



MEMORANDUM

Date: September 16, 2013

To: David Anspacher, Planner Coordinator, M-NCPPC

Organization: M-NCPPC, Functional Planning and Policy Division

From: Jeff Ciabotti, Senior Planner; Robert Patten, Senior Planner; Eric Mongelli, Director of Engineering

Project: Peer Review of Trail Projects – Capital Crescent Trail and Silver Spring Green Trail

Re: Assessment of bicycle and pedestrian issues along the Purple Line corridor

Summary

In June 2013, M-NCPPC Planning Department staff asked the Toole Design Group (TDG) to review various aspects of the most current preliminary engineering drawings for the proposed Purple Line Light Rail System and adjacent shared use paths--the Capital Crescent Trail (CCT) and Silver Spring Green Trail (SSGT). This review also included study of bicycle and pedestrian access routes linking the trails to the adjacent built environment and evaluation of both roadway design and bicycle and pedestrian accommodations within the general scope of the Purple Line project and related infrastructure improvements. Within this scope of work, TDG paid particular attention to a list of issues that Planning Department staff had already identified, most of which have already have been communicated to the Maryland Transit Authority (MTA) and its engineering consulting team prior to the TDG review. This report documents the assessment made by the TDG planning and engineering staff.

To support the recommendations made in this report we cite primarily the Guide for the Development of Bicycle Facilities, 4th Edition, 2012, American Association of State

Highway and Transportation Officials (AASHTO) and the Guide for the Planning, Design and Operation of Pedestrian Facilities, July 2004, AASHTO. Throughout they will be referenced in the narrative as the *AASHTO Bike Guide*, the *AASHTO Pedestrian Guide*, or simply *AASHTO*. Other sources include the Bicycle Parking Guidelines 2nd Edition, Association of Bicycle and Pedestrian Professionals, 2010. Additionally, recommendations that do not stem from a specific industry standard may be described as *best practices*. This characterization is based upon the experience and engineering judgment of Toole Design Group as a consulting firm that specializes in multi-modal transportation.

The report is divided into two sections. Section 1 of the report provides a short list of design issues that are of the highest priority. TDG recommends that these issues be given strong consideration as the planning and engineering process for this project moves forward.

Section 2 of the report is organized geographically following the CCT/Purple Line corridor from west to east (i.e. Bethesda to Langley Park). However, the issues addressed in this report include only those between Pearl Street in Bethesda and Arliss Road/Piney Branch Road intersection in Long Branch. Trail configuration and bicycle/pedestrian access issues to the west of Pearl Street are being addressed in the context of the Purple Line Bethesda Station planning initiative. TDG was asked to provide only cursory review of issues east of Sligo Creek, as this is the eastern terminus of the Silver Spring Green Trail.

Section 1--Key Bicycle and Pedestrian Safety and Trail Development Issues

The following issue areas are considered the most important for making improvements to bicycle, pedestrian and trail design. General topics are listed first, then location specific issues in geographic order from west to east.

- Lighting of the CCT from Bethesda to Silver Spring
- Bike Parking at Purple Line Stations
- Access to CCT at Sleaford Road and Kentbury Drive
- Platform design at the Connecticut Avenue Station
- Intersection of Jones Mill Road and Jones Bridge Road

- Lyttonsville Place Station and Access Design
- CCT Trail along Talbot Avenue
- Lyttonsville Road Area Alternative CCT Alignments
- Intersection of 16th Street and the Entrance to the Woodside Station
- Intersection of 16th Street and Spring Street
- The CCT / Metropolitan Branch Trail Link at the Silver Spring Transit Center
- Silver Spring Green Trail link with the Sligo Creek Trail

To identify some of the most important design issues (listed above) and to guide the entire analysis of this report, the following criteria were utilized:

- a. Ensuring the safety of bicyclists and pedestrians
- b. Maintaining the integrity of the Capital Crescent Trail as a high volume urban shared use path that provides the highest quality transportation and recreation to its users.
- c. Maximizing overall Purple Line ridership
- d. Achieving the highest possible bicycle, pedestrian and transit mode split for the trips transit patrons will make to and from the Purple Line LRT; i.e. minimize the need for motor vehicle parking and kiss & ride infrastructure at Purple Line stations.
- e. Maximizing the positive impact of this project on existing and other planned bicycle and pedestrian infrastructure, such as the Metropolitan Branch Trail, Sligo Creek Trail, and general bicycling and walking conditions in each neighborhood the project traverses.
- f. Maximizing the potential for effective transit-oriented redevelopment in locations where County zoning and master plans target a shift in development character.
- g. Ensuring that the most important access routes related to the Purple Line station and the adjacent parallel trails will be developed in conjunction with Purple Line construction and designed in the most optimal fashion; to avoid future reconstruction costs and negative feedback from the general public, trail users and surrounding neighborhoods.

Section 2--General Bicycle/Pedestrian and Trail Design Issues

Recommendations provided in this section are provided with the recognition that engineering drawings for this project are preliminary. At the current design stage many features such as striping, signs, surface materials, etc. have not been detailed. The recommendations below provide guidance both for revisions to the engineering completed thus far, and for subsequent design work that will be completed prior to construction.

Lighting

As indicated in Section 1 of this report, lighting is a top tier concern of the review team. Lighting significantly affects each of the criterion we established to evaluate trail design quality. A primary driver for elevating this issue is how trail usage will change as a result of its improved quality and integration with the Purple Line LRT. The portion of the trail between Bethesda and Silver Spring will shift from being primarily a recreational trail with some transportation usage, to being a transportation trail with a high level of recreational usage. The completed CCT combined with the Metropolitan Branch Trail will serve as a vital link in the region's transportation infrastructure. Accordingly, properly designed and placed lighting will have a major impact on how well the trail and transit line serve the public.

While the Capital Crescent Trail between the DC Line and downtown Bethesda is owned and operated by Montgomery County Parks (M-NCPPC) and the future segment of the Capital Crescent Trail between downtown Bethesda and Silver Spring is operated by the Department of Transportation and will be a combined transportation and recreation facility in the fullest sense. It is vital to the success of the Purple Line that the CCT be understood, designed and managed as a part of the multi-modal transportation network. While there is no standard methodology that can be used to predict the volumes of transit patrons that will use the CCT to get to and from Purple Line stations, it is reasonable to expect that it will be used as an access route for up to 15% of Purple Line boardings and alightings at all stations between Bethesda and Silver Spring.

The Purple Line will have a span of service that is similar to metrorail, open 18-20 hours each day. Both pedestrians and bicyclists will use the CCT and its many direct neighborhood connections to get to and from the Purple Line stations at Connecticut

Avenue, Lyttonsville Road and Woodside. As a result, lighting will be essential for function, safety and security.

To increase access and security along the entire route, lights on a trail should, at the very least, be installed at the following locations according to AASHTO guidelines (Guide for the Development of Bicycle Facilities, 2012).

- ALWAYS in a tunnel or at overpasses
- Trailheads
- Bridge entrances and exits
- Public gathering places
- Along streets
- Crosswalks
- Where the path crosses another path or sidewalk
- On signage

Further, AASHTO states that the “provision of lighting should be considered where nighttime usage is not prohibited, and especially on paths that provide convenient connections to transit stops and stations, schools, universities, shopping, and employment areas.”

In support of the AASHTO guidelines, public space design standards such as Crime Prevention Through Environmental Design (CPTED) and others accepted widely by police and public safety agencies cite lighting as one of the most effective deterrents to crimes against persons by controlling and reducing the “fear” and opportunity of crime (International CPTED Association, www.cpted.net).

Pedestrian-scale lighting

There are many lighting design options that can be used to shield adjacent residential and natural areas from disruptive light and there are new lighting systems that will conserve energy and can control lighting in areas where needs may vary in patterns that are hard to predict and program for. While some residents whose homes back up to the trail may be concerned that lighting will spill over into their homes, spill over can be eliminated by installing fixtures that prevent the light from rising above the level of the fixture and from extending beyond the desired area to be lit.

Precedents from other trails

A 2010 study conducted by the Northern Virginia Regional Park Authority (NVRPA) who own and manage the Washington & Old Dominion Trail surveyed several trail operating agencies around the United States to review their current trail lighting policies and

the types of lighting infrastructure they use (Trail Lighting Policy Research for the Northern Virginia Regional Park Authority for the Washington & Old Dominion Trail, 2010). Information was gathered from 17 trail operating agencies in eleven states from across the U.S.

The findings suggest that despite the added expense, lighting the entire length, or major portions of urban and suburban trails is not uncommon. A number of trail managers have chosen not to provide trail-specific lighting along portions of trail adjacent to roadways which are already lit to roadway standards. Their policy for trail lighting in these locations is to rely on spillover lighting from the adjacent roadways. For trails that do provide lighting, it is most commonly located within urban areas with higher night-time use, where public safety issues are preeminent, or where public space in the surrounding community is already lit to support safety in areas where routine activities of urban life are conducted before dawn and during evening or late night hours.

Recommendation

The review team's recommendation is to light the entire trail. It has been the review team's experience that planning for lighting during the developmental phases of a project is far preferable to the significant time and expense necessary to retrofit an established trail in response to public demand. At a minimum, the team recommends a sketch plan for wiring layout and lighting be developed as a part of preliminary engineering drawings, and that MTA/Montgomery County consider installing underground conduit in key locations and identifying areas near transit stations that will be convenient tie ins for lighting fixtures that may be installed after the project's initial build out.

Bicycle Parking at Purple Line Stations

Because an in-depth study of bicycle parking needs and solutions was not within the scope of this review, only general guidance is provided on this topic. After reviewing most other intermodal bicycle aspects of this project, TDG believes that additional study and design is needed sooner rather than later to ensure that the station area layouts include the correct amount of space for initial bicycle parking equipment installations as well as future growth.

The Association of Pedestrian and Bicycle Professionals¹ recommends the following for rail transit station bicycle parking.

- At a minimum, each station should have covered inverted-U racks. The APBP Bicycle Parking Guide recommends providing a parking mix and capacity as follows: Long Term Parking – 5% of am peak boardings; Short Term Parking – 1.5% of am peak boardings.
- For a rail transit station in an urbanized or *high mode share area*, the APBP Bicycle Parking Guide recommends providing space for Long Term Parking to accommodate 7% of am peak boardings; Short Term Parking 2% of am peak period ridership.

WMATA (Metrorail) has set a goal to have 2.1% of am peak rail station access trips arrive by bike, by the year 2020; 3.5 % by 2030. This goal sets a target for each Metrorail station's contribution to that system wide goal. Projections for Bethesda and Silver Spring (Red Line) are presented in the table below.

Station Name	Percent of 2020 AM Peak Arrivals	2020 Bike Parking Capacity	Percent of 2030 AM Peak Arrivals	2030 Bike Parking Capacity
Bethesda	5.7%	229	9.7%	401
Silver Spring	2.1%	217	3.3%	380

These projections/goals were developed in 2011 and did not factor in the potential impact of the Purple Line as an intermodal rail link at these stations.

In addition to overall quantity, to plan for and design space for bicycle parking at a new transit station it is important to consider what mix of bicycle parking types are needed. APBP provides only two categories: Long Term and Short Term.

- Provisions meeting the Long Term definition include lockers or racks in a covered and secure area, such as the limited access bicycle storage area recently built by WMATA at the College Park station. Valet bicycle parking and racks within the paid area of a staffed transit station are also considered long term.

¹ Bicycle Parking Guidelines, 2nd Edition, 2010, Association of Pedestrian and Bicycle Professionals (This organization is the equivalent of the Institute of Traffic Engineers (ITE) in the field of bicycle and pedestrian transportation.

- Short Term bike parking includes unsheltered bicycle racks and only passive surveillance (eyes on the street).

WMATA has developed a more nuanced set of mix recommendations based upon station typologies. Both Bethesda and Silver Spring are considered Regional Urban Centers, meaning they have urban CBD type density and development form, a mix of employment, retail, residential, and other uses, and the street system tends to be a more traditional grid.

WMATA's recommended mix for Bethesda and Silver Spring is as follows:

<u>Covered Inverted-U Rack Capacity</u>	<u>High Security Storage Area Capacity</u>	<u>On-Demand Locker Capacity</u>	<u>Standard Lockers</u>
50%	25-35%	15-25%	0-5%

For stations in this typology, *full-service bicycle stations* are to be strongly considered, space for bikeshare docks must be planned, and uncovered inverted-U racks should only be provided if necessary to meet seasonal demand. It should be noted that WMATA has a varied, but still limited set of bike parking equipment options in its tool box.

Bicycle parking is a fast evolving field with new technologies emerging every few years. Standard rental lockers are becoming less popular due to the high cost of managing what is usually a small "fleet," and their inability to provide high security parking for the non-regular transit patron. For this and a host of other reasons, **a detailed study of bicycle parking needs and station location and design options should be undertaken in the near future prior to any further progress in the development of engineering drawings for the Purple Line Project.**

Because this is the first rail transit system to be built in Montgomery County, outside of the Metrorail system, the County Department of Transportation does not have any standards or guidelines to offer to MTA regarding how to address this critical issue. Moreover, MTA, as a state agency, has no standards or guidelines and is only able to provide or upgrade bicycle parking at MTA transit centers around the state with the guidance and funding provided by local transportation agency staff.

In the development of bicycle parking plans, because there are no predictive models available to measure demand based upon other known inputs, and like transit use itself

society generally wants bike use for transit access to be a growing activity, the approach must include setting goals (not predicting need) for the numbers of bike arrivals as a percentage of overall station arrivals. As a result, station area plans must not only identify a quantity and mix that is provided on opening day, but provide space for easy expansion of bike parking capacity as the need grows and changes.

Bikeshare Docking Stations

In general, bikeshare docking stations should be located on the periphery of Purple line stations. Bikeshare docks at transit stations should be sited so that they not only serve transit patrons but people traveling to and from surrounding locations. To maximize use and convenience for all Bikeshare users, docks need to be sited so that they can be seen from the station exit area and from land uses that may be nearby. Station location must also factor in access to solar power and provision of lighting for night time use.²

Full Service Bicycle Storage Facilities (Bike Stations)

Full service bicycle stations are bicycle parking and transportation support facilities that offer a range of bike parking options (short term – long term; minimum security – high security), and any number of additional services such as shower and changing facilities, bicycle rental, bicycle repair, accessories, food, information, space for bicycle mounted police/ambassador squad room, meeting space, etc.

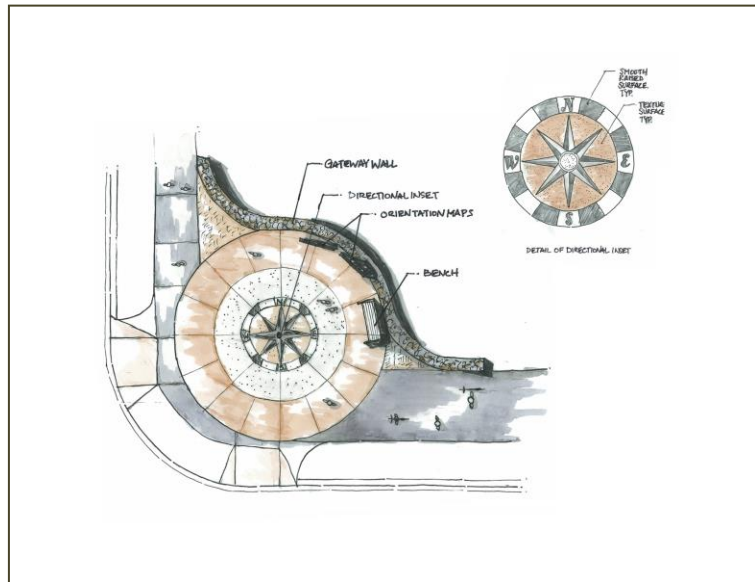
As recommended by bicycle parking planning efforts undertaken by WMATA, both the Bethesda and Silver Spring intermodal centers should provide full service bicycle stations. The Planning Department has a locational and quantity analysis underway for full service bicycle storage facilities at both stations.

Trail Connections

At locations where a spur trail meets the main trail or a sidewalk, or the main trail connects with a sidewalk, there is increased potential for conflicts among trail users and/or other bicyclists and pedestrians. TDG concurs with Planning Department staff in recommending that wherever spur trails or trail ramps connect to the CCT/SSGT or a local sidewalk, the following national guidelines and best practices should be employed:

² *Bike Sharing in the United States: State of the Practice and Guide to Implementation, September, 2012, USDOT Federal Highway Administration*

- Trail/trail and trail/sidewalk intersections should be as close to 90 degrees as possible.
- Trail legs of these intersections should be flared to facilitate turns. At a 90 degree intersection, a 10-foot radius of curvature is typically adequate; larger radii may be needed at more severe angles. Design should include a 2-foot setback for any vertical obstructions such as walls, as per the AASHTO Bike Guide.
- Sightlines between intersecting pathways should be clear. Sight triangles at intersections are based on trail stopping sight distance as described in the AASHTO Bike Guide.
- Best Practice: Circular pavement designs that enlarge the areas of potential conflict and use of different surface materials will improve safety and comfort and reduce conflicts. These designs may be applied where spur trails meet the main trail, or at the corners of a roadway intersection through



which a shared use path passes, such as along the SSGT along Wayne Avenue. Circular pavement designs will provide a larger area for cueing, making turning movements and passing. Use of different surface materials is an indication to trail users that the trail is passing through an area where crossing movements should be expected, caution is prudent and conflicts should be avoided. These areas also serve as landmarks along a trail and places where trail users can meet up, talk and make travel plans. At trail access points, they serve as visual gateways. The size of the circular paved areas can vary and locations to apply this treatment should be selected based upon available ROW, safety needs of each particular intersection, expected volumes of trail and cross path users and/or other characteristics of the trail that may make one intersection more important to “call out” than another.

Bicycle Accessible Stairways

Many of the stairways that provide access to/from the CCT, or Purple Line stations should have bicycle rolling trays designed into them. In locations where ramps are provided and stairs are provided for pedestrian “short cuts” bicycle rolling trays do not need to be included.

It is important to remember that rolling trays will be easier to use if the stairway is less steep than a normal stair. Providing landing between flights is also helpful for those rolling their bike up because it provides a level resting area.

MTA should develop system wide criteria for this treatment as it will be needed in most MTA projects for a new rail system, as well as for station retrofit projects throughout the state of Maryland.

Trail Separation from Lateral Obstructions

Regarding separation from lateral obstructions such as poles, walls, fences, etc. it is recommended that the Guidelines for the Development of Bicycle Facilities (AASHTO) be followed. Where the CCT or other trails in the corridor are built (i.e. paved) to the foot of a wall, according to AASHTO, the two feet of pavement adjacent to the wall is considered a clear zone or shoulder, not part of the travel way, and should be striped as such. CCT shoulders may be paved, fine packed crushed stone or grass depending on the setting.

Where design constraints (such as existing fixed objects that are too costly to move) present no better alternatives, it may be acceptable to design the path with 1-foot or 1.5-foot offsets from vertical edge structures. In these situations the option of narrowing the striped travel way is also a design consideration.

Adjacent to a wall, fence or rail, an absolute minimum of 1 foot clear zone (paved or unpaved) is needed, as that is the natural shy distance for a cyclist traveling at a relatively slow speed (5-10 mph). Additional factors that need to be considered in the design of pinch points include the slope of the trail, curvatures in the alignment and the presence of connecting or crossing trails or other traffic; and the expected volumes of trail users and mix of user types in the segment in question; each of which add to the potential for conflicts.

The CCT travel way is designed to AASHTO’s urban standard, 12 feet, which provides a 6-foot travel lane in each direction. The two-foot shoulders on each side mean the standard trail footprint is 16 feet. To address constrained environments, the trail travel way can be narrowed in one –foot increments to as little as eight feet, however the

minimum 8-foot width should only be done for pinch points of less than 100 feet in length. Best practice has found that longer pinch points will begin to significantly reduce the functionality and safety of the trail. If severe width constraints on the CCT cannot be reduced to 100 linear feet or less, more significant changes in overall project design should be pursued even if it requires significant additional expense.

Wherever trail travel lane widths or clear zones change, it is standard practice to use striping and signing, and potentially other design features, to warn trail users of less than optimum design features and encourage use of the desired cautious behavior, such as reducing ones speed, staying right or yielding to select trail users. Note: Dismounting and walking one's bicycle is only appropriate at a transitional location, such as where a cyclist leaves the trail to use a narrow spur path to bike parking or to enter a pedestrian zone.

CCT Trail Alignment and Slopes

In general, TDG found trail alignments and slopes to be within ranges established by AASHTO, especially for a trail that has to be re-engineered into a narrow rail corridor along with a double track LRT. One location stood out as questionable. From review of the design drawings, it is unclear why the slope of the CCT under Jones Mill Road continued to its lowest elevation some 200 feet west of the actual passage under the roadway. It is preferable that the trail dip just enough necessary to get under a roadway and then rise gradually to the existing grade.

TDG surmised that this was done because it allowed the project designers to avoid having to place an even longer wall between the CCT and the LRT. The LRT must dip more than the trail to get under the road. Yet on both sides of the road the CCT and LRT are close to level with each other. To employ a best practice, TDG recommends that the trail be redesigned in this area to eliminate the trail's unnecessary loss of elevation, which must eventually be regained as the trail continues to the west.

Spur Trail Alignment and Slopes

Again, in general, spur trail alignment and slopes were acceptable and represented some resourceful engineering.

Other Spur Trail Considerations

TDG found the spur trail connections to the CCT to be relatively frequent, making the trail very accessible to the neighborhoods through which it passes. In many locations stairs and ramps were combined in creative ways. In other locations more design work

is needed to improve the layout and combinations of direct pedestrian access and ADA acceptable access for wheeled trail users.

Driveway Crossings

Best practice and ADA design for trails and sidewalks require that trail crossings of driveways should maintain the trail surface material, cross-slope and grade across the driveway apron. For non-single family residential driveways, best practice includes installation of signs and pavement markings for entering and exiting drivers to stop for bikes and pedestrians using the trail. At commercial or multi-family residential properties, standard trail signing and markings (MUTCD Chapter 9 and AASHTO Planning and Design Guidelines for Bicycle Facilities) should be used to warn trail users of approaching driveways.

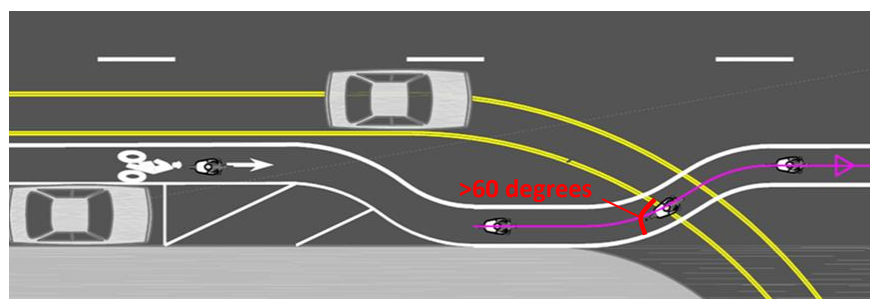
To avoid sign proliferation where residential or other driveways are clustered consider trail signage on a block by block basis or other defined segment. Engineering judgment should be applied in the consideration of additional treatments that may enhance safety in locations where the driveway may be hard to see, sight lines are blocked by unmovable features, driveway use is relatively busy such as for a grocery store, or the design speed for cyclists on the trail is relatively high (i.e. on a downgrade of more than 2 percent).

On Road Bicycle and Pedestrian Safety Issues

Bicycling in Streets with Embedded LRT Tracks

Where the light-rail line tracks are embedded into the pavement through downtown Silver Spring and along Wayne Avenue, special considerations must be made for bicyclists. Bicycle tires can easily get caught in the gap between the rail and road pavement causing a cyclist to lose control and crash. The following design guidelines are recommended:

- Median track alignment is preferred. TDG recommends retaining the proposed median alignment of the Purple Line tracks along Wayne Avenue to reduce conflicts and allow on-street cyclists to ride in the rightmost lane where there are no tracks.
- Shared lane markings should be placed in the



right lane of Wayne Avenue from Fenton Street to Sligo Creek parkway.

- In general, wherever bicycle use of a street with embedded tracks is legal, it should be expected and designed for. Use pavement markings and signage to facilitate safe track crossings. According to the AASHTO Bike Guide, the skew angle between the centerline of the tracks and the path of the bicycle should ideally be 90 degrees, but can be as low as 60 degrees to facilitate safe bicycle crossings. At all intersections, evaluate the angle at which each movement from each leg of the intersection (left, through, and right) crosses the tracks. If the crossing angle could be less than 60 degrees, use shared-lane markings to guide cyclists across tracks at an angle between 60 and 90 degrees. At some locations, it may be necessary to provide additional width for the cyclist to achieve this (see figure above).

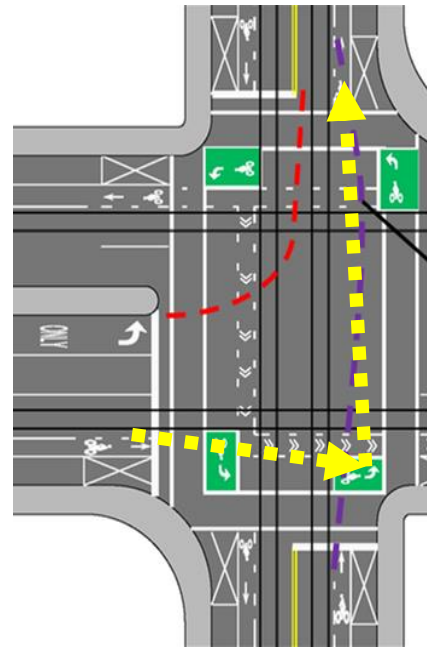
If a 60-degree (or better) crossing is not possible, identify an alternative route and direct cyclists to it using signs. For instance, a two-stage left turn (aka crosswalk left) where the cyclists cross the street on the right side and wait in a bicycle box on the far side of the street to make a second crossing using the perpendicular crosswalk or the right hand travel lane to complete the left-turn maneuver (see dashed yellow line in figure at the right).

The four most important areas where bicycle safety and embedded LRT track are of concern include the following:

1. At Bonifant Street and Fenton Street
2. At Fenton Street and Wayne Avenue
3. At Wayne Avenue near Plymouth Street where the Purple Line leaves the Wayne Avenue ROW.
4. At Arliss Street and Piney Branch Road

Curb Radii Considerations at Roadway Intersections

Along Wayne Avenue, curb radii at intersections are between 20 and 30 feet. Where possible, these radii should be reduced to provide better experiences for disabled



people, and other pedestrians and cyclists, especially near Purple Line stations where pedestrian traffic will likely be highest. Curb radii need to accommodate the design vehicle, however these are small residential cross streets to which large trucks make few trips. Tighter curb radii are helpful for pedestrians and cyclists in the following ways:

- Allows better alignment between curb ramps and crosswalks, which improves and shortens the accessible route per ADA.
- Shortens crossing distances, which also can allow for shorter cycle lengths at signalized intersections.
- Limits speed of turning motorists, which reduces likelihood and severity of crashes.
- Increases motorist visibility of pedestrians and cyclists crossing the street.

Section 3 – Specific Recommendations by Geographic Location

The following set of recommendations are arranged in geographic order beginning at the west end of the project between Pearl Street in Bethesda and Arliss Road/Piney Branch Road intersection in Long Branch.

Access to CCT at Sleaford Road and Kentbury Drive

The tunnel under the CCT/Purple Line connecting Sleaford Road with MD 410 (for bicyclists and pedestrians) is a great feature. The current design shows only a stair access at this location.

It appears as if there is enough room to provide a ramp access at this location. TDG recommends a ramp and stair on the Sleaford Road side of the CCT, or a ramp on one side and stair on the other. Ramp access for those with disabilities would reduce the need for the many trail users living in the neighborhood north of MD 410 to cross MD 410 to access the ramp on the south side of 410. If a ramp is not possible, it is recommended that this stair be of gentle slope and include a bicycle rolling tray.

Newdale Road--Shared Use Path

There is some question regarding how best to provide CCT access along Newdale Road given that the ramp entrance is at the west end of the dead end road. TDG recommends that the Planning Department consider either option described below. It is likely that the residents of this short street may want to participate in the design of this trail linkage. Both of the options described below are at variance from the Planning Department staff recommendation which is to make the new 4-5-foot sidewalk along the south edge of Newdale Road into a shared use path of eight feet.

The two options presented below seek to balance three design goals, which TDG assumes would be among those goals of trail users, local residents and the M-NCPPC:

- Safety for trail users (bicyclists and pedestrians) and local residents (bicycling, walking and driving).
- Reduction of the potential negative visual impact of the retaining wall on the south side of Newdale Road.
- Minimizing stormwater runoff.

Option 1: Work with Newdale Road residents to develop a woonerf/bicycle boulevard (5 mph motor vehicle speed limit) type roadway with a design that

would narrow the street to 16-18 feet, making the street useful and safe for bicyclists, children, pedestrians and local access motor vehicles and fire trucks and other commercial vehicles. Maximize the amount of unpaved surface, use permeable pavement materials, integrate landscaping, trees, and/or public art to reduce visual impact of the wall. At the east end, near Connecticut Avenue, as much space as possible should be preserved for benches and a seating area.

Option 2: Expand the proposed new sidewalk from 5 feet to 6 feet or 7 maximum, and place shared lane markings on Newdale Road.

- With pavement markings and signage, the roadway will safely serve adult cyclists, skaters, runners and some motorized scooter users (for the disabled) seeking access to and from the trail. A 6 to 7 foot sidewalk will serve those who are not comfortable using the road, such as pedestrians, people using assistive devices, family and child bicyclists; while providing enough room for these users to pass each other.
- TDG expects that a significant amount of lawn/planting space will be needed at the base of the wall for tree planting/growth and other screening vegetation, to soften the impact of the Purple Line and retaining wall supporting the CCT. Public art on the wall may be desired by the community.
- Also the design of stair access to the trail on the west side of Connecticut Avenue should be integrated into the placemaking design effort. A bicycle rolling tray on this stair is not needed because at grade access to the trail is within a reasonable distance at the end of Newdale Road.

Connecticut Avenue Station (Master Planned Street B-1)

From an urban design and access point of view, TDG recommends that the Connecticut Avenue station be built on piers. This will create ground level space under the station tracks and platform which can be programmed as a plaza that provides a link from Connecticut Avenue to the new Street B-1, as well as a link between existing or redeveloped properties immediately north and south of the station. An open area can provide a space for covered bicycle parking and will create a more attractive, active and secure pedestrian environment at this station. An open area under the platform will provide more flexibility in future design of the following access links that are highly desirable, but can be constructed in conjunction with future redevelopment, including the following:

an east-west path on either the north or south side of the platform will be needed to connect Road B-1 with the elevators near the sidewalk on Connecticut Avenue.

Coquelin Run Trail

The Planning Department is concerned about the need to link the CCT with the planned Coquelin Run (CR) trail.

The MTA response to Planning Department on this issue says there will be a connection on the north side of the trail and west side of the stream. It will be a ramp or a stair.

TDG recommends that if it is a stair it should be wide, and have a bicycle rolling tray/channel. A connection to the north to Jones Bridge Road will provide good access to the trail and the Connecticut Avenue station for residential neighborhoods in and around North Chevy Chase.

A 14-foot wide culvert under the CCT and Purple Line provides passage to the south for the future Coquelin Run trail. The current design uses the AASHTO recommended minimum vertical clearance (10 feet). This AASHTO minimum represents a functional minimum; however minimum vertical clearance for a tunnel is rarely a desirable clearance. A best practice is to provide as much additional height that engineering constraints will allow, up to 13 feet of vertical clearance. In this setting, for this type of trail, the planned 14-foot tunnel width is appropriate.

Intersection of Jones Mill Road and Jones Bridge Road

TDG strongly concurs with Planning Department comments about this intersection and the transition routes and space provided for bicycle and pedestrian movements between the street and the CCT. In addition to realigning the intersection as suggested by Planning Department staff, TDG stresses and adds the following items:

- In addition to providing a wider sidewalk along the east side of Jones Mill Road, provide a large unified landing area at the top of the ramp for bicycle and pedestrian turning movements between the sidewalk and trail.
- The section of sidewalk from the trail north to Susanna Lane should be path width (8-10 feet) and have a 5-foot buffer.

- Crosswalks should be aligned to allow pedestrians from all legs of the intersection to move directly to the top of the ramp to the trail.
- All bike movements between each street leg and the trail need to be thought through and accommodated in direct and intuitive routes. Most cyclists making transitions here will be on road cyclists, as Jones Mill Road is a heavily traveled on road cycling route. Pay particular attention to southbound lefts to the trail from Jones Mill Road, eastbound through movements to the trail from Jones Bridge Road, westbound lefts from the trail to Jones Mill Road, and westbound through movements from the trail to Jones Bridge Road. Some of these movements are not possible under the current design, such as the southbound left.
- To enable the stair and ramp to meet at a point relatively close to the top of the ramp, the stair alignment may need to be modified.
- Because there is no room for pedestrian or bike linkage to the trail on the west side of Jones Mill Road, the design of the linkage on the east side must be safe and convenient for bicyclists and pedestrians making through and trail-related movements to and from each side of each road.
- Crossing distances should be kept relatively short and slip lanes should be eliminated.

Lyttonsville Place and Station Area Design

Evaluation

In general, TDG agrees with the comments provided by Planning Department staff. TDG realizes that there is a large amount of overall bus traffic because of the Ride-On maintenance and parking facility on Brookville Road, which raise the following questions:

- Where do the southbound buses drop/pick up passengers transferring to the Purple Line?
- Why is the northbound bus drop off located south of the bridge rather than on the bridge where it would be closer to the ramp and stair to the CCT and Purple Line platform?
- How many bus lines will serve the station?

Planning Department staff informed TDG of traffic counts for Lyttonsville Place taken by the Maryland State Highway Administration.³ The 2012 ADT of ~10,000 vehicles suggests that it is a medium volume roadway typical of an urban collector or minor arterial. This road segments links to a primarily residential community to the south and a primarily industrial neighborhood to the north which includes a high employment military base, the Forest Glen Annex. Given these factors, and the introduction of a CCT connection and a Purple Line transit station it is appropriate to make this a complete street that is safe and functional for all modes.

Recommendations for Improvement

- Southern Bridge Approach Cross Section (Lyttonsville Place):** The proposed southern approach to the bridge (from Lyttonsville Road) appears to provide a 48' roadbed and 4' sidewalks on each side (56' total), with only mill and overlay proposed between Lyttonsville Road and the bridge. TDG highly recommends extending curb work to Lyttonsville Road and narrowing the total cross section by two feet, to achieve a balanced multi-modal street in a residential setting but serving a mixed use area. The following cross section would provide a 32 foot road bed, curb face to curb face, and a sidewalk and tree buffer on one side with a path and tree buffer on the other:

Use	Width (feet)
West Sidewalk	6
West Tree Buffer with Pedestrian Lights	3
SB Bike Lane (including gutter pan)	5
SB Travel Lane	11
NB Travel Lane	11
NB Bike Lane (including gutter pan)	5
East Tree Buffer with Pedestrian Lights	5
East Sidewalk/Shared-Use Path	8
Total	54

- Lyttonsville Bridge Cross Section:** The proposed bridge appears to provide 66 feet of travel space between the side walls/railings. To achieve the cross section

³http://shagbhisdatd.mdot.state.md.us/itms_public/ViewReport.aspx/?reportName=VolumeDetail.rpt&stationID=S2012150827&countno=1124410&startdate=09/18/2012&enddate=09/19/2012&format=pdf

recommended by M-NCPPC without increasing the width of the bridge, TDG suggests the following cross section:

Use	Width (feet)
West Sidewalk	7
SB Bike Lane (including gutter pan)	6
SB Travel Lane	12
NB Travel Lane	12
NB Bike Lane (including gutter pan)	6
NB Bus Pullout	11
East Sidewalk/Shared-Use Path	12
Total	66

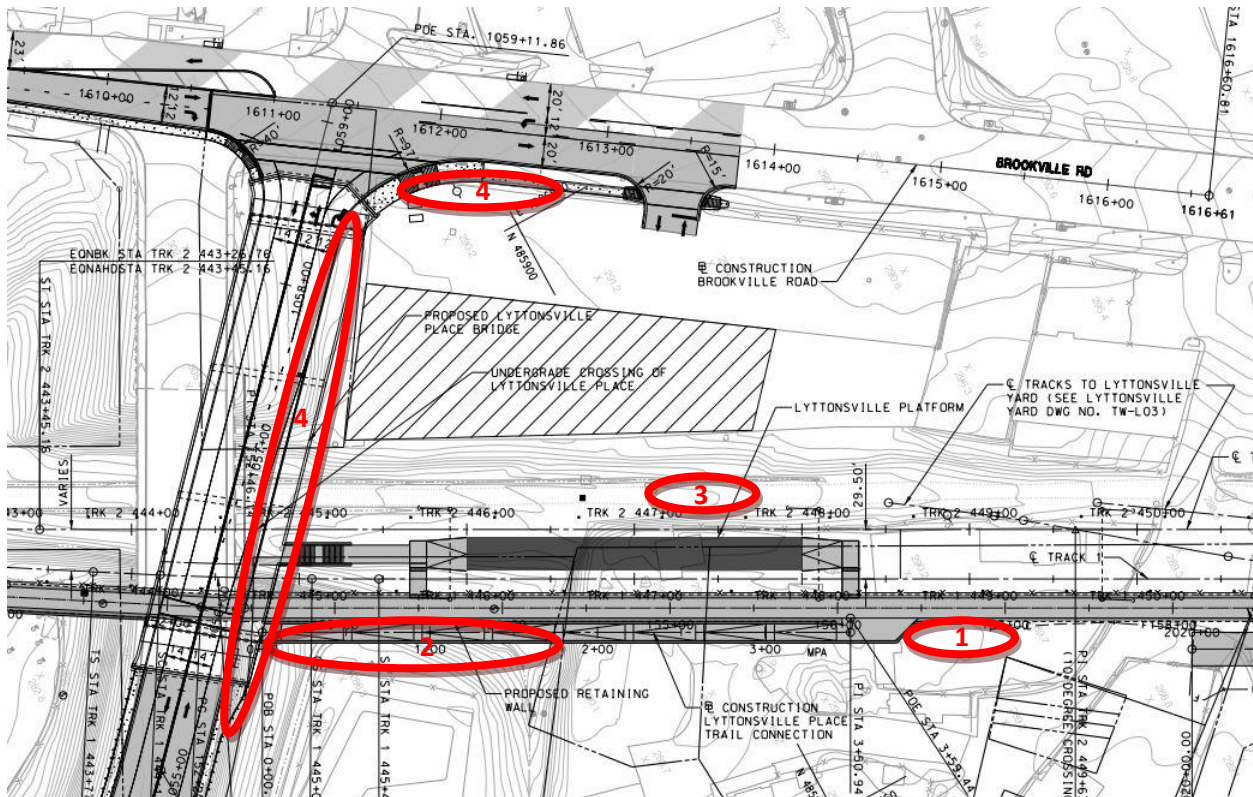
Because the tree buffer on the east side of Lyttonsville Place is not continued on the bridge, the east sidewalk/shared-use path can be 12 feet rather than 8 feet wide. Because it is primarily an access path to the Purple Line, not a through path, the 12 foot width can also accommodate bus shelters or benches for the waiting area and provides additional mixing capacity for the pedestrians and bicyclists accessing the CCT and Purple Line Station. The bike lanes on the bridge are 6 feet wide to provide bicyclists the opportunity for greater separation from adjacent buses when they are stopped to pick up/drop off transfer patrons.

- **Access Ramp Width:** The proposed access ramp from the bridge to the CCT is 10 feet wide. This does not provide sufficient capacity for a ramp that provides access for both Purple Line station users and CCT trail users. In areas with high use by a variety of user groups, AASHTO and the Shared Use Path Bicycle Level of Service Tool recommend wider paths of 11 to 14 feet. Given the very high anticipated volume of users, the ramp should be a minimum of 14 feet wide (inside rail to inside rail), though 16 feet is preferred.
- **Raised Crosswalk:** Strong consideration should be given to providing a raised crosswalk on the bridge opposite the two access routes to the CCT and Purple Line station (i.e. the stair and the ramp). A raised crosswalk would: a) calm traffic, b) allow pedestrians to cross to and from the potential southbound bus stop and c) enable bicyclists to make transitions between the bike lanes in the street and the CCT ramp. TDG recognizes that a raised crosswalk needs to be factored into the bridge design as it would affect structural loads and vibrations. If a raised crosswalk is not feasible, at a minimum, a striped crosswalk with curb ramps should be provided.

Perhaps the best configuration of the crosswalk and bus pull out is to provide a single wide crosswalk that serves both the stair and ramp connection. The bus stops could be provided north of the crosswalk, which would shorten the right turn lane. At this location it seems unlikely that this would present a traffic problem.

- **Lyttonsville Place & Lyttonsville Road Intersection:** Curb radii should remain tight at Lyttonsville Road and Lyttonsville Place intersection. Bike lanes provide added turning room for larger vehicles.
- **Lyttonsville Place & Brookville Road Intersection:** Curb radii at Lyttonsville Place and Brookville Road should be tightened, if possible, given bus and truck turning requirements. When testing radii, be sure to recognize that bike lanes create additional space for the tracking of large vehicles. At this intersection, full crosswalks and curb ramp improvements should be provided on the north side of Brookville Road. Proposed curb ramps do not appear to meet Americans with Disabilities Act (ADA) guidelines as described in the Accessibility Guidelines for Pedestrian Facilities in the Public Right Of Way (PROWAG), including that all curb ramps should point users directly across the crosswalk they serve.
- **Bike Parking:** This station specific bike parking analysis serves as a partial example of the higher level of study needed for each Purple Line station. At Lyttonsville, there are a variety of locations to consider for bike parking and a variety of parking types to consider. Following is a preliminary assessment of ideas and issues. Further study is needed to develop firm recommendations.
 1. The space at the bottom of the bottom of the ramp where it meets the trail, could be enlarged to the east. This location may be well suited for on-demand bicycle lockers, bike lids, standard lockers or even bikeshare bikes. They should be well buffered from the trail edge and oriented to ensure that cyclists accessing the lockers do not block the trail.
 2. Opposite the western track crossing to the platform, racks could be provided under the ramp structure, which will provide weather protection.
 3. If public access is provided from Brookville Road along the edge of the Purple Line maintenance yard to the platform, consider providing covered bicycle parking near the station platform access area on the north side of the Purple Line tracks.

4. An area on the proposed wide sidewalk along the bridge or near the intersection of Lyttonsville Place and Brookville Road may be a good location for bikeshare docks or standard lockers that would serve egress trips to the Forest Glen Annex.



Commercial Access Driveway at Stewart Avenue

Where the Purple Line crosses Stewart Avenue a commercial driveway paralleling the tracks intersects with Stewart Avenue just south of the track crossing. The Planning Department staff expressed concerns regarding the potential for motor vehicle traffic to ignore stop lines when the train passes, and block the CCT with stopped vehicles waiting for a train to pass.

TDG does not have a high level of concern regarding possible vehicle/trail conflicts at this commercial driveway. TDG generally finds MTA's response to staff concerns as sufficient. It may be useful to have the location and design of the gate arms that block Stewart when a trail is passing to cross both travel lanes of Stewart Avenue. It may also be useful to have a gate arm descend between the CCT and the LRT tracks to ensure that trail users do not try and enter or exit the trail by crossing the tracks. It seems likely

that if behavioral problems among commercial vehicle drivers using the private driveway emerge at this location in the future they can be addressed through direct communication with drivers using driveway, additional signage and enforcement.

Stewart Avenue as a Trail Access Location: With the addition of the Purple Line, Stewart Avenue may be increasingly utilized as a bicycle and pedestrian access point to the Lyttonsville Station and the CCT, especially by employees for the Forest Glen Annex. Sidewalks are currently shown in the plans to link the trail with Brookville Road, however, two 12-foot travel lanes are shown in each direction. Currently, on-street parking is allowed on both sides of Stewart Avenue.

Consideration should be given to a street cross section that provides a bicycle climbing lane (bike lane in the uphill direction) in the northbound direction from the CCT to Brookville Road. For the downhill movement consider a standard bicycle lane or wide outside lane (13-14 feet) with a shared lane marking.

Moreover, bicycle lanes, or shared lane markings should be provided on both sides of Stewart Avenue between the CCT and the path that links to Kansas Avenue.

Kansas Avenue Trail Access

Area master plans call for trail access between Kansas Avenue and the CCT at the east end of Kansas. An access connection to the CCT is not included in the June 26, 2013 design plans for the Purple Line project. TDG does believe that this path connection is important enough to warrant the related cost, however every point of access contributes to convenient trail use and security. It is presumed that trail users can continue to use the recently built path linking Kansas Avenue to Stewart Avenue. This access provides direct and secure access from the residences on and near Kansas Avenue to the CCT for west bound trips. For east bound trips pedestrians and cyclists in this community can access the trail at Michigan Ave which is discussed below. TDG believes that available funding should first be applied to creating an enhanced trail access at Michigan Avenue (see next item for details).

Trail Along Talbot Avenue

Along Talbot Avenue from Michigan Avenue to the Talbot Avenue Bridge and over the bridge, the CCT is designed as a shared use path immediately adjacent to the roadway. This design does not meet AASHTO bike guidelines for a shared use path adjacent to a roadway. There is no lateral buffer between the trail and the road, only a curb. AASHTO requires a 5-foot buffer or a vertical physical barrier between the trail and the

road, which can be accomplished with a 3-foot buffer. The trail is only 10 feet wide between the curb and a wall; given the 2 feet adjacent to the wall is considered the required shoulder adjacent to vertical elements next to a shared use path, and trail users naturally shy 2 feet from the curb, the functional trail width in this section is 6 feet.

This width is not acceptable, and would represent a serious liability to the trail owners, as well as a disservice and safety hazard to future trail users. This pinch point is likely to result in reduced trail use for access to nearby Purple Line stations and reduced overall use in this area.

TDG recommends continued engineering analysis of this area and recommends the following concepts be studied and considered. Based upon our somewhat limited knowledge of all the issues, TDG favors Option 1 or 3.

1. Return to a previously developed alignment that kept the CCT on the east side of the tracks to a point where a bridge could be built diagonally to span the CSX and LRT tracks and “land” near the corner of Talbot Avenue and Michigan Avenue; at this point the trail would likely have to remain elevated from the surrounding grade and be gradually brought to grade level closer to Stewart Avenue. Small portions of some private residential backyards will have to be acquired as well as some CSX property.
 - This option could include passage under Talbot Avenue as previously envisioned, but considering the low volumes expected on this roadway, ease of trail access would be enhanced, and costs reduced by having an at-grade street crossing at the east end of the new bridge.
2. Between the Talbot Street Bridge and Michigan Avenue, route all cyclists and skaters (not child cyclists, pedestrians or runners) onto Talbot Street for two blocks. Provide a railing on the road edge of the 10-foot pedestrian treadway to provide protection for child cyclists. The street cannot be widened to support bicycle lanes, so it would have to be designed for a shared use condition. Special treatments would be needed in the design of the transitions at each end, as each would occur at a 90 degree turn in the roadway. Traffic calming would be needed to ensure appropriate motor vehicle speeds (15-20 mph) for sharing the road with peak volumes of trail users.
3. Re-evaluate the role for Talbot Street and the Talbot Street Bridge. It may be possible to create a low speed, fully shared street, similar to an option described in this report for Newdale Road. The AASHTO Pedestrian Guide discusses

shared streets on page 55 and references a European model known as a Woonerf. FHWA's Pedestrian Facilities User Guide – Providing Safety and Mobility, provides guidelines for development of this type of low-motor-vehicle- speed (5 mph) facility. This approach would provide a child safe environment near the adjacent school and calmed traffic for residences on Talbot Street. The 20 feet of space set aside for the street and 10 feet set aside for the trail would provide considerable room for such a corridor which would need to be at most two blocks long. The new Talbot Street Bridge would be a part of this facility and provide local vehicular connectivity as well as passage of the CCT over the railroad tracks.

4. Using piers, or walls and fill, maintain the planned CCT elevation at the Talbot Street Bridge to Michigan Avenue. From Michigan Avenue to the traction power substation, a vacant property is slated to have a stormwater pond and tree planting to meet environmental requirements for the Purple Line project. To link the neighborhood with the CCT at this point, TDG suggest that a circular ramp be designed into this space and that the area be made into a more multi-purpose park-type space. The CCT can be designed to gradually ramp down reaching grade level prior to Stewart Avenue. The access path can be designed to meet the elevated trail at an appropriate location along this down slope. Stairs should also be provided at this location for direct pedestrian access. Note: The current drawings show a path link to the CCT that is about 5 feet wide, which is substandard in width. If any portion of this segment presents horizontal cross section constraints, the standard trail foot print of 16 feet can be reduced to 14 feet; a 10-foot treadway and 2-foot buffers on each side to railings.

Lyttonsville Road Trail Access

At the northern end of this access path, the path should be designed to allow trail users to transition to sidewalks on both sides of Lyttonsville Road, and directly to the street. Current drawings only show a connection to the sidewalk on the north side.

CSX Property between Lyttonsville Road Access and 16th Street

Background

Because this section of the CCT alignment is currently drawn on CSX Transportation (railroad) property and CSX has proven to be difficult to deal with on ROW issues, Planning Staff have been considering other alignments that would be viable in the event that the County is not able to secure this piece of unused railroad ROW.

TDG has reviewed the planning department's alternatives matrix for the CCT along this trail segment (see the table on pg. 29). We found the matrix to be thorough and accurate. To determine preferred options to recommend to the planning department we utilized the metrics in the matrix, as well as the overarching criteria used for other analyses in this report (pg. 3, a-g). Our conclusion is that the current master plan design, as represented in the most up-to-date Purple Line engineering drawings prepared by MTA, offers the optimal solution for the CCT in this area. The two best alternatives to this are the options on the west side of 16th Street.

Recommendations in order of preference:

1. Master Plan: Acquire CSX Property
2. Alternative 2: via Lyttonsville Road / west side 16th Street (road diet)
3. Alternative 1: via Lyttonsville Road / west side 16th Street

While this discussion addresses CSX Railroad property issues in the vicinity of Lyttonsville Road and 16th Street it is important to note that CSX also owns right-of-way needed for the preferred alignment along the highly constrained Talbot Avenue section. Additionally, it is very likely that other small parcels or construction easements will be needed for Purple Line and CCT implementation.

Despite the inherent complexities of acquiring railroad right of way TDG recommends that Purple Line drawings continue to show the CCT partially within CSX property boundaries. Although this option requires limited property acquisition, the benefits are many: avoiding street and driveway crossings, improved security, direct access to the Woodside Transit Station, minimal interaction with the road network, direct and efficient travel times. The alignment diversions in each of the alternatives create a series of trail design challenges and negative impacts on the trail user's level of service.

With two critical components of the CCT alignment in the Woodside area at stake, TDG also recommends that an appropriate County agency develop a broad approach that bundles all of the acquisitions and associated liability issues into a streamlined agreement. The County may even want to partner with the District of Columbia which is facing similar CSX ROW issues for the Metropolitan Branch Trail in the Ft. Totten area.

	Master Plan	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Metric	Acquire CSX Property	via Lyttonsville Rd / west side 16th St	via Lyttonsville Rd / west side 16th St (road diet)	via Lyttonsville Rd / east side 16th St	via Lyttonsville Rd / Elkhart Pl / east side 16th St	Interim Georgetown Branch Trail via Grace Church Rd / 2nd Ave / east side 16th St
Additional Distance (ft)	n/a	500	500	500	1,115	1,300
Additional Walk Time (min)	n/a	2.1	2.1	3.1	5.6	6.4
Additional Cycle Time (min)	n/a	0.6	0.6	1.6	2.3	2.5
On-Road Distance (ft)	0	0	0	0	850	1,800
Major Road Crossings	0	0	0	1	1	1
Minor Road Crossings	0	1	1	1	1	n/a
Parking Lot Crossings	0	1	1	0	0	n/a
New Traffic Signal	No	No	No	Yes	No	No
Additional Private Property Impacts	n/a	West side of 16th Street	No	East side of 16th Street	East side of 16th Street	East side of 16th Street
Road Diet (SB from 3 to 2 lanes)	No	No	Yes	No	No	No
Access for Park Sutton Condos	n/a	Better	Better	Better	Worse	Worse
Access to Woodside Station	n/a	Better	Better	Better	Worse	Worse
Security	n/a	More "eyes on the trail" and "escapes"	More "eyes on the trail" and "escapes"	More "eyes on the trail" and "escapes"	More "eyes on the trail" and "escapes"	More "eyes on the trail" and "escapes"
		Blind spot at underpass	Blind spot at underpass			
	= Advantage					
	= Disadvantage					

16th Street Trail Access

TDG sees a wide variety of issues in the area where 16th Street crosses over the railroad tracks and where a stair and ramp connect the Woodside neighborhood and south side of 16th Street to the CCT:

- To provide residents of the Park Sutton Condominiums and others living north and west of 16th Street/railroad tracks access to the Woodside Station, provide a sidewalk on the west side of 16th Street between the bridge and Lyttonsville Road. At the bridge a stairway should be added to connect the sidewalk to the CCT to facilitate access to the Woodside Station. Near the east end of the north abutment of the 16th Street Bridge, provide a stairway to directly link the trail to the currently planned stair that links 3rd Avenue with the sidewalk along 16th Street.
- A bicycle and pedestrian crossing of 16th Street at Lyttonsville Road should be included in proposed improvements to 16th Street. How much usage a crossing at this location will receive depends upon a number of other design questions addressed in this report, including whether or not a sidewalk and trail access is

added to the west side of 16th Street (see bullet above), and how the CCT is ultimately routed between the Lyttonsville Road access west of 16th Street to 3rd Street east of 16th Street (see item 17C).

- From 2nd Street to Spring Street, the sidewalk on the east side of 16th Street should be widened to shared use path width to provide local bicycle and pedestrian access to the Woodside station. This side will be used by a large number of cyclists and pedestrians. This sidewalk should be a minimum of 10 feet wide with a 5 foot buffer from the street (minimum sidepath cross section recommended in AASHTO). An alternative if a lane in each direction on 16th Street could be eliminated would be to provide a cycletrack, enhanced buffers and a standard 6 foot sidewalk.
- From the east side of 16th Street into to the Woodside Station provide a standard width (10 to 14 ft., per AASHTO) shared use ramp and pathway where the plans currently show a stairway and narrow walkway.
- The revised drawing (June 26, 2013) of the stair and ramp on the east side of the railroad tracks linking 16th Street to the CCT is much improved.

Intersection of 16th Street and the Entrance to the Woodside Station

TDG concurs that a pedestrian activated signal is needed. Median refuge islands are needed and lane widths should be narrowed. It is possible that all of 16th Street should be reduced from 6 to 4 travel lanes to make the street crossable for pedestrians and to enhance redevelopment potential for the Woodside Station property. If rush hour flows are an issue, perhaps a reversible center lane is needed. With the location of the Woodside station on this road, a major effort needs to be made to make it bicycle and pedestrian friendly on both sides, and regarding crossings.

The access sidewalks from the Summit Hills residential complex should be 8 feet wide, rather than 5 feet wide. They should be designed for bicycle and pedestrian use, even though there are short cut stairs for pedestrians.

Intersection of 16th Street and Spring Street

TDG concurs with Planning Department staff that this intersection should be redesigned, and accommodations on the bridge for bicyclists and pedestrians should be appropriate for a street within a transit-oriented development.

- Spring Street should be curved slightly to meet 16th Street at a 90 degree perpendicular angle. The slip lanes should be removed or redesigned.
- Pedestrians walking along the east side of 16th Street should not be required to cross four crosswalks in order to cross one street. Pedestrian crossing distances should be reduced.
- Bicycles should be accommodated on road as are called for in the CBD Master Plan. For a medium to low volume collector such Spring Street the standard accommodation would be bicycle lanes in each direction. Bicycle lanes are recommended by Planning Department staff. TDG agrees that it is likely that this section of Spring Street only needs one lane in each direction; however a traffic study may be needed to support this conclusion. With a lane reduction, bicycle lanes should fit into a new cross section easily.
- The sidewalks along Spring Street between 2nd Street and 16th Street should be 6-8 feet wide. Six-foot sidewalks are viewed as best practice in the vicinity of an urban rail transit station (See AASHTO Guidelines for the Development of Pedestrian Facilities).
- The sidewalks along both sides of 16th Street, north and south of Spring Street should be widened to shared use path width, or as an alternative, cycletracks and sidewalks should be installed.

Silver Spring Transit Center

Planning Department staff would like confirmation that there is enough people moving infrastructure to support vertical movements between modes at the SSTC; especially between the Red and Purple Lines, but also between Purple Line and MARC station, rail lines and bus services, and between bike parking/CCT/MBT and the rail lines.

TDG concurs with this request.

Convergence of the CCT and MBT

TDG concurs with Planning Department staff comments requesting clarification about how the CCT and MBT come together.

Upon further study of the MTA drawings, it appears to TDG that there are a number of issues regarding the convergence of these two trails. However, the problems appear to

be with the design and construction of the Silver Spring Transit Center and would not be the responsibility of the MTA Purple Line project.

The top of a building at the south end of the transit center appears to be designed to receive the CCT and connect it to the MBT. The treadway for the MBT, already constructed on the top of this building (adjacent to a green roof) narrows to 5 feet prior to meeting the sidewalk at *Ripifant Street*, and has been built with 2 foot concrete knee walls. This is substandard and inappropriate trail design and should not be accepted by Montgomery County.

Additionally, it appears that there are standpipes in the trail ROW. Two are PVC pipe and may be cut off at a later date because they will be future surface drains. Two appear to be steel.

The trail alignment appears to be duplicative with the sidewalk along the new street (*Ripifant*), but much narrower. Eventually, what appears to be the trail merges with the sidewalk, again, with inadequate design of the merge area.

A side note regarding the Silver Spring Transit Center. The new bicycle rack located by the Metro Entrance are well placed, but should be covered.

Issues that do pertain to the MTA Purple Line project including the following:

- It appears that there is a connection between the CCT near where it links to the building roof and a pedestrian way that connects to the Purple Line platform. The connections appear to be quite narrow – 3 to 4 feet. Are these connections? If so, why are they so narrow? Are these connections on bridge structure above ground level?
- When the Purple Line and CCT are built, what will happen with the existing concrete walkway from Ripley Street to the ground level entrance of the Metrorail station at Colesville Road? This sidewalk also serves the MARC platform. It appears as if the Purple Line platform and CCT will be on structures above this sidewalk area. Is that the case? Will the sidewalk remain under the new structures?

Dixon Lane Crossing

TDG concurs with Planning Department staff that a crosswalk is needed on the east leg at the intersection of Bonifant Street and Dixon Lane.

Bonifant Street

TDG is concerned that the routing of the Purple Line on Bonifant Street from Fenton Street to Ramsey Avenue, will make that street impossible to use on a bike. Current drawings make Bonifant Street one way east from Ramsey Avenue to Georgia Avenue, and one way west from Fenton Street to Georgia Avenue. This operational format makes it impossible for cyclist traveling from East Silver Spring neighborhoods to use Bonifant to access the Silver Spring Metrorail Station, or to make the return trip on Bonifant. The roadway is not wide enough to provide a contra-flow bike lane and bicycle use of sidewalks on this retail street is not appropriate.

Bonifant Avenue is a low traffic alternative to Wayne Avenue for residents in the East Silver Spring neighborhood, and between Sligo Creek Trail and the Silver Spring Metrorail station. Bonifant Street is also the most direct access route to both the future Capital Crescent Trail and the Metropolitan Branch Trail, as they converge at Ramsey Avenue where the trails meet and where they can each be accessed from streets in the Ripley District, including Bonifant.

As a result of this condition, plans should be developed in conjunction with the Purple Line project for making an improved bicycle link from Bonifant Street at Fenton Street, to Thayer Avenue, along Georgia Avenue and using Ripley Street to access the MBT, CCT, and Silver Spring Metrorail station. By having to use Fenton Street and a short portion of Georgia Avenue, the low volume nature of today's Bonifant route is lost. To compensate, high quality bicycle facilities are needed on these two segments of the route.

Silver Spring Green Trail

The current design for the Silver Spring Green Trail (SSGT) along Wayne Avenue appears to meet the minimum AASHTO shared use path guidelines, i.e. a 5-foot buffer between curb and trail, and an 8-foot path travel way. However, it is important to note that it may be a matter of interpretation as to whether or not the SSGT truly does meet the conditions set out in AASHTO for an 8-foot shared use path width – which include the following:

- *“Bicycle traffic is expected to be low, even on peak days or during peak hours.*
- *Pedestrian use of the facility is not expected to be more than occasional.*
- *Horizontal and vertical alignments provide frequent, well-designed passing and resting opportunities.*
- *The path will not be regularly subjected to maintenance vehicle loading conditions that would cause pavement edge damage.”*

Eight foot trails are generally not recommended for urban shared use paths except for very short sections where wider widths are simply infeasible. Ten feet is the standard width.

According to the Shared Use Path Level of Service Calculator User's Guide⁴, 11 feet provides a much higher level of service for shared use paths where a balanced mix of bicyclists and pedestrians are expected. Twelve feet is the recommended width for urban shared use paths. A vertical barrier is recommended in locations where a shared use path is adjacent to a roadway and a 5 foot lateral buffer between the road and the trail edge is not possible.

TDG concurs with Planning Staff in recommending that the path be 10 feet wide where public ROW is available or small amounts of private ROW can be acquired. Locations where current plans suggest that a 10-foot width is possible within public ROW include the following:

- Between Springvale Road and Cloverfield Road
- Between Cloverfield Road and Greenbrier Drive.
- Between Silver Spring International Middle School (station 653+15) and station 656+62, to the east.

Additionally, consideration should be given to a design cross section that would include a 3.5 foot buffer with a split rail wood fence (or other style wood fence) and a 9.5-11.5 foot wide asphalt path (varying based upon availability of public ROW). Because the path is on a significant slope, crosses a number of driveways and is adjacent to an arterial roadway, somewhat unique safety issues are present. It will be easy for a bicyclist to travel at a relatively high speed in the east bound direction (downhill); 15-25 mph. The five foot buffer may not provide adequate recovery space for an errant cyclist, especially a child or youth cyclist, causing them to cross the buffer, drop off the curb and enter the roadway against opposing traffic.

Using the cross section suggested above, the narrower buffer allows for a wider treadway. This improves safety for all users by providing more navigational space and enhances users' ability to pass. The fence provides a greater level of protection for

⁴ Published by the Federal Highway Administration in July 2006; available on the FHWA website: <http://www.fhwa.dot.gov/publications/research/safety/pedbike/05138/05138.pdf>

errant cyclists than an open 5-foot buffer. The 3.5-foot buffer will not provide a good environment for street trees and the roots of street trees in this setting will eventually cause buckling of the trail pavement and maintenance issues. Home owners should be provided trees for planting in adjacent front yards.

This pathway will cross a number of small side streets and a number of private driveways. Each of these crossings represents potential crash locations for users of a shared use path. It may be appropriate to consider special signs for trail users and educational outreach to residents along Wayne Avenue and other residents in the adjacent neighborhoods. Rumble strips on the trail may also be useful to encourage trail users to maintain appropriate speeds.

Wayne and Cedar Street (801 Cedar St.):

TDG concurs with Planning staff regarding the problems of the narrow trail width at 801 Cedar St., however because the building is so close to the ROW and this pinch point is relatively short, if the property owner is uncooperative, it may be a tolerable pinch point.

If the staircase and landscaping cannot be relocated, a vertical barrier (fence), in addition to the curb, should be introduced between the trail and the roadway.

At this intersection, and others, the curb ramps for the SSGT should not be setback from the edge of Wayne Avenue, but rather placed on the arc of the curb at the corner to enable trail users to make relatively straight movements into the crosswalks. Parallel curb ramps, depressed curbs, or other custom curb ramp designs will likely be needed for these corners. Additionally, every leg of this, and most, intersections along Wayne Avenue should have a crosswalk.

Trail Crossing at Dartmouth Avenue

The intersection of Wayne Avenue and Dartmouth Road is skewed, creating a very large intersection for the crossing of a narrow residential street. Planning staff recommends extending the curb at the northwest corner of this intersection to reduce the crossing distance for the trail. TDG concurs and further recommends that the crossings of each leg of Dartmouth Avenue be addressed for pedestrian crossing improvements. A variety of best practices in pedestrian crossing design can be considered, including reconfiguring the Dartmouth Avenue intersection to create a 90-degree angle and to tighten curb radii. If larger curb radii are justified for some reason, median crossing islands could be installed to narrow entrances to and exists from

Dartmouth Road. The excess pavement at this intersection provides an opportunity for LID stormwater treatments and landscaping. Finally, a single pedestrian crossing of Wayne should be provided across the shortest distance – between the northwest corner and the southeast corner.

Wayne Avenue near the eastern terminus of Bonifant Street

At the eastern terminus of Bonifant Street a sidewalk connects Bonifant to the sidewalk along Wayne Avenue across a public easement. This sidewalk should be widened and a curb ramp is needed at Bonifant Street. Furthermore, the sidewalk from this location to the Sligo Creek Trail should be widened where ROW allows, to 6-8 feet.

Sligo Creek Trail

A number of issues exist with the current design of the Silver Spring Green Trail's linkage to the Sligo Creek Trail, and the trail's crossing of Piney Branch Road. They include the following:

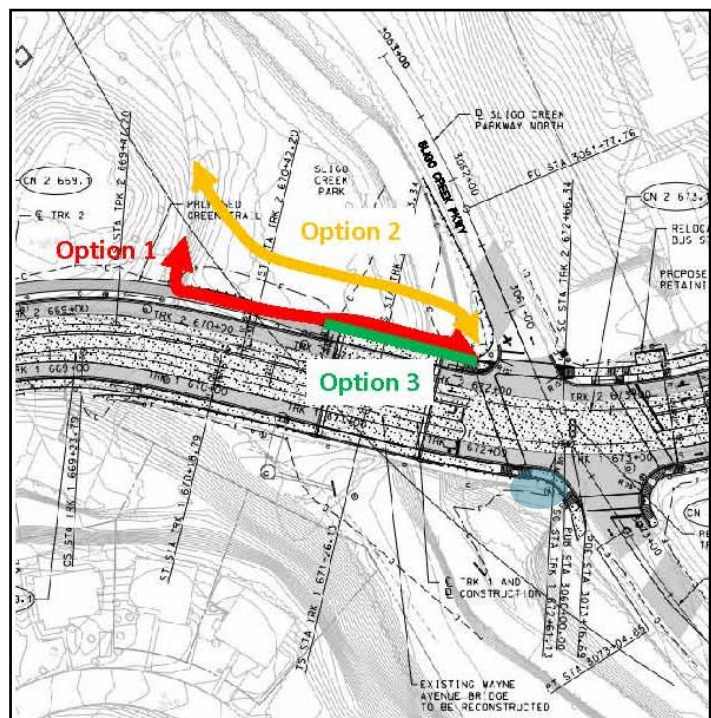
1. A lack of sufficient trail width and buffer (not AASHTO standard) from the Sligo Creek Trail where it meets Wayne Avenue from the north to the bridge, across the replaced bridge, and to the intersection of Wayne Avenue and Sligo Creek Parkway. This section of the trail is essentially on the sidewalk today, and is unimproved by the Purple Line project.
2. A lack of improvement to the Sligo Creek Trail crossing of Wayne Avenue.
3. A lack of improvement to the Sligo Creek Trail on the south side of Wayne Avenue.
4. A lack of aesthetics in the design of the bridge as a gateway to Silver Spring and homage to the natural feature of Sligo Creek and Sligo Creek Park and Trail.

TDG concurs with the concerns raised by Planning Staff. Additionally, TDG is aware that the Sligo Creek Trail was designed many years ago. In its current condition in this area, it is substandard in width, and it appears that the Purple Line project is not bringing the parts of the trail impacted by the project up to current standards. It is a best practice to have every capital transportation project improve the other transportation facilities in its area of impact. The Sligo Creek trail is expected to be a major feeder of bicycle and pedestrian traffic to the Purple Line, thus the Purple Line will result in increased trail traffic which the project should accommodate. Moreover, improving a portion of the Sligo Trail will encourage its use for Purple Line access and help ensure that Purple Line ridership projections are met.

Finally, the Purple Line project is triggering the replacement of the bridge over Sligo Creek and the Sligo Creek Trail is currently accommodated on the north side of that bridge.

TDG recommends that the Purple Line project include one of three options outlined below, and address an additional item which is independent of the options, but related to the southeast corner of the bridge:

- Option 1 (Red): Widen the Sligo Creek Trail on the north sidewalk of Wayne Avenue (15-foot cross section) and have it cross Sligo Creek north of the Wayne Avenue bridge and roughly parallel to it. A separate bridge over the stream, for the trail, would avoid having to widen the Wayne Avenue Bridge over Sligo Creek to accommodate the trail, and may lessen the environmental impacts to the stream caused by extending the length of the abutments. On the bridge, a 5-foot sidewalk could be provided adjacent to a box style guide rail.
- Option 2 (Yellow): North of Wayne Avenue, realign the Sligo Creek Trail to approach the stream before reaching Wayne Avenue, and cross the stream at an angle to the land near the current crosswalk at Wayne Avenue and Sligo Creek Parkway.
- Option 3 (Green): Widen the trail passageway on the north side of the bridge to provide a barrier and 10-foot travel way with two foot buffers from the outside parapet and the interior traffic barrier (such as a bicycle railing). This would require a significantly wider bridge. Elimination of a travel lane is not recommended because for on-road bicycling, track free right lanes are recommended for Wayne Avenue over the entire length of the street that is shared with the Purple Line.
- Additional Item: On the south side of Wayne Avenue, the receiving area for the trail crossing should be significantly enlarged to safely accommodate all of the



turning and merging movements that happen at a trail crossing co-located with sidewalks at an intersection of arterial roadways (see blue area on map).

Manchester Station Area

TDG concurs with Planning Department staffs' concern about eastbound cyclists using the right lane of Wayne Avenue when they reach the location where the LRT tracks veer right off of Wayne and go underground. Cyclists traveling east on Wayne may get their tires caught in the LRT tracks.

In a response to Planning staff's comments about this issue, MTA said that a sign would be provided warning cyclists of the situation and directing them to dismount. TDG believes that this is an inadequate response because the MUTCD does not have a sign that can be used to require bicyclists to stop in a public street and dismount (unless it would be for a temporary situation, like a construction detour).

The narrow sidewalk (5-6 feet) on the south side of Wayne going east from Sligo Creek and the 11 foot outside travel lane present a difficult situation for cyclists who will be going up a very steep hill – the sidewalk is too narrow to share with pedestrians and the travel lane is too narrow to share with motorists. When they reach the track crossing their difficulty will be compounded. It appears that ROW is limited in this area. TDG does not have a solution readily available. Possibilities to explore include the following:

- Adjusting road and lane widths to allow for a 13 foot outside lane in the eastbound direction on Wayne Avenue from Sligo Creek to Flower Avenue.
- Adjusting the alignment of the road and expanding the sidewalk to 8-10 feet to allow cyclists to leave the road and use the sidewalk for their uphill climb. This approach may not be attractive to all cyclists, but will serve the less skilled and least strong riders. Sidewalk travel will place cyclists in a better position to receive warning about the dangers in crossing the tracks and be guided toward a good crossing angle with striping that can be combined with the crosswalk at this location.

Arliss Street

Though this is outside the assigned study area, TDG was able to make a cursory review of the bicycle and pedestrian issues east of Sligo Creek Parkway. In this review two pedestrian crossing issues were noted:

- Along Arliss Street, a few hundred feet east of Flower Avenue, a pedestrian desire line may create demand for a mid-block crossing of Arliss just west of the LRT portal. If a pedestrian path connection from Sudbury Road were ever created with a connection to Arliss Street, the location of a grocery store across the street is likely to generate considerable neighborhood foot and bike traffic. The addition of the Purple Line station on Arliss will add to the demand for this connection. It is true that Plymouth and Walden provide an equally good connection to the Purple Line station, however, pedestrians are likely to desire trip chaining that includes a stop at a grocery store.
- In a related concern, all legs of the Arliss/Walden intersection should have curb ramps and crosswalks, and approach sidewalks. This intersection connects a library, a community center, a grocery store and a new LRT station. It should be very pedestrian friendly and safe.

Appendix A

Lynn Drive Crossing

Background

Currently, an unpaved connector path links Lynn Drive to the south of the corridor with the CCT. It is used primarily by students living south of East West Highway, in the Chevy Chase community, as a walking route to the B-CC High School. Pedestrians (not cyclists) are able to get from Lynn Dr. to the CCT and then to Montgomery Avenue via a narrow passage way adjacent to a high rise residential building. These two path connections create a fairly direct route between the residential neighborhood south of E-W Highway and the high school.

At the request of the community to keep the link open despite construction of a light rail line along the CCT corridor, MTA proposed an at grade crossing of the Purple Line tracks. Later, MTA concluded that train speeds and sight distances at this location made it unsafe for an at-grade crossing.

MTA developed two tunnel options as a way to keep the link open. It is assumed that the tunnel options would increase costs, however they would eliminate the potential danger of a pedestrian/cyclists being hit by a train. To connect a tunnel under the tracks to the CCT on the north side of the tracks, the trail has to be dropped in elevation, and the track raised in elevation. It should be noted that the Purple Line will close off access to the narrow path from the CCT corridor directly to Montgomery Avenue, and the new route to/from B-CC HS would be along the trail to the east, under E-W Hwy, and up the stairs to the sidewalk along E-W Hwy. A ramp access is provided on the south side of E-W Highway; this route requires pedestrians and cyclists to make an at-grade crossing of E-W highway at Chelton Road to access the HS.

Evaluation

Following is a simple set of pluses and minuses of the various options at this location. The following scale was employed worst to best: Poor > Fair > Better > Good > Best

	Tunnel Option 1	Tunnel Option 2	At Grade RR Crossing	Alternate Routes
Factor				
Increase Access	Good	Fair	Fair	None

to CCT				
Increase Access to B-CC HS	Fair	Fair	Good	Poor
Safety Crossing Tracks	Good	Good	Poor	Good
Safety Entering CCT	Poor	Poor	Fair	Good
Directness	Fair	Better	Best	Poor
Function for Bikes	Poor	Good	Poor	Best
Function for Pedestrians	Fair	Good	Fair	Poor
User Experience	Fair	Better	Fair	Fair
Personal Security	Poor	Better	Poor	Good
Cost	?	?	?	?
Negative Impact to CCT Function*	Yes	Yes	None	None
Negative Impact to CCT Experience*	Yes	Yes	None	None

*It will require a small amount of additional study, and possibly additional cross section drawings from MTA to fully understand how much of a “trench” between walls would be created along the CCT to the east and west of the tunnel opening.

Tunnel Option 2 is preferable to Tunnel Option 1. In Option 1, the sharp turn in the trail just south of the rail line limits sight distance and could increase conflicts between trail users. Option 2 provides better function for all trail users. The direct route in Option 2 improves personal security and functionality of the tunnel as a connection to the Capital Crescent Trail, B-CC High School and other destinations near the school.

Recommendations for Improvement

Further modifications to the proposed Tunnel Option 2 design are needed, including the following:

- **Tunnel Width:** The proposed tunnel appears to be 8-10 feet wide. According to the AASHTO Bike Guide, the minimum width of a two-way shared-use path should be 10 feet with an additional minimum 2-foot clearance on each side. A 3- to 5-foot clearance is recommended as it provides more comfort for trail users.

Further, a wider, taller tunnel provides more personal security, thus the interior tunnel should be 16-feet wide interior wall to interior walk with two 5-foot striped travel lanes.

- **Tunnel Height:** The proposed tunnel is 10 feet high, which meets the 2012 AASHTO Bike Guide's desirable vertical clearance. As described above, a wider, taller tunnel increases personal security for all trail users, so while a tunnel height of 10 feet is acceptable, a 12-foot or taller height would be preferable.
- **Light Shaft:** Consider a natural light shaft in the middle of the tunnel between the two tracks to provide natural lighting if feasible and suitable given the required depth of such a shaft.
- **Trail Intersection:** To increase visibility and decrease potential for conflicts, the trail spur should flare where it meets the CCT. If possible, adjust the trail spur approach to meet the CCT at or approaching a 90-degree angle with 10-foot radius flares.
- **Tunnel Approach Width:** On each side of the tunnel, the approach pavement along the spur should widen to meet the pavement width through the tunnel.
- **Striping & Signage:** Consider striping and signage to warn trail users of the tunnel on the tunnel approaches.