVENUE TO DECOVERLY ROAD)

Diamondback Drive is an existing, four-lane road with multiple turn lanes between Key West Avenue and Decoverly Drive. The Corridor Cities Transitway will run along the west side of this road. The LSC DANAC station will be located just south of the intersection with Decoverly Road.

- **Number of Through Lanes:** 4 exisiting, 6 planned at build-out (including 2 transit lanes).
- **Target Speed:** 30 mph.
- **On-Street Parking:** None.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 150 feet, including Corridor Cities Transitway.


Looking north toward Decoverly Drive.

Level of Traffic Stress: Bicycling on Diamondback Drive is currently a high-stress experience only acceptable to 1-4 percent of the population, due to the posted speed limit and the number of traffic lanes.

Status: The Planning Department, MCDOT and MTA have agreed to one-way separated bike lanes along Diamondback Drive. The southbound separated bike lane is reflected in the 30 percent design plans for the CCT. However, the separated bike lanes on this road should be two-way on both sides of the road to facilitate access to the LCS DANAC station and to connect Decoverly Drive with Street B-2 and Research Boulevard.

DIAMONDBACK DRIVE
(DECOVERLY ROAD TO CROWN FARM)

Diamondback Drive is an existing, four-lane road between Key West Avenue and Decoverly Drive, with off-peak parking.

- **Number of Through Lanes:** 4 existing.
- **Target Speed:** 30 mph.
- **On-Street Parking:** Off-peak on both sides of the street.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 100 feet.

Looking north toward Crown Farm.

Level of Traffic Stress: Bicycling on Diamondback Drive is currently a high-stress experience only acceptable to 1-4 percent of the population, due to the posted speed limit and the number of traffic lanes.

LOWER LOOP SEPARATED BIKE LANE

The Lower Loop Separated Bike Lane travels along the Johns Hopkins Drive, Medical Center Drive, and Omega Drive between Belward Campus Drive and the City of Gaithersburg.

JOHNS HOPKINS DRIVE

(BELWARD CAMPUS DRIVE TO KEY WEST AVENUE)

Johns Hopkins Drive is an existing, two-lane road with on-street parking. The Great Seneca Science Corridor Master Plan recommends expanding the road to four lanes by eliminating the on-street parking. The Corridor Cities Transitway will operate in the median.

Looking south toward Key West Avenue.

- **Number of Through Lanes:** 2 existing, 6 planned at build-out (including 2 transit lanes).
- **Target Speed:** 25 mph.
- **On-Street Parking:** Existing, but will be converted to traffic lanes.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 150 feet, including Corridor Cities Transitway.

Level of Traffic Stress: Bicycling on Johns Hopkins Drive is currently a low-stress experience suitable for most adults because it lacks through connections. However, when the road becomes a through street and when the existing on-street parking is converted to two additional traffic lanes, it will become a moderate stress road only acceptable to around 10 percent of the population.

Status: The Planning Department, MCDOT and MTA have agreed to one-way separated bike lanes along Belward Campus Drive. The northbound separated bike lane is reflected in the 30 percent design plans for the CCT.

MEDICAL CENTER DRIVE EXTENDED
(KEY WEST AVENUE TO GREAT SENECA HIGHWAY)

Medical Center Drive Extended will be constructed from Key West Avenue to Great Seneca Highway as part of the redevelopment of the Public Safety Training Academy (PSTA) redevelopment project. It will be a four-lane road with the Corridor Cities Transitway running in the median.

- **Number of Through Lanes:** 6 planned (including 2 transit lanes).
- **Target Speed:** 30 mph.
- **On-Street Parking:** None.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 150 feet, including Corridor Cities Transitway.

Level of Traffic Stress: Level of Traffic Stress: Bicycling on Medical Center Drive will be a high-stress experience only acceptable to 1-4 percent of the population, due to the speed limit and likely traffic volume.

MEDICAL CENTER DRIVE
(GREAT SENECA HIGHWAY TO BROSCHART ROAD)

Medical Center Drive is an existing, two-lane road with on-street parking. The Great Seneca Science Corridor Master Plan recommends expanding it to a four lanes by removing the on-street parking and adding two lanes for the Corridor Cities Transitway in the median of the road.

Looking east toward Broschart Road.

- **Number of Through Lanes:** 2 existing, 6 planned at build-out.
- **Target Speed:** 30 mph.
- **On-Street Parking:** Existing, but will be converted to traffic lanes.
- **Functional Classification:** Arterial
- **Master-Planned Right-of-Way:** 150 feet, including Corridor Cities Transitway.

Level of Traffic Stress: Bicycling on Medical Center Drive is currently a moderate stress experience, suitable for 10 percent of the population. When the existing on-street parking is converted to two additional traffic lanes, Medical Center Drive will become a high-stress bicycling experience only acceptable to only 1-4 percent of the population.

Status: The Planning Department, MCDOT and MTA have agreed to one-way separated bike lanes along Belward Campus Drive. The eastbound separated bike lane is reflected in the 30 percent design plans for the CCT.

MEDICAL CENTER DRIVE
(BROSCHART ROAD TO BLACKWELL ROAD)

Medical Center Drive is an existing, two-lane road with on-street parking. The Great Seneca Science Corridor Master Plan recommends expanding it to a four lanes by removing the on-street parking.

- **Number of Through Lanes:** 2 existing, 4 planned at build-out.
- **Target Speed:** 30 mph.
- **On-Street Parking:** Existing, but will be converted to traffic lanes.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 100 feet.

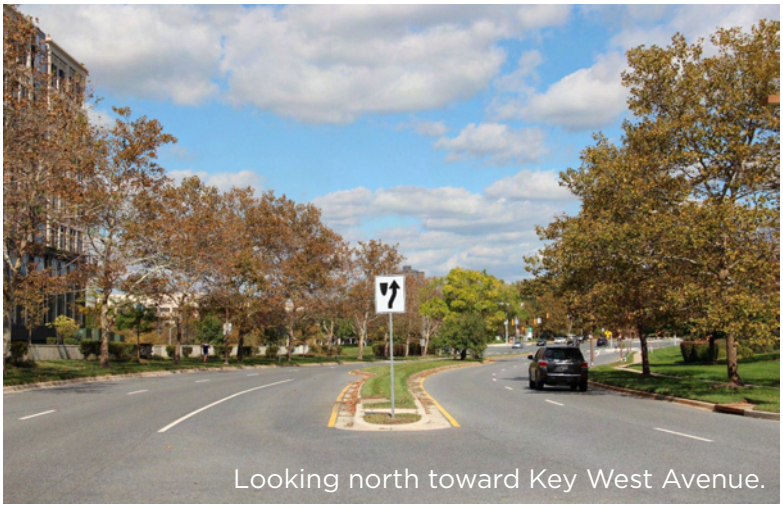

Looking north toward Blackwell Road.

Level of Traffic Stress: Bicycling on Medical Center Drive is a moderate stress experience, suitable for 10 percent of the population. When the existing, on-street parking is converted to two additional traffic lanes, Medical Center Drive will become a high-stress bicycling experience only acceptable to 1-4 percent of the population.

MEDICAL CENTER DRIVE
(BLACKWELL ROAD TO KEY WEST AVENUE)

Medical Center Drive is an existing, two-lane road with on-street parking. The Great Seneca Science Corridor Master Plan recommends expanding it to a four lanes by removing the on-street parking.

- **Number of Through Lanes:** 2 existing, 4 planned at build-out.
- **Target Speed:** 30 mph.
- **On-Street Parking:** Existing, but will be converted to traffic lanes.
- **Functional Classification:** Arterial.
- **Master-Planned Right-of-Way:** 100 feet.


Looking north toward Key West Avenue.

Level of Traffic Stress: Bicycling on Medical Center Drive is a moderate stress experience, suitable for 10 percent of the population. When the existing, on-street parking is converted to two additional traffic lanes, Medical Center Drive will become a high-stress bicycling experience only acceptable to 1-4 percent of the population.

OMEGA DRIVE
(KEY WEST AVENUE TO RESEARCH BLVD)

Omega Drive is an existing, four-lane road.


Looking north toward Crown Farm.

- **Number of Through Lanes:** 4 existing.
- **Target Speed:** 35 mph.
- **On-Street Parking:** None.
- **Functional Classification:** Arterial
- **Master-Planned Right-of-Way:** 100 feet.

Level of Traffic Stress: Bicycling on Omega Drive is a high-stress experience only acceptable to 1-4 percent of the population.

MUDDY BRANCH ROAD SEPARATED BIKE LANE

The Muddy Branch Road Separated Bike Lane travels along Muddy Branch Road between Darnestown Road and Great Seneca Highway.

MUDDY BRANCH ROAD

(DARNESTOWN ROAD TO GREAT SENECA HIGHWAY)

Muddy Branch Road is an existing, four-lane major highway. The Great Seneca Science Corridor Master Plan recommends expanding it to a six-lane road with the Corridor Cities Transitway in the median. An interchange is recommended at the intersection of Great Seneca Highway and Muddy Branch Road.

Looking north toward Great Seneca Highway.

- **Number of Through Lanes:** 4 existing, 8 planned at build-out (including 2 transit lanes).
- **Target Speed:** 45 mph.
- **On-Street Parking:** None.
- **Functional Classification:** Major Highway
- **Master-Planned Right-of-Way:** 170 feet, including Corridor Cities Transitway.

Level of Traffic Stress: Level of Traffic Stress: Bicycling on Muddy Branch Road is a high-stress experience only acceptable to 1-4 percent of the population.

Status: The Planning Department, MCDOT and MTA have agreed to pursue two-way separated bike lanes on the east side of this road as part of the Corridor Cities Transitway and Belward Campus development.

LONG-TERM BICYLE PARKING RECOMMENDATIONS

Long-term bicycle parking stations are recommended to be located directly adjacent to the LSC Belward and LSC Central CCT stations. Both stations should accommodate approximately 100 bicycles. While the spatial requirements of such facilities will be determined through a more detailed evaluation, it is estimated that each station will be around 2,500 square feet in size.

These estimates were determined by:

1. Identifying the AM peak boardings at the CCT stations.
2. Determining the percent of bicycle parking for each CCT station based on the number of dwelling units within a 0.5 to 2.0 mile catchment area of the station.
3. Assuming 5 percent of total 2030 peak boardings for the CCT could be made by bicycle resulting in 488 bicycle parking spaces.[3]
4. Determining the allocation of bicycle parking spaces to station areas based on housing distribution.
5. Assuming that 67 percent of AM peak boardings by bicycle would require long term storage.[4]
6. Clustering the long-term parking into 3 locations.
7. Estimating the square footage requirement of each station based on 9 square feet per space, an additional 700 square feet per facility for support services, and adding space for site access and ancillary facilities.

STATION	A.M. PEAK BOARDINGS	DWELLING UNITS IN STATION AREA		BICYCLE PARKING SPACES			LONG TERM BICYCLE PARKING SPACES BY AREA		
		NO.	PERCENT	TOTAL	LONG-TERM	SHORT-TERM	TOTAL	ROUNDED	SQ. FT.
LSC BELWARD	465	4,032	27%	133	89	44	89	100	2,400
LSC WEST	591	2,908	20%	96	64	32	103	100	2,400
LSC CENTRAL	600	1,118	8%	37	25	12			
DANAC	180	592	4%	20	14	6			
CROWN FARM	1,614	890	6%	29	19	10	136	140	2,900
WEST GAITHER	816	324	2%	11	7	4			
EAST GAITHER	234	1,748	12%	58	38	20			
SHADY GROVE	5,265	3,211	22%	106	72	34			
TOTAL	9,765	14,824	100%	488	328	162	328	340	

[3] Association of Pedestrian and Bicycle Professionals (APBP) guidelines recommend 2 percent of boardings for short-term parking and 7 percent for long-term parking. For purposes of this planning framework, 5 percent is used to consolidate the range of parking required; Source: APBP Bicycle Parking Guidelines 2nd Edition, 2010.

[4] Recommended adjustments to Washington Metropolitan Area Transit Authority (WMATA) bicycle parking guidelines suggest two-tiered high capacity parking comprise 65 percent of total bicycle parking at the Silver Spring Metrorail station. For purposes of this planning framework, 67 percent two-tiered parking is used; Source: Toole Design Group, 2014

A separated bike lane in Austin, Texas (Source: Jeff Owen).

THE BICYCLE MASTER PLAN

DRAFT LIFE SCIENCES CENTER BICYCLE NETWORK PROPOSAL

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