PHED COMMITTEE #1
January 27, 2014

MEMORANDUM

January 23, 2014

TO: Planning, Housing, and Economic Development Committee

FROM: Glenn Orlin, Deputy Council Administrator

SUBJECT: Bethesda Purple Line Station Plan—transportation issues

Councilmembers: Please bring your copy of the Draft Minor Plan Amendment to the worksession.

This memorandum addresses the transportation elements in the Planning Board's Draft Plan. Some purely technical corrections will be made to the final document, but they are not identified in this memorandum. The zoning aspects of this Plan will be addressed at a subsequent worksession, currently scheduled for February 3.

The Executive Branch is working on the fiscal impact statement for this Plan. The 60-day legislative deadline extends until February 3. If the fiscal impact statement is not transmitted in time for a Committee worksession, it will be reviewed as part of the packet that goes to the full Council.

1. Existing versus proposed design. The purpose of the Plan is to facilitate the construction of a better western terminus for the 14-mile Purple Line and to maintain a tunnel connection beneath Wisconsin Avenue for the Capital Crescent Trail (CCT). This would be done by providing a series of incentives—including higher zoning—to encourage the property owner of the Apex Building at the southwest corner of Wisconsin Avenue and Elm Street to raze the building and to construct a new building over the station and relocated trail. Generally, the benefits of the new design are that it:

- provides new CCT access under Wisconsin Avenue with a dedicated tunnel (the default design allows only for a 5-7'-wide walkway through the existing tunnel);
- moves the new Red Line Station south entrance from Elm Street sidewalk into the new building;
- enhances circulation on a wider, open Purple Line platform;
- eliminates gaps between trains and the platform, by straightening the platform;
- reduces the distance the "tail track" extends into Woodmont Plaza down to only 30';
- provides an opportunity to relocate a sizable Purple Line exhaust tower from Woodmont Plaza into a new building; and
- accommodates a new bike station integrated into the station.

The "default" (i.e., existing) and proposed designs for the Purple Line station and new southern entrance station to the Bethesda Metro Station are on pp. 2-4; the default and proposed designs for the CCT are on pp. 7-9. There are two options for the trail tunnel. Option 1 extends east to 47th Street and crosses the northwest portion of Elm Street Park at grade. Option 2 remains sub-surface on a curved section beneath much of Elm Street Park before emerging near the garage of the Air Rights Building. The Maryland Transit Administration (MTA) costs out Options 1 and 2 at $15 million and $30 million, respectively, and it estimates that the new design for the Metro Station south entrance would save $10 million in utility costs (©1-2). These savings and costs would redound to the County, so MTA recognizes that this would be entirely the County's decision.

The Planning Board and its staff presented a brief overview of these designs prior to the Council's January 14 public hearing; MTA and Planning staff will give a more detailed briefing at the beginning of this meeting.

In most respects the new design is superior to the default design. However, a problem with the new design is that it would require patrons transferring from Metrorail to the Purple Line (or the CCT) to take an elevator to street level and then another elevator or a flight of stairs back down to the Purple Line/CCT level, and the reverse from the Purple Line/CCT to Metrorail (©3). The default design requires only the elevator ride. The transfer volume between Metrorail and the Purple Line is projected to be quite heavy; the new design would lengthen that transfer.

The Planning staff conducted a thorough analysis of the two new trail options (©X-X). Of the trail options, the Planning Board recommends Option 1. Council staff concurs, not only because it would be only half the cost, but because of the better personal security afforded by a shorter and straighter tunnel. In its testimony the Coalition for the Capital Crescent Trail was correct in pointing out that the grade emerging from the tunnel should be less than 5%, not the 8% it would be if it returned to grade short of the 10-space parking lot on the south side of Elm Street midway between Wisconsin Avenue and 47th Street. The County should work with the property owner to find a comparable location for these 10 spaces so the access to the lot can be closed off.

3. Land use/transportation balance. Every master plan should have a balance between its proposed land use and its proposed transportation network and services. For more than two decades this "balance" has been defined as what would be needed to meet the current adequate public facilities (APF) requirements as described in the Subdivision Staging Policy. Achieving this balance in a plan is not an academic exercise: if a plan is not balanced, then at some point in the future a proposed master-planned development will be unable to proceed because it will have no means to meet the APF requirements.

Meeting the TPAR requirements proves not to be an issue for the proposed development. TPAR is measured over the entirety of the Bethesda-Chevy Chase Policy Area (the area south of the Beltway, west of Rock Creek, north of the District of Columbia, and east of the Potomac River) and this proposed development is but a miniscule portion of it. Though the B-CC Policy Area is near the roadway adequacy threshold based on TPAR testing of the build-out of adopted plans by the year 2040, the proposed development in this Minor Amendment would not cause the B-CC Policy Area to fall below the TPAR roadway adequacy threshold for urban policy areas (i.e., 40% ratio of forecast speed to uncongested speed). The transit adequacy test is not applied to Metro Station Policy Areas, within which the proposed development sits.

For Local Area Transportation Review (LATR) Planning staff examined seven intersections in the vicinity of the Purple Line Station area to determine whether additional development in the one-block area would cause the LATR standard of 1.13 volume/capacity (v/c) to be exceeded. Their traffic analysis and results are on ©13-20. Under their "High Estimate" Scenario (i.e., the worst case for traffic impact), these four intersections would meet the 1.13 v/c standard in each peak at buildout without any further improvements:

- Wisconsin Avenue/Montgomery Lane
- Wisconsin Avenue/Elm Street/Waverly Street
- Wisconsin Avenue/Bethesda Avenue/Willow Lane
- Old Georgetown Road/Woodmont Avenue

At two other intersections, the standard can be met merely be reassigning how the existing lanes are used. At Wisconsin Avenue/East-West Highway/Old Georgetown Road, the intersection is forecasted to operate at 1.20 and 1.22 v/c in the AM and PM peaks, respectively. Currently the northbound approach on Wisconsin Avenue has an exclusive left-turn, a combination left/through-lane, and two through lanes. If the combination left/through lane were to be designated as a second left-turn lane, then the v/c ratios would improve to 1.05 and 0.97, respectively.

Bradley Boulevard/Arlington Road is forecasted to operate at 1.17 and 1.71 v/c in the AM and PM peaks, respectively. Here the solution is dynamic lane assignment: changing how some of the lanes on the northbound and southbound approaches on Arlington Road are utilized between the AM and PM peaks. With the reassignment, the v/c ratios would improve to 1.08 and 1.13, respectively.

The only intersection widening identified by the analysis would be on the south leg of Wisconsin Avenue at Bradley Boulevard, where a second northbound-to-westbound left-turn would be needed to bring the intersection in compliance with the 1.13 v/c standard. This would mean adding 10' to the road's cross-section: perhaps 5' from each side (abutting the fire station to the west and the Chevy Chase Club to the east).

With these improvements, the Plan would be in balance between the proposed land use and transportation. However, these improvements should not be officially designated in the Plan until or unless they are confirmed in the subsequent comprehensive update to the Bethesda CBD Sector Plan.

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MARYLAND TRANSIT ADMINISTRATION
MARYLAND DEPARTMENT OF TRANSPORTATION
Martin O'Malley, Governor • Anthony G. Brown, Lt. Governor
James T. Smith, Jr., Secretary • Robert L. Smith, Administrator

TO: Gary Erenrich, DOT
Tom Autrey, M-NCPPC
David Anspacher, M-NCPPC
Elza Hisel-McCoy, M-NCPPC
Charles Latucca, DOT

FROM: Michael D. Madden, Project Manager
Maryland Transit Administration

SUBJECT: Purple Line
Cost Implications for Apex Building

DATE: September 6, 2013

Over the past weeks the Maryland Transit Administration's (MTA) Purple Line team has been conducting preliminary studies of a revised plan for the Apex Building site in Bethesda. We have identified many significant benefits for transit and trail users, as well as potential for significant transit-oriented development. Several parties have inquired as to the cost savings which would occur as a result of demolishing the presently-occupied Apex Building in Bethesda. This memorandum serves to outline the project-related cost impacts affecting decisions by public agencies and private entities. Demolition and redevelopment of the Apex Building must be viewed in the context of three interrelated projects: the Purple Line, the Capital Crescent Trail and a new south entrance to the Bethesda Metro station; and, to some extent which agency is bearing the cost of those projects. Finally, an ongoing study by the Maryland-National Park and Planning Commission is examining demolition/redevelopment of the Apex building purely as an improvement to urban design, transit accessibility, and development.

As shown below, nearly all of the known savings to the demolition/redevelopment of the Apex Building would accrue to the County-sponsored Bethesda Metro south entrance project; however, the County's long-term vision of an adjacent, underground Capital Crescent Trail through Bethesda would raise the County's total cost by $5 - $20 million depending on the final design alternative selected by the County for the Capital Crescent Trail.

(1)

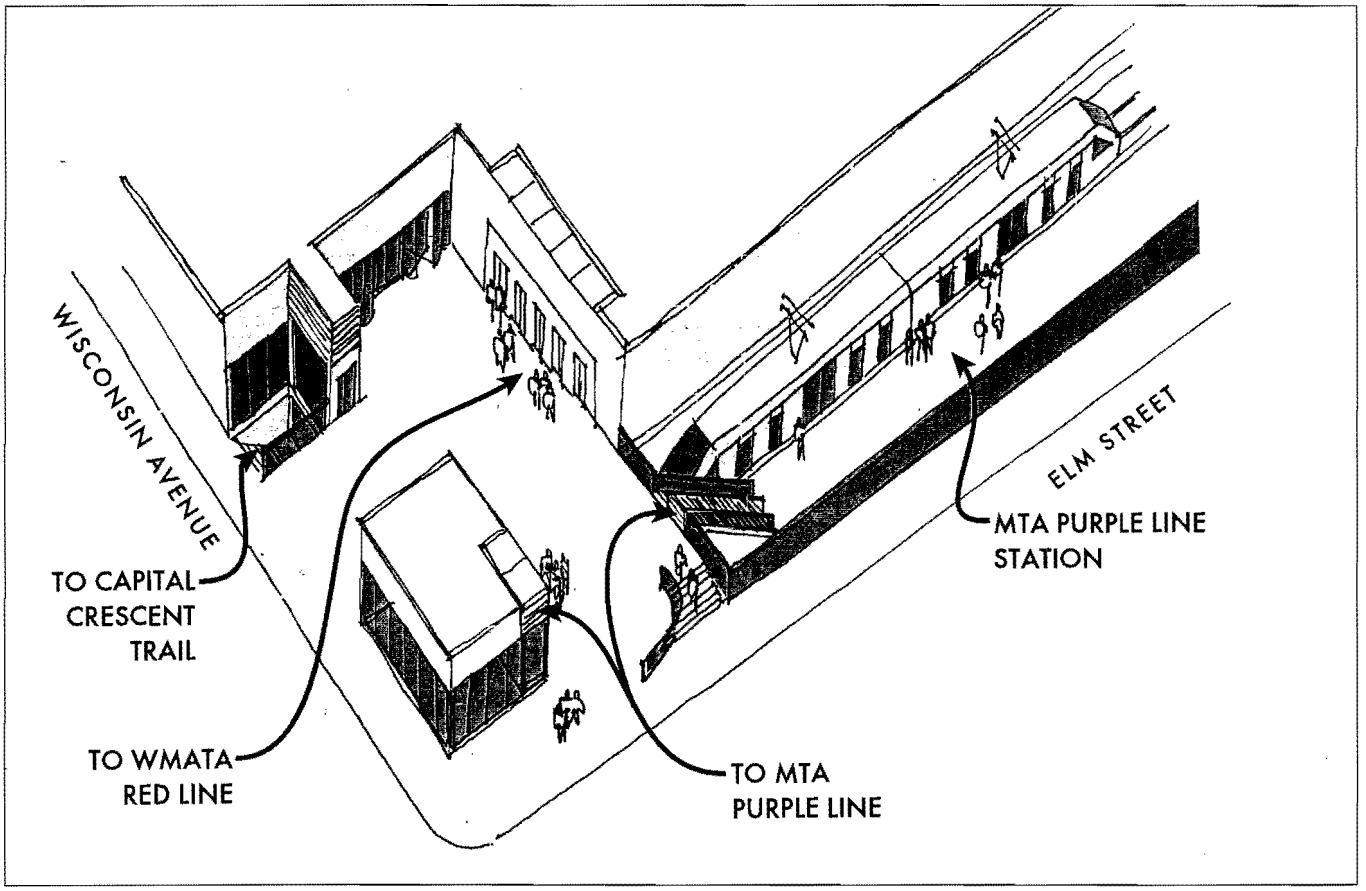
Cost Impacts associated with Demolition/Redevelopment of Apex Building (in millions)				
	Savings to	Base Cost (w/ Apex)	Potential Cost (w/o Apex) -- Option 1	Potential Cost (w/o Apex) -- Option 2
Bethesda Metro South Entrance	County	$ 80.0	$ 70.0	$ 70.0
Capital Crescent Trail	County	$ 0.3	$ 15.0	$ 30.0
Purple Line Station	MTA	$ 37.0	$ 37.0	$ 37.0
Trail Options: The first option is a tunnel under Wisconsin Avenue only with a portal in Elm Street east of Wisconsin Avenue and the trail connecting into Elm Street Park. The second option is a tunnel under Wisconsin Avenue, Elm Street and a portion of Elm Street Park with a portal within the park right before entering the Air Rights Building.				
Purple Line: At this time, MTA cannot say with certainty that there would be much of a cost difference for the Purple Line station. Platform and track/system components would be similar under either condition. It is possible that the new station configuration would allow reduction or elimination of the ventilation equipment, but due to the early stage of design we have not verified this and therefore any potential savings are not reflected in the chart above. Also, we would note that these savings would be partially offset by addition of 2 elevators and stairs between the Wisconsin Avenue Level and Purple Line Level.				
Bethesda Metro South Entrance: Estimated savings of $10M for the Bethesda Metro South Entrance project if the entrance is relocated within the Apex Building footprint. This savings is based only on anticipated utility impacts. We did not include any paving and restoration savings on Elm Street as it's likely it will still be used during construction as part of the haul route.				

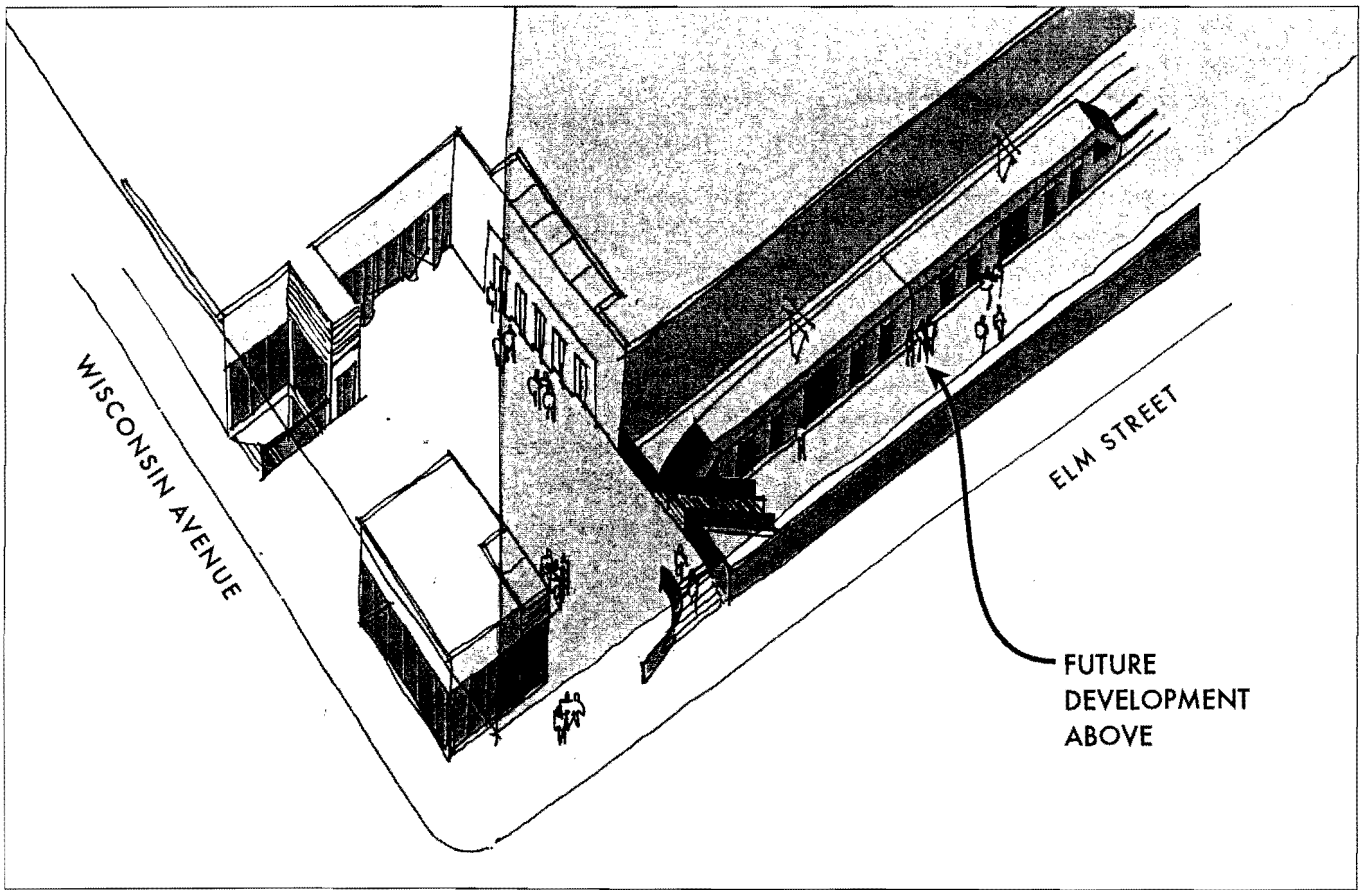
Additional technical considerations in demolition and redevelopment which are also unquantifiable at this time (and would depend on the redevelopment scenario and timing) relate to:

- Construction of a potential parking structure at- or below-grade of the building
- Ease of access to/from the construction area for all of the projects
- Construction efficiencies and integration risk mitigation for the construction of the projects jointly
- *Less disruption to Elm Street during construction and ability to maintain current traffic pattern for Elm Street long term*

While MTA sees many benefits and opportunities to demolition/redevelopment of the Apex Building, MTA continues to defer to Montgomery County government to draw a final conclusion regarding its efficacy.

REDEVELOPED APEX BUILDING





Bethesda Purple Line Minor Master Plan Appendix – Capital Crescent Trail

Capital Crescent Trail Surface Route

As stated in the 1994 Bethesda CBD Sector Plan, the Surface Route of the Capital Crescent Trail is important "since it will allow easy access to many businesses and activities and will contribute to the vitality of the area." It will be the only branch of the trail open during construction of the Purple Line and if a Tunnel Route is not constructed, this branch of the Capital Crescent Trail will become the mainline.

The Montgomery County Department of Transportation (MCDOT) is in the conceptual phase of design for this segment of the trail. The concept plan deviates from the 1994 Sector Plan in several regards. First, it routes the trail along 47th Street instead of 46th Street. Second, the concept plan envisions implementing the Surface Route as a cycle track and a sidewalk along Bethesda Avenue and Willow Lane instead of a shared use path adjacent to a sidewalk. Planning staff agrees that the trail should be routed along 47th Street, since there will be fewer impacts to the road network and to the residences along 46th Street. Staff also agrees that the trail should be implemented as a cycle track and a sidewalk instead of a shared use path and a sidewalk along Willow Lane and Bethesda Avenue, since these areas have the greatest potential for conflicts between cyclists and pedestrians. While both cycle tracks and shared use paths maintain separation from traffic, a cycle track is a bicycle-only facility that maintains separation from pedestrians, whereas a shared use path accommodates all users (bicycles, pedestrians, joggers, skaters, etc).

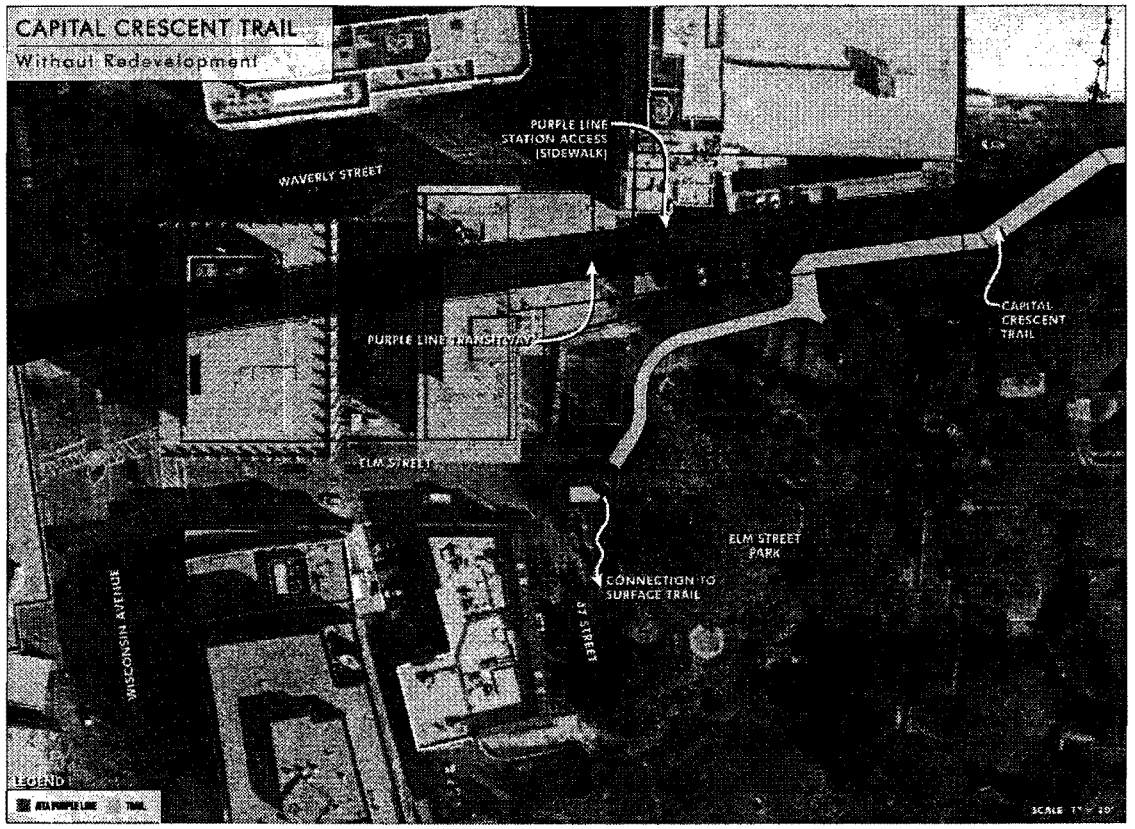
Much of the facility planning discussion regarding the Surface Route is driven by an approval for 7200 / Wisconsin development project, which requires the developer to pay for a cycle-track like facility on the north side of Bethesda Avenue. If a result of this plan is that the approved development along Bethesda Avenue is substantially rethought, it may be possible to improve upon the trail design on Bethesda Avenue by eliminating one or more driveways and widening the trail and sidewalk, especially on the western end.

Comparison of Tunnel Options for the Capital Crescent Trail

Baseline Condition

As noted above and illustrated in Figure 4 below, the current plan is for the Capital Crescent Trail is to utilize the Surface Route as the main connection through downtown Bethesda. Heading in the westbound direction the Capital Crescent Trail crosses over the Purple Line and winds through the northern portion of Elm Street Park. It then transitions into the Surface Route, traveling southbound along the east side 47th Street, heading westbound along the south side of Willow Lane, crossing Wisconsin Avenue, and then heading westbound along the north side of Bethesda Avenue. A narrow 5 to 7 foot wide sidewalk would provide access from the Capital Crescent Trail directly into the Purple Line station, running adjacent to the Purple Line, but would be prohibited for bicycles due to space limitations. The benefits of a new tunnel should be weighed against this Baseline condition.

Figure 4: Capital Crescent Trail without Redevelopment

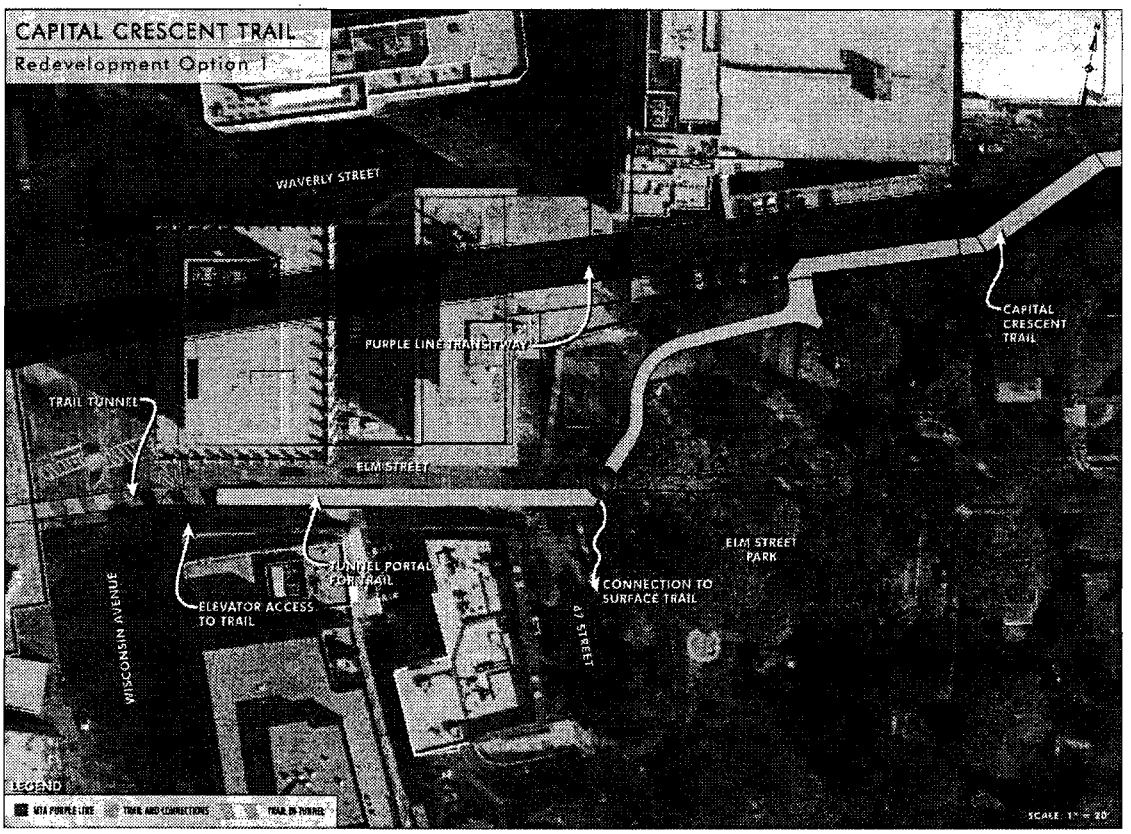


MTA has developed two concepts for a new Tunnel Route for the Capital Crescent Trail. Both options assume the construction of the Surface Route, as described above, though they would not include the narrow 5 to 7 foot wide sidewalk running adjacent to the Purple Line.

Tunnel Option 1

Heading in the westbound direction the Capital Crescent Trail crosses over the Purple Line and winds through the northern portion of Elm Street Park (see Figure 5). At the intersection of Elm Street and 47th Street the trail branches into the Tunnel Route and the Surface Route of the Capital Crescent Trail. The Surface Route heads south along 47th Street. The Tunnel Route crosses 47th Street at grade and travels along the south side of Elm Street. The trail begins to descend at an 8% grade into a 13 foot wide tunnel just west of a driveway to avoid blocking a small parking lot for 4610 Elm Street. It then passes beneath Wisconsin Avenue in a tunnel and enters the Apex Building site at the Purple Line level (about 15 feet below Wisconsin Avenue). Since an 8% grade does not meet ADA requirements, an elevator is provided at the southeast corner of Wisconsin Avenue and Elm Street for trail users that are unable to navigate the steep grade. Tunnel Option 1 would remove both rows of on-street parking on Elm Street (14 parking spaces).

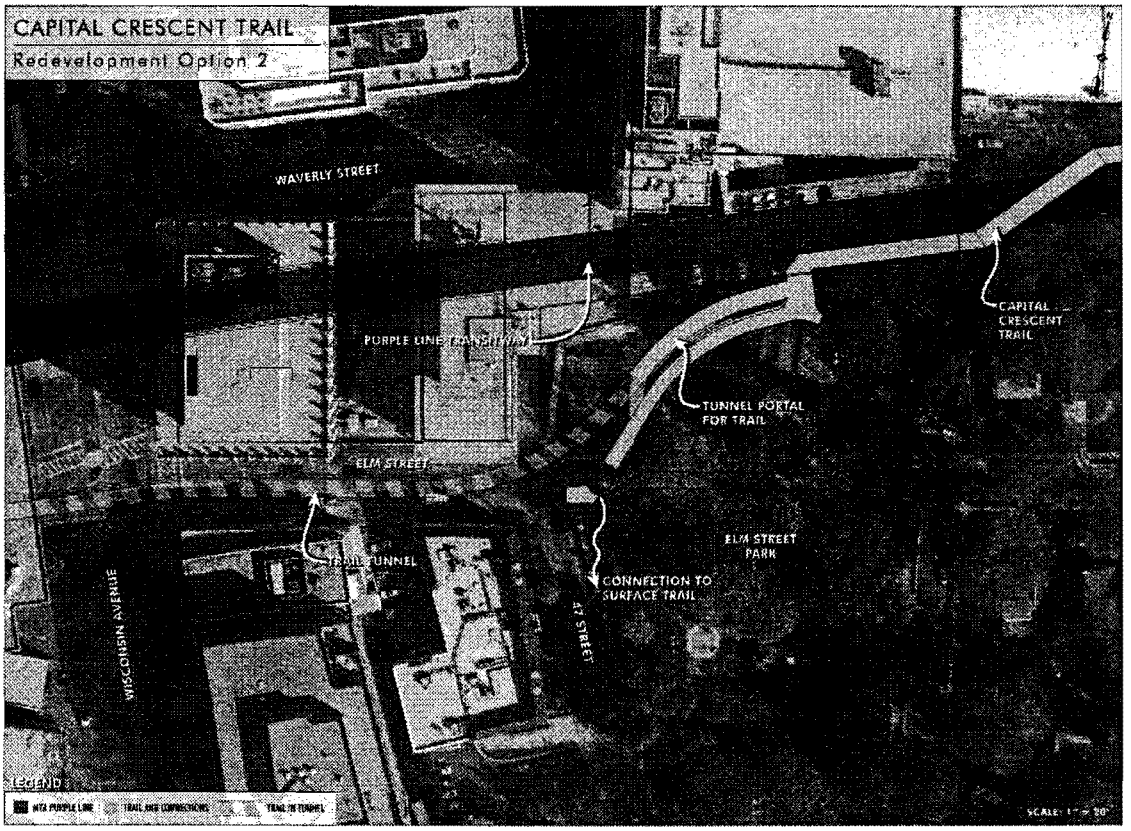
Figure 5: Capital Crescent Trail Tunnel Option 1



Tunnel Option 2

Heading in the westbound direction the Capital Crescent Trail crosses over the Purple Line and immediately branches into the Tunnel Route and the Surface Route of the Capital Crescent Trail in the northern portion of Elm Street Park (see Figure 6). The Surface Route winds through the park and then heads south along 47th Street. The Tunnel Route parallels the Surface Route for a short period, then enters a tunnel on the east side of the basketball courts. The tunnel curves through Elm Street Park, then travels underneath Elm Street in a 16 foot wide trail. It then passes beneath Wisconsin Avenue in a tunnel and enters the Apex Building site at the Purple Line level (about 15 feet below Wisconsin Avenue).

Figure 6: Capital Crescent Trail Tunnel Option 2

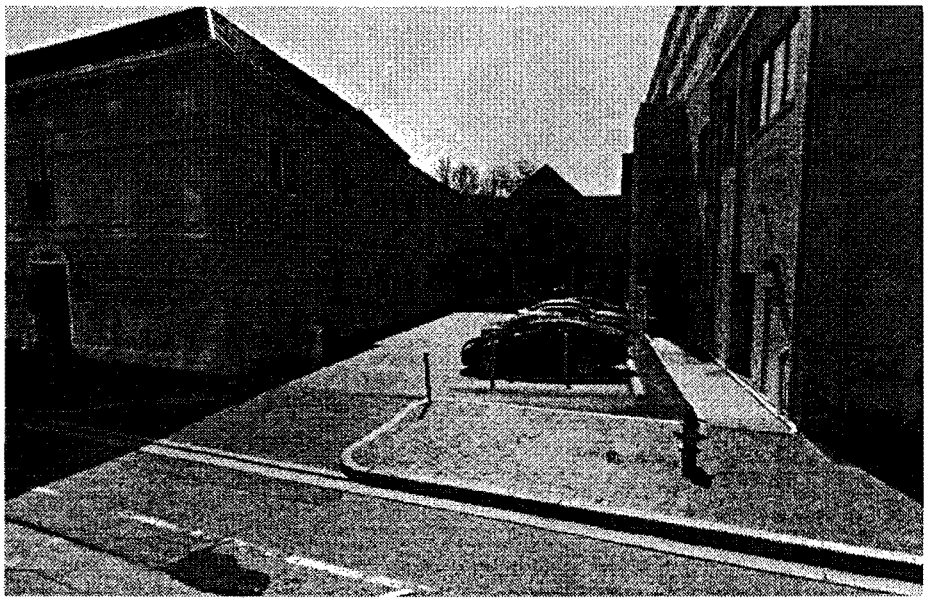


Comparison of Tunnel Options

Table 4 compares the two tunnel options.

- Tunnel Length: In most instances – weather being a notable exception – trail users would prefer a shorter tunnel to a longer tunnel, especially when they are in confined spaces. The tunnel is 225 feet long for Option 1 and 450 feet long for Option 2.
- Tunnel Width: To accommodate the potential high usage of the Tunnel Route, the trail should be at least 15 feet wide in the tunnel and tunnel portal. Cyclists tend to shy away from retaining walls and other fixed objects and therefore a 15 foot wide trail would have an effective width of about 11 feet. The current design for Option 1 includes a width of 13 feet (an effective width of 9 feet). While widening the tunnel to 15 feet is technically feasible, it could include a substantial cost if the utility vaults on the north side of Elm Street need to be relocated. MTA will evaluate the location of the electrical vaults (and the additional cost) if the County recommends moving forward with Option 1. Option 2 would be 16 feet wide its entire length.
- Tunnel Grade: Perhaps the most important design consideration for Option 1 is the 8% grade over a distance of 225 feet that is needed to avoid cutting off access to the parking lot for 4610 Elm Street (see below). An 8% grade is very steep and would be difficult – if not impossible – for

several user groups to navigate, including children, elderly, and disabled users. An elevator at the southeast corner of Wisconsin Avenue and Elm Street would provide an ADA compliant alternative route. An 8% grade could be an issue because: 1) it would allow cyclists traveling downhill toward the Purple Line station to reach high speeds on their bikes, and 2) because cyclists traveling uphill typically need additional space to navigate steep grades and could come in contact with other trail users if the trail is only 13 feet wide. Many trail users may opt instead to cross Wisconsin Avenue at grade using the Surface Route or at Elm Street to avoid the tunnel. Tunnel Option 2 has a segment of about 150 feet that has a grade of 4.75%. While this is still steep, it meets ADA requirements and is much more reasonable for various user groups to navigate.



Parking Lot Entrance to 4610 Elm Street

- Tunnel Curvature: Perhaps the most important design consideration with Option 2 is the curvature of the tunnel in Elm Street Park. While there is sufficient sight distance to achieve the design speed of the trail, there will be many trail users that are uncomfortable using a tunnel where they cannot see the end of the tunnel, especially during low demand periods. This will be more of an issue for pedestrians who travel at slower speeds than cyclists.
- Impacts to Elm Street Park: In Option 1 the junction of the Mainline, Surface Route, and Tunnel Routes of the Capital Crescent Trail occurs at the northwestern edge of Elm Street Park so only a single shared use path passes through the northern section of Elm Street Park. In Option 2 the junction of the Mainline, Surface Route, and Tunnel Routes of the Capital Crescent Trail occurs at the northern edge of Elm Street Park so that two shared use paths pass through this section of the park. Option 2 therefore has a greater impact to the park than Option 1. Option 2 may require removal and replacement of the half basketball court. The Department of Parks is

concerned about the loss of any recreational facilities in Bethesda, which already has a low level of service for many park facilities.

- Impacts to Elm Street: Option 1 would eliminate 14 on-street parking spaces and a left turn lane. Option 2 would have no impact on Elm Street.
- Street Crossing: Option 1 contains an at-grade crossing of 47th Street, though the volume on this road is low[1]. Option 2 contains no street crossings.
- Convergence of Shared Use Paths: In Option 1 the Tunnel Route, Surface Route, and Mainline of the Capital Crescent Trail converge at a single point in a visible location. In Option 2 the convergence of the trail is somewhat more complicated, requiring the Tunnel Route and Surface Route to parallel each other for a short distance.
- Capital Cost: MTA has estimated a preliminary, order-of-magnitude capital cost of $15 million for Option 1 and $30 million for Option 2.

[1] A 2004 traffic count showed 1,500 vehicles between 6:00 am and 7:00 pm on a weekday.

Table 4: Comparison of Tunnel Options

	Tunnel Option 1	Tunnel Option 2	Advantage
Tunnel Length	225 feet	450 feet	Option 1
Tunnel Width	13 ft wide, expandable to 16 ft wide with added cost	16 ft wide	Option 2
Tunnel Grade	Very steep for short distance (8% for 225 feet), requires elevator for ADA	Somewhat steep for shorter distance (4.75% for 140 feet)	Option 2
Tunnel Curvature	Slight bend near station	Slight bend near station; curve in park	Option 1
Impacts to Elm Street Park	One bikeway/shared use path through park (that serves as both the tunnel route and the surface route)	Two bikeways/shared use paths through park (tunnel route and surface route)	Option 1
Impacts to Elm Street	Eliminates on-street parking	None	Option 2
Street Crossing	Crosses 47th Street at grade (volume is about 1,500 daily vehicles)	No at grade street crossing	Option 2
Convergence of Bikeways/Shared Use Paths	Less complicated convergence at Elm St / 47th St	More complicated convergence in Elm St Park	Option 1
Capital Cost*	$15 million	$30 million	Option 1

*preliminary order-of-magnitude costs

Bethesda Purple Line Minor Master Plan Appendix – Capital Crescent Trail

Recommendation

The baseline condition for our evaluation of the two trail tunnel options was the planned Surface Route for the Capital Crescent Trail and the narrow 5 to 7 foot sidewalk adjacent to the Purple Line. We assessed what the operating conditions for existing and new trail users of that baseline facility would be and determined what incremental benefits would be available for each of the trail tunnel options. After completing that functional assessment, we assessed whether the benefits of each tunnel option would justify the costs.

For bicyclists using the Capital Crescent Trail, both Tunnel Option 1 and Tunnel Option 2 provide good benefits over the baseline condition, but the advantages vary for different user groups. For advanced and intermediate level cyclists who would likely use the Surface Route, the benefits are fewer and are due largely to travel time savings. For basic and child cyclists who might otherwise be deterred from using the trail, the benefits are greater and are due to travel time savings and avoiding an at-grade crossing at Wisconsin Avenue. Tunnel Option 2 is somewhat better than Tunnel Option 1 for bicyclists. The major concern with Option 2 – personal security – is less critical for the cyclists than for pedestrians. Personal security only becomes an issue during periods of low usage. Since cyclists would have the option of using the surface route during these low usage times, it may not be accurate to weigh this issue so negatively for all of users. On the other hand, the average cyclists will be able to travel through the tunnel in about 30 seconds, faster than they would be able to do on the surface route.

For pedestrians using the Capital Crescent Trail, both Tunnel Option 1 and Tunnel Option 2 provide important benefits over the baseline condition, such as a faster travel time, conflicts at driveways and minor roadway intersections, and conflicts at the MD355 intersection. Either tunnel alternative would attract cyclists, thereby decreasing potential conflicts with pedestrians queuing at the MD355 intersection, as well as along the shared use path segment along 47th Street. But because both tunnel options have drawbacks - the 8% grade for Tunnel Alternative 1 and the tunnel length and curve for Tunnel Alternative 2 - and because the Surface Route as currently conceived provides a high quality alternative for many trail users, the benefits of the tunnel options as currently conceived are moderate for pedestrians. Tunnel Option 1 is somewhat better than Tunnel Option 2 for pedestrians, due to the longer tunnel that may deter some pedestrians using it, especially at night and other low-demand periods.

The problem is that while the surface route that is planned would have almost the best accommodation that can be achieved in an urban context, absent a separate right-of-way, it involves more potential conflict than is typical with the rest of the Capital Crescent Trail. From a regional trail perspective, the surface route alone falls short for basic and child cyclists, who may be deterred from using a trail that crossings a major highway. The only way to eliminate those deficiencies is to build a tunnel, an expensive option whose value must be judged in terms of not only how many users' experience would be improved, but also by how many users would no longer perceive the experience as being substandard. Tunnel Option 2 is somewhat better than Tunnel Option 1 for cyclists, but Tunnel Option 1 is somewhat better than Tunnel Option 2 for pedestrians, and both options are better than the baseline. Both options have drawbacks that will limit the benefit for users and that would continue to be perceived by some users as having a substandard experience. However, if Option 1 can be widened to

16 feet and if the grade can be reduced to below 5 percent, Option 1 would become an excellent connection and would justify the costs. At this time it appears the only way to reduce the grade of the trail without major impacts to Elm Street Park is to close the commercial driveway on the south side of Elm Street and relocate the 10 parking spaces somewhere else. In the longer term, with redevelopment, it may be possible to eliminate the parking lot altogether.

Bethesda Purple Line Minor Master Plan Appendix – Bethesda South Entrance

Bethesda South Entrance Project

The concept plan for the Bethesda South Entrance project includes two high-speed elevators that travel between Elm Street and the Red Line and four high-speed elevators that travel between the Purple Line and the Red Line. The alternative station design includes five high speed elevators within the Apex Building site that travel between Wisconsin Avenue and the Red Line. According to MTA, none of the elevators stop at the Purple Line level in the alternative station design because this would degrade the level of service for Red Line customers, and the constraints of the site would require passengers to cross the light rail tracks. However, this will require all passengers transferring between the Purple Line and the Red Line to first travel up to street level and then descend back into the station – an inconvenience that will create additional congestion at street level. On balance, we believe that a direct elevator connection between the Purple Line and Red Line should be retained for the following reasons:

Level of Service for Red Line Customers: Table 3 shows the number of boardings and alightings for the Metrorail Red Line, the Purple Line, and transfers between the Red Line and Purple Line, for both the existing Bethesda North Station (located at Wisconsin Ave and Old Georgetown Road) and the planned Bethesda South Station. According to the *Bethesda Station South Entrance Alternate Station Concept (07/23/13) Elevator Simulation Calculations* report, there will be more Red Line passengers at the South Entrance that transfer to and from the Purple Line than do not transfer to and from the Purple Line. And since the inconvenience to Red Line passengers that must go out of their way to transfer to and from the Purple Line is likely to be greater than the inconvenience to Red Line passengers who are delayed because the elevators make an additional stop, at least some of the elevators should either make an additional stop at the Purple Line station, or travel just between the Red Line station and the Purple Line station. This analysis should be confirmed by a travel time study for Red Line passengers and pedestrian level of service study.

Pedestrian Crossings of Purple Line Tracks: One of the benefits of light rail compared to heavy rail is that pedestrians can walk across the tracks. In fact, pedestrians are permitted to walk across the tracks at most Purple Line stations, including the Bethesda station in the concept plan. While the Bethesda station has higher passenger volumes than other stations, it is not uncommon for pedestrians to cross the tracks at other high volume stations light trail lines.

Table 3: 2030 Daily Ridership Summary

Daily		Metrorail Bethesda Station		Purple Line Bethesda Station		Transfers Between Metrorail and Purple Line		Total Access Demand (excludes transfers)					
	Entrance	Boardings	Alightings	Boardings	Alightings	From Metro to PL	From PL to Metro	Boardings	Alightings				
South Entrance with Purple Line	North	8,992	8,976	0	0	0	0	8,992	8,976				
	South	5,008	5,524	4,303	5,699	5,582	7,443	9,311	11,223				
	Total	14,000	14,500	4,303	5,699	5,582	7,443	18,303	20,199		Total		
						East - Elm/Wisconsin	65%	6,052	6,509	58%	12,561	61%	
						West - Woodmont	35%	3,259	4,714	42%	7,973	39%	

Source: *Bethesda Station South Entrance Alternate Station Concept (07/23/13) Elevator Simulation Calculations*

Bethesda Purple Line Minor Master Plan Appendix – Traffic Analysis

Traffic Analysis

A traffic analysis was conducted for the Bethesda Purple Line Station area that focused on five gateway intersections to Bethesda and two intersections immediately adjacent to the site. The analysis used traffic counts to evaluate existing congestion and the TRAVEL/3 regional model to evaluate 2040 congestion based on the likely growth under the existing master plan.

Because there are no subzones with a parcel specific evaluation of existing and future land use for the entire TAZ, we have to make assumptions on the relationship between the existing and approved development in the TAZ and the Round 8.0 2040 land use forecast. More specifically, we have to give some thought to what was assumed for the site in the development of the Round 8.0 2040 land use forecast.

If we assume that the existing and approved land use for the site (Apex, JBG, Federal Realty) is close to what was assumed in the Round 8.0 2040 land use forecast for development for the site (i.e., there is no "space" or "room" for additional development for the site within the Round 8.0 2040 land use forecast) and then we add the difference attributable to any master plan "build out" (the theoretical maximum under any eventual proposed zoning in this Minor Master Plan Amendment) for the site, we get the "High Estimate" (or most traffic) scenario.

If we assume instead that the Round 8.0 2040 land use forecast for the TAZ is more representative of a scenario where the site develops close to build-out instead of the "existing and approved" (i.e., there is "space" or "room" for the additional development for the site within the Round 8.0 land use forecast) and then we add the difference attributable to any master plan "build-out" (the theoretical maximum under any eventual proposed zoning in this Minor Master Plan Amendment) for the site, we get the "Low Estimate" (or less traffic) scenario.

It should be noted that it is unlikely the eventual development would equate to the theoretical maximum available under the proposed zoning and that the transit mode share inherent in the trip rates is representative of the Metro Station Policy Area overall and not a specific development located at the convergence of the Red Line and Purple Line. For these reasons, it likely the more applicable congestion results are closer to the lower end of the range provided by this initial analysis. For both scenarios the additional traffic was then assigned to the road network. The resulting Critical Lane Volume (CLV) and Highway Capacity Manual (HCM) analysis are shown for each intersection below. Of the seven intersections evaluated in this plan, three exceed the congestion standards and could require mitigation.

Intersection of Wisconsin Avenue / East-West Highway / Old Georgetown Road
This intersection is below the 1800 CLV standard for the Bethesda CBD in all scenarios, but in the 2040 Master Plan High Estimate scenario it exceeds the 1.13 HCM standard during the AM and PM peak hours. To bring this intersection within an acceptable level of congestion would require:

- Converting the existing northbound left/through lane to a left lane

Intersection of Wisconsin Avenue / Bradley Blvd

This intersection is below the 1800 CLV standard except in the 2040 Master Plan High Estimate during the PM peak hour and the 1.13 HCM standard in all future scenarios for the AM and PM peak hours. To bring this intersection within an acceptable level of congestion would require:

- Add a second northbound left turn lane
- Converting the existing eastbound through lane to a left/through lane
- Converting the existing westbound left lane to a left/through lane

Adding a second northbound left turn lane would require road widening.

Intersection of Bradley Blvd / Arlington Road

This intersection is below the 1800 CLV standard in all scenarios. It exceeds the 1.13 HCM standard for the PM peak hour in the existing scenario and the AM and PM peak hours in all future scenarios. To bring this intersection within an acceptable level of congestion would require:

- Convert the existing southbound left/through lane into a through lane and add a left turn lane

In addition, to accommodate traffic forecasts for the Master Plan High Estimate would require dynamic lane use:

- Southbound Direction
  - AM peak lane configuration is left, through/right
  - PM peak lane configuration is left, through, right
- Eastbound Direction
  - AM peak lane configuration is left, left, through, through/right
  - PM peak lane configuration is left, through, through, through/right

Since we expect the congestion results to be closer to the "Low Estimate" than the "High Estimate", dynamic lane use is unlikely to be needed.

Intersection of Wisconsin Avenue / East-West Highway / Old Georgetown Road

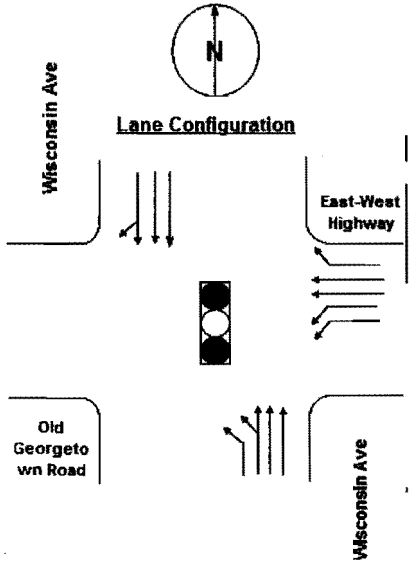
Land Use Scenario	Critical Lane Volume			HCM		
	CLV	V/C Ratio	Level of Service	Delay (sec)	V/C Ratio	Level of Service
Existing	1237 (1321)	0.77 (0.83)	C (D)	41.0 (44.7)	0.94 (0.98)	D (D)
2040 Existing & Approved	1473 (1446)	0.92 (0.90)	E (D)	86.4 (63.4)	1.10 (1.12)	E (E)
2040 Master Plan Low Estimate	1488 (1486)	0.93 (0.93)	E (E)	88.2 (65.9)	1.11 (1.13)	F (E)
2040 Master Plan High Estimate	1615 (1654)	1.01 (1.03)	F (F)	120.1 (95.5)	1.20 (1.22)	F (F)
2040 Master Plan High Estimate with Improvements (1)	1449 (1314)	0.91 (0.82)	D (D)	59.6 (44.2)	1.05 (0.97)	E (D)

** AM (PM) = exceeds standard for Bethesda CBD

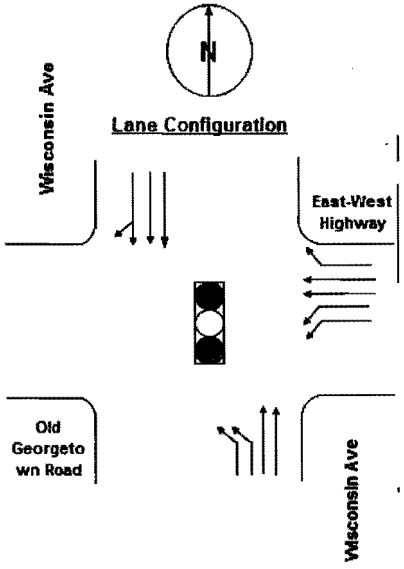
Improvements

(1) Northbound Direction: Revise lane configuration from Left, Left/Through, Through, Through to Left, Left, Through, Through

Existing:



Improvements #1:



Intersection of Wisconsin Avenue / Bradley Blvd

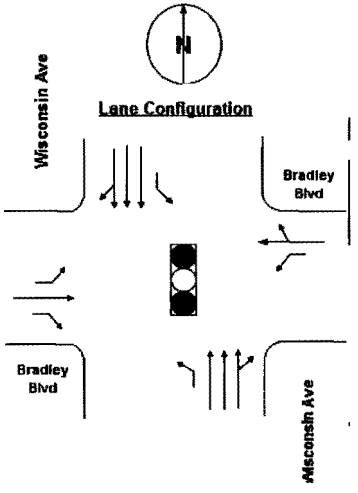
Land Use Scenario	Critical Lane Volume			HCM		
	CLV	V/C Ratio	Level of Service	Delay (sec)	V/C Ratio	Level of Service
Existing	1319 (1414)	0.82 (0.88)	D (D)	34.6 (48.0)	0.92 (1.00)	D (D)
2040 Existing & Approved	1605 (1665)	1.00 (1.04)	F (F)	72.1 (84.2)	**1.16 (1.30)**	E (F)
2040 Existing & Approved with Improvements (1)	1443 (1420)	0.90 (0.89)	D (D)	79.2 (78.9)	1.06 (1.04)	E (E)
2040 Master Plan Low Estimate	1622 (1683)	1.01 (1.05)	F (F)	76.2 (87.6)	**1.17 (1.32)**	E (F)
2040 Master Plan Low Estimate with Improvements (1)	1458 (1433)	0.91 (0.90)	E (D)	82.7 (80.9)	1.06 (1.04)	F (F)
2040 Master Plan High Estimate	1729 (1831)	**1.08 (1.14)**	F (F)	101.1 (133.3)	**1.44 (1.38)**	F (F)
2040 Master Plan High Estimate with Improvements (1)	1524 (1513)	0.95 (0.95)	E (E)	99.4 (120.1)	1.08 (1.13)	F (F)

** AM (PM) = exceeds standard for Bethesda CBD

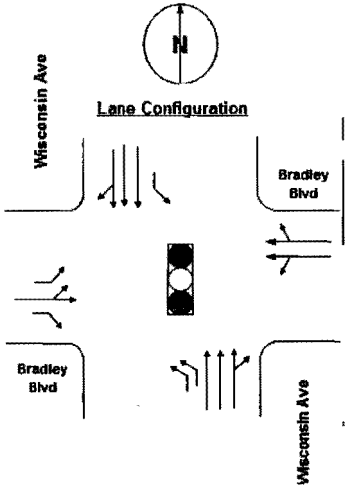
Improvements

(1) Northbound Direction: add 2nd left turn lane
Eastbound Direction: Revise lane configuration from Left, Through, Right to Left , Left/Through, Right
Westbound Direction Revise lane configuration from Left , Through/Right to Left/Through, Through/Right

Existing:



Improvements #1:



Intersection of Bradley Blvd / Arlington Road

Land Use Scenario	Critical Lane Volume			HCM		
	CLV	V/C Ratio	Level of Service	Delay (sec)	V/C Ratio	Level of Service
Existing	939 (1238)	0.59 (0.77)	A (C)	65.5 (129.3)	0.95 (1.32)	E (F)
2040 Existing & Approved	1145 (1485)	0.72 (0.93)	B (E)	84.1 (180.8)	1.15 (1.59)	F (F)
2040 Existing & Approved with Improvements (1)	1343 (1391)	0.84 (0.87)	D (D)	81.2 (77.8)	1.09 (1.10)	F (E)
2040 Master Plan Low Estimate	1150 (1487)	0.72 (0.93)	B (E)	84.7 (180.9)	1.15 (1.59)	F (F)
2040 Master Plan Low Estimate with Improvements (1)	1348 (1393)	0.84 (0.87)	D (D)	81.3 (78.2)	1.09 (1.10)	F (E)
2040 Master Plan High Estimate	1217 (1595)	0.76 (1.00)	C (E)	96.7 (213.4)	1.17 (1.71)	F (F)
2040 Master Plan High Estimate with Improvements (1&2)	1263 (1414)	0.79 (0.88)	C (D)	85.3 (85.7)	1.08 (1.13)	F (F)

** AM (PM) = exceeds standard for Bethesda CBD

Improvements

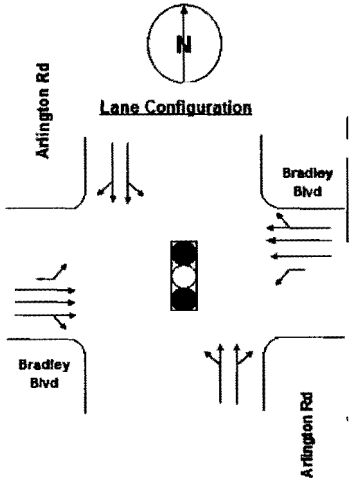
(1) Southbound Direction: Revise land configuration from Left/Through, Through/Right to Left, Through, Through/Right

(2) Dynamic Lane Use:

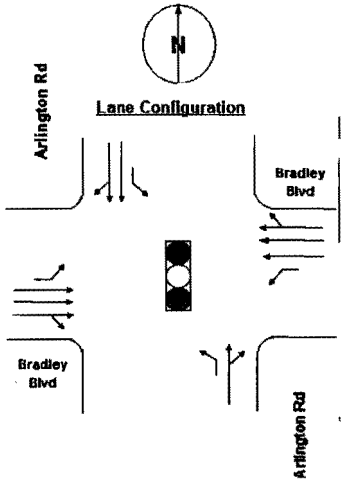
Southbound Direction: AM peak lane configuration is left, through/right; PM peak lane configuration is left, through, right

Eastbound Direction: AM peak lane configuration is left, left, through, through/right; PM peak lane configuration is left, through, through, through/right

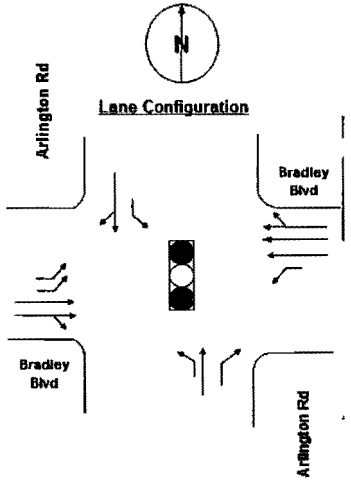
Existing:



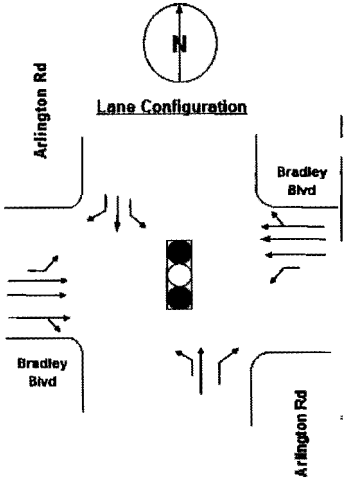
Improvements #1:



Improvements #2 (AM Peak):



Improvements #2 (PM Peak):



Intersection of Wisconsin Avenue / Montgomery Lane

Land Use Scenario	Critical Lane Volume			HCM		
	CLV	V/C Ratio	Level of Service	Delay (sec)	V/C Ratio	Level of Service
Existing	1050 (998)	0.66 (0.62)	B (A)	17.2 (17.7)	0.80 (0.78)	B (B)
2040 Existing & Approved	1140 (1254)	0.71 (0.78)	B (C)	22.1 (23.8)	0.84 (0.91)	C (C)
2040 Master Plan Low Estimate	1155 (1260)	0.72 (0.79)	C (C)	22.6 (24.4)	0.84 (0.91)	C (C)
2040 Master Plan High Estimate	1176 (1400)	0.74 (0.87)	C (D)	25.3 (60.2)	0.89 (1.02)	C (E)

** AM (PM) = exceeds standard for Bethesda CBD

Intersection of Wisconsin Avenue / Elm Street / Waverly Street

Land Use Scenario	Critical Lane Volume			HCM		
	CLV	V/C Ratio	Level of Service	Delay (sec)	V/C Ratio	Level of Service
Existing	784 (942)	0.49 (0.59)	A (A)	4.5 (5.9)	0.57 (0.72)	A (A)
2040 Existing & Approved	1059 (1136)	0.66 (0.74)	B (C)	8.9 (11.0)	0.74 (0.86)	A (B)
2040 Master Plan Low Estimate	1063 (1193)	0.66 (0.75)	B (C)	9.0 (11.2)	0.75 (0.87)	A (B)
2040 Master Plan High Estimate	1191 (1367)	0.74 (0.85)	C (D)	12.8 (27.5)	0.83 (1.01)	B (C)

** AM (PM) = exceeds standard for Bethesda CBD

Intersection of Wisconsin Avenue / Bethesda Avenue / Willow Lane

Land Use Scenario	Critical Lane Volume			HCM		
	CLV	V/C Ratio	Level of Service	Delay (sec)	V/C Ratio	Level of Service
Existing	757 (808)	0.47 (0.50)	A (A)	15.3 (24.2)	0.55 (0.66)	B (C)
2040 Existing & Approved	966 (1007)	0.60 (0.63)	A (B)	13.4 (22.6)	0.73 (0.79)	B (C)
2040 Master Plan Low Estimate	979 (1012)	0.61 (0.63)	A (A)	13.7 (22.6)	0.74 (0.82)	B (C)
2040 Master Plan High Estimate	1149 (1351)	0.72 (0.84)	B (D)	21.8 (48.9)	0.83 (1.13)	C (D)

** AM (PM) = exceeds standard for Bethesda CBD

Intersection of Old Georgetown Road / Woodmont Avenue

Land Use Scenario	Critical Lane Volume			HCM		
	CLV	V/C Ratio	Level of Service	Delay (sec)	V/C Ratio	Level of Service
Existing	974 (1088)	0.61 (0.68)	A (B)	15.2 (30.4)	0.73 (0.84)	B (D)
2040 Existing & Approved	1175 (1153)	0.73 (0.72)	C (C)	23.9 (31.1)	0.90 (0.86)	C (C)
2040 Master Plan Low Estimate	1177 (1157)	0.74 (0.72)	C (C)	24.6 (31.4)	0.92 (0.87)	C (C)
2040 Master Plan High Estimate	1257 (1204)	0.79 (0.75)	C (C)	34.9 (35.0)	0.98 (0.90)	C (C)

** AM (PM) = exceeds standard for Bethesda CBD