Appendix E:
Transportation

This appendix summarizes the methodology and analysis behind recommendations included in the Bethesda Downtown Sector Plan. Those recommendations are intended to promote a safe and efficient multimodal transportation system through "Complete Streets" principles that encourage equitable roadway utilization by all modes of transportation. It is anticipated that an enhanced multimodal transportation network, resulting from this Plan's recommendations, will help meet future transportation demand in Bethesda. In order to achieve this goal, transportation recommendations included in the Downtown Plan focus on strategic improvements to existing transportation infrastructure and expansion of transit options as a means of improving connectivity and mobility through the horizon year (2040) of this transportation analysis.

DRAFT
Bethesda Downtown Sector Plan
Transportation Appendix
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Introduction

This appendix summarizes the methodology and analysis behind recommendations included in the Bethesda Downtown Sector Plan. Those recommendations are intended to promote a safe and efficient multimodal transportation system through "Complete Streets" principles that encourage equitable roadway utilization by all modes of transportation. It is anticipated that an enhanced multimodal transportation network, resulting from this plan's recommendations, will help meet future transportation demand in Bethesda. In order to achieve this goal, transportation recommendations included in the Downtown plan focus on strategic improvements to existing transportation infrastructure and expansion of transit options as a means of improving connectivity and mobility through the horizon year (2040) of this transportation analysis.

Sector Plan Study Area and Plan Boundary

The sector plan boundary was formally established by the Planning Board at the outset of this planning process and confirms the previously adopted 1994 Bethesda Central Business District Sector Plan and subsequent 2006 Woodmont Triangle Amendment boundaries as the boundary of the Bethesda Downtown Sector Plan. Since traffic congestion represents a regional issue that extends beyond the plan's boundaries, the Bethesda Downtown Sector Plan transportation analysis encompasses an area beyond the sector plan boundary, generally comprised of the transportation analysis zones[1] (TAZs) within and contiguous to the plan boundary (Figure 1). Definition of the study area is an important first step in establishing the interface between the regional transportation model and the sector plan specific local area transportation analysis. The more detailed local area transportation analysis is conducted on the roadway network within the sector plan boundary.

At a more refined level of detail, the sector plan boundary represents the geographic area that is the focus of the sector plan's land use recommendations. Within the sector plan area, land use recommendations are focused into "Character Districts," defined by the Urban Design team, with discrete height, density, and land use recommendations. The local area transportation analysis reflects these character districts by dividing each TAZ into subzones (Figure 2) that represent areas of similar land use and density within Downtown Bethesda. Each of the subzones is included within one of the three TAZs within the sector plan area. Further discussion of the traffic analysis methodology, using the MWCOG model and NCHRP post processing is discussed later in this appendix.

[1] TAZs are the unit of geography most commonly used in conventional transportation planning forecasting models. While the size of a zone may vary, individual zones may reflect unique attributes with respect to land use, natural barriers (e.g., streams), and infrastructure (roadways, metro stations, etc.). TAZs are defined by the Metropolitan Washington Council of Governments.

Figure 1: Sector Plan Transportation Study Area and Plan Boundary

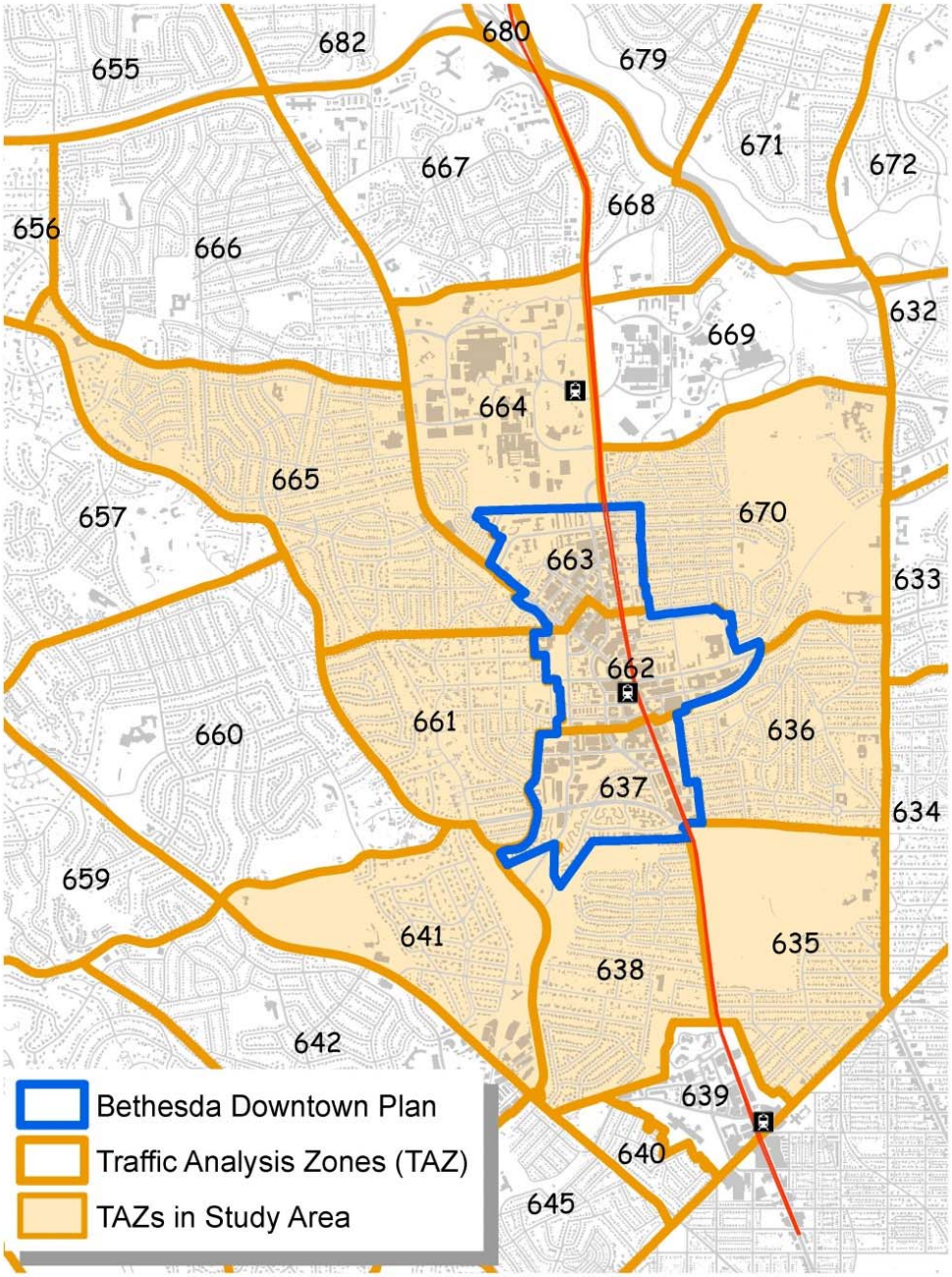
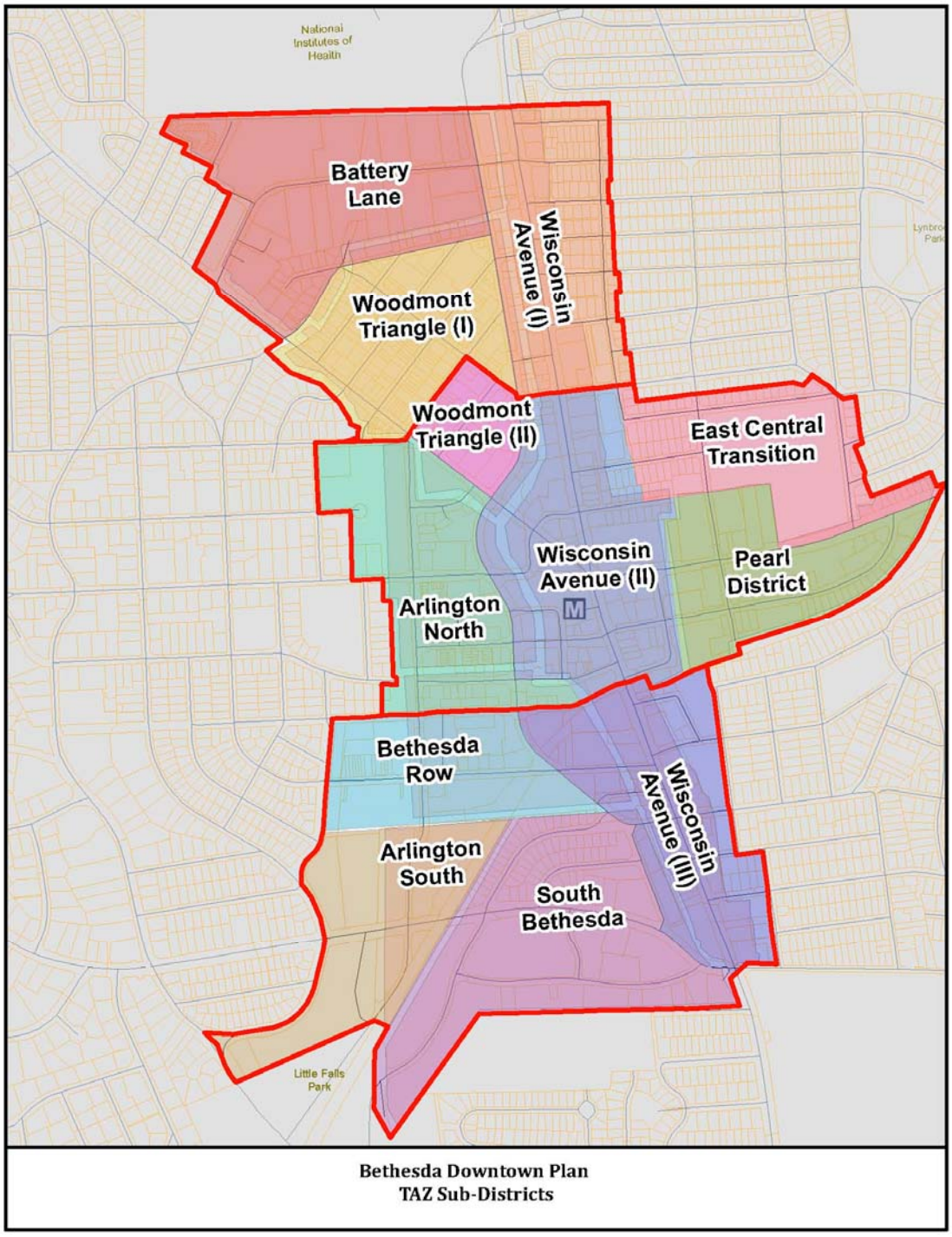


Figure 2: Sector Plan Study Area with Sub-TAZ Boundaries



Subdivision Staging Policy/ Transportation Capacity

Analysis of the proposed sector plan development and its potential impact upon the transportation network considers three levels of transportation analysis:

- **Area wide mobility analysis**: An indication of the degree to which any particular local land use and transportation scenario provides an appropriate balance between land use and transportation per current County policies. This analysis is completed through the Transportation Policy Area Review.
- **Intersection congestion analysis**: An indication of the degree to which the sector plan land use and transportation network affects congestion hot-spots within the Bethesda Downtown plan boundary and the extent to which the intersection performance falls within the Policy Area standard. This analysis is completed through the Local Area Transportation Review.
- **Cordon line analysis**: A demonstration of the relative amount of through traffic vs. local traffic.

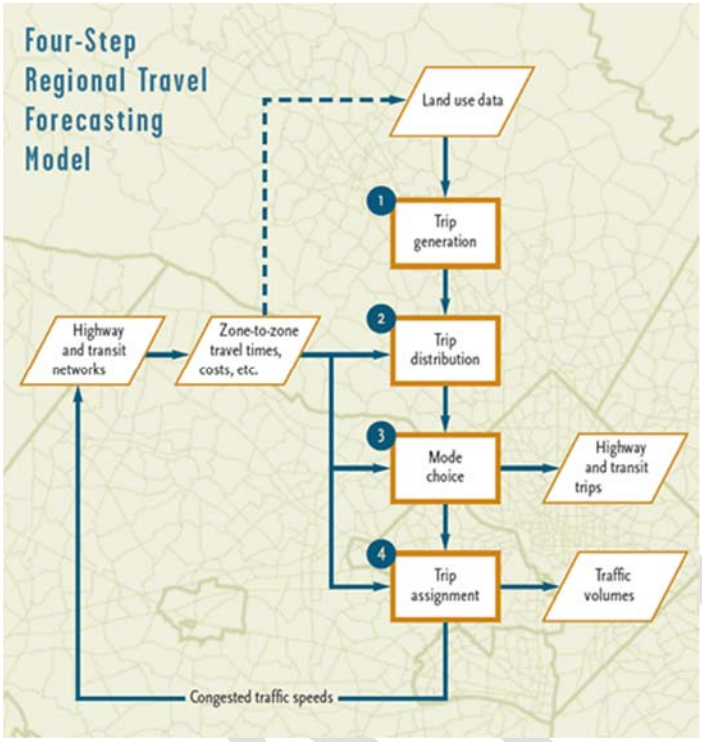
The first two measures described above are elements of the County's Subdivision Staging Policy – Transportation Policy Area Review (TPAR) and Local Area Transportation Review (LATR) – and are summarized below. Detailed background information on the methodology and process related to these two reviews as applied under current policy is available on the Department's website, www.montgomeryplanning.org.

Travel Forecasting Methodology

The travel demand forecasting process is based on the Planning Department's regional travel demand forecasting model, which is used to forecast travel demand results for weekday travel and evening peak periods. This tool is a four-step model (figure 3), consisting of:

- Trip generation: the number of person trips that are generated by given types and densities of land uses within each TAZ.
- Trip distribution: how many person trips generated by each TAZ will travel to each of the other TAZs within the metropolitan area.
- Mode split: which mode of travel the person trips will use, including single-occupant auto, multiple-occupant auto, transit, or a non-motorized mode such as walking or bicycling.
- Traffic assignment: the roadways that will be used for vehicular travel between TAZs.

Figure 3: Four Step Travel Model



The regional travel demand forecasting model incorporates land use and transportation assumptions for the metropolitan Washington region, using the same algorithms as applied by the Metropolitan Washington Council of Governments (MWCOG) for air quality conformity analysis.

The regional travel demand forecasting model provides system-level results that are used directly to obtain TPAR forecasts as described in the County's Subdivision Staging Policy. The system-level results are also used as inputs to the finer grain analytic tools described below. The second level of analysis consists of post processing techniques applied to the regional travel demand model forecasts, as described in NCHRP Report 765. These techniques include refining the morning and evening peak hour forecasts to reflect a finer grain of land use and network assumptions than included in the regional model, such as the location of local streets and localized travel demand management assumptions. The NCHRP 765 analyses are used to produce the cordon line analyses. The third level of analysis includes intersection congestion, using the Critical Lane Volume (CLV) methodology described in the Department's *Transportation Policy Area Review / Local Area Transportation Review Guidelines* (TPAR/LATR).

Regional Travel Demand Model Forecasting Assumptions

The Bethesda Downtown Sector Plan forecasts assumed the following parameters:

- A 2040 horizon year. This is currently the most distant horizon year for which forecast land use and transportation system development is available.
- Regional growth per the MWCOG Round 8.1 Cooperative Forecast.
  - For the Washington region, the Round 8.1 forecasts include an increase from 4.0 million jobs and 2.5 million households in 2010 to 5.6 million jobs and 3.4 million households in 2040.

  - For Montgomery County, the Round 8.1 forecasts include an increase from 510,000 employees and 361,000 households in 2010 to 737,000 employees and 460,000 households in 2040.
- Transportation improvements in the region's Constrained Long Range Plan (CLRP), a fiscally constrained transportation network. Notable projects assumed to be in place for the build-out of the Bethesda Downtown Plan include:
  - elimination of the WMATA turnback at Grosvenor
  - the Purple Line between Bethesda and New Carrollton
  - HOV lanes on I-95 between the ICC and MD 198
  - express toll lanes on I-270 from I-370 to the city of Frederick

Local Area Transportation Analysis Process and Assumptions

This process uses NCHRP Report 765 techniques to convert the regional travel demand model system level forecasts to intersection-level forecasts. The process is then used as a pivot-point technique to reflect changes to the localized land use or transportation network, providing both cordon line and network analysis results. The regional travel demand model represents the Bethesda Downtown Sector Plan study area as three transportation analysis zones (TAZs). The Bethesda Downtown local area transportation analysis disaggregates the Plan area overlapping these three TAZs into twelve subzones based on block groupings separated by major roads within the Plan area boundary.

Transportation Policy Area Review (TPAR) Methodology

Since the early 1980s, every master plan has considered the balance between land use and transportation using an assessment of area-wide conditions forecast for the plan's end-state conditions. TPAR is the current measure of area-wide transportation adequacy, introduced into the County Subdivision Staging Policy in 2012. It is similar in nature to the Policy Area Mobility Review (PAMR) measure that was an element of the Growth Policy from 2007 to 2012. Staff notes that the Subdivision Staging Policy (SSP) was being updated during the same time period the Bethesda Downtown Plan was prepared, however, the 2012 SSP was the guiding document during the Sector Plan Process.

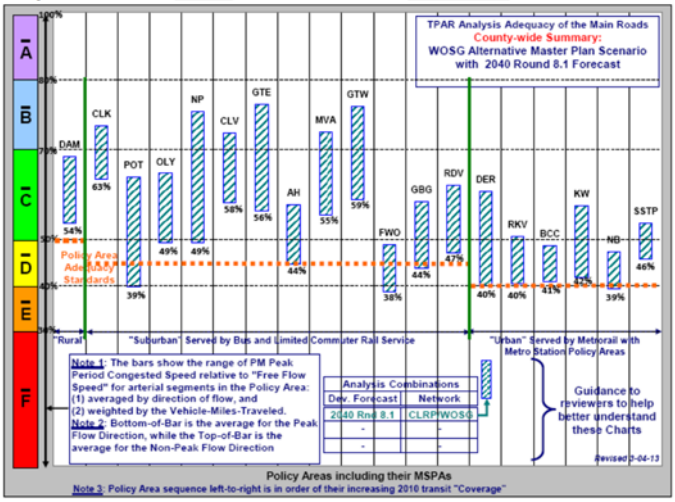
In the regulatory context, TPAR is used to implement the Adequate Public Facilities Ordinance (APFO) to forecast conditions by considering the County's ten year forecast of development and transportation system improvements for which funding is anticipated during the next ten years. TPAR continues the County's long-standing policy that higher levels of roadway congestion are appropriate in areas with higher quality transit service. This provides multi-modal equity across the County and promotes the development of pedestrian-oriented, rather than auto-oriented, improvements in Metro Station Policy Areas.

The TPAR test evaluates the forecasted speed of travel of each arterial road, excluding interstates, within the policy area in its peak direction of travel (as derived from the regional transportation demand model) against uncongested, "free flow" speed, and weight-averages the results of all arterials in a policy area by vehicle miles of travel (VMT). The ratio of forecasted speed to uncongested speed is consistent with the type of analysis recommended by the Transportation Research Board's *Highway Capacity Manual (HCM*).

The Subdivision Staging Policy's roadway adequacy standard for the Bethesda Chevy Chase (BCC) Policy Area (which includes the smaller Bethesda CBD Policy Area) is a minimum 40 percent ratio of

forecast speed relative to uncongested speed (mid-point of Level of Service "D"). A ratio that is lower than this standard is considered to be inadequate. This ratio is measured over the entirely of the Bethesda Chevy Chase Policy Area of which the Bethesda CBD Policy Area represents a relatively small portion. The Countywide land use estimates assumed as background for the TPAR analysis performed in support of the recently adopted White Oak Science Gateway Plan included the build-out of the currently adopted plans in the BCC area by the year 2040. These results are depicted in Figure 4 and show that average congested roadway speed will be 41% of uncongested speed in the BCC policy area. This result is just above the 40% roadway adequacy threshold for the policy area. As noted above, the additional development reflected in the Vision scenario for the Bethesda Downtown area represents a relatively small portion of the total development in the much larger BCC policy area (upon which the TPAR analysis is based). It should also be noted that the current estimated residential non-auto driver mode share (NADMS) in the sector plan area exceeds 50% without the presence of the Purple Line. It is reasonable to expect that this level of transit usage will only be enhanced with the presence of the Purple Line which is assumed as a key element of the transit network used in support of the 2040 TPAR analysis. This recognition supports the position that the additional development reflected in the Vision scenario for the Bethesda Downtown area would not cause the BCC policy area to fall below the roadway adequacy threshold for urban policy areas (i.e., 40% ratio of forecast speed relative to uncongested speed).

Figure 4: Countywide TPAR Analysis Results



The following notes should be used in support of interpreting the results provided in Figure 4:

- The vertical "aqua blue/green-hatched" bars show the range of the average of roadway speeds by direction of travel in relation to the "free flow speed", or level of service (LOS), for each Policy Area in the PM peak period.
- The bottom of the bar shows the average speed LOS in the peak direction of travel. The top of the bar shows the average speed LOS in the non-peak direction.
- The measurement scale weighted average LOS, A through F, is shown on the left side of the chart.
- Horizontal dotted orange lines are shown to depict the roadway adequacy standards (LOS) for the Rural, Suburban and Urban with Metrorail Policy Areas, from left to right, which graphically corresponds to the Standards of Adequacy depicted in the table above.

Local Area Transportation Review (LATR) Methodology

As previously noted, the intersection analysis conducted in support of this Plan applies the Critical Lane Volume (CLV) methodology from the Department's Local Area Transportation Review (LATR) Guidelines. The CLV values are converted to a volume-to-capacity measurement, or V/C ratio, by dividing the current or forecasted CLV values by the applicable policy area congestion standard.

As depicted in Figure 5 and shown in Table 1, the County's Subdivision Staging Policy establishes acceptable levels of congestion for different policy areas based on the degree to which alternative modes of transportation are available. In rural policy areas, where few alternatives to auto transport exist, the congestion standard is 1,350 CLV (which equates to the middle range of LOS D). In Metro Station Policy Areas, where multiple alternatives to auto transport are provided, the congestion standard is 1,800. Currently, intersections in the Bethesda Downtown sector plan area, which is contiguous with the Bethesda CBD Policy Area, have a congestion standard of 1,800 CLV.

Figure 5: Intersection Congestion Standards by Policy Area

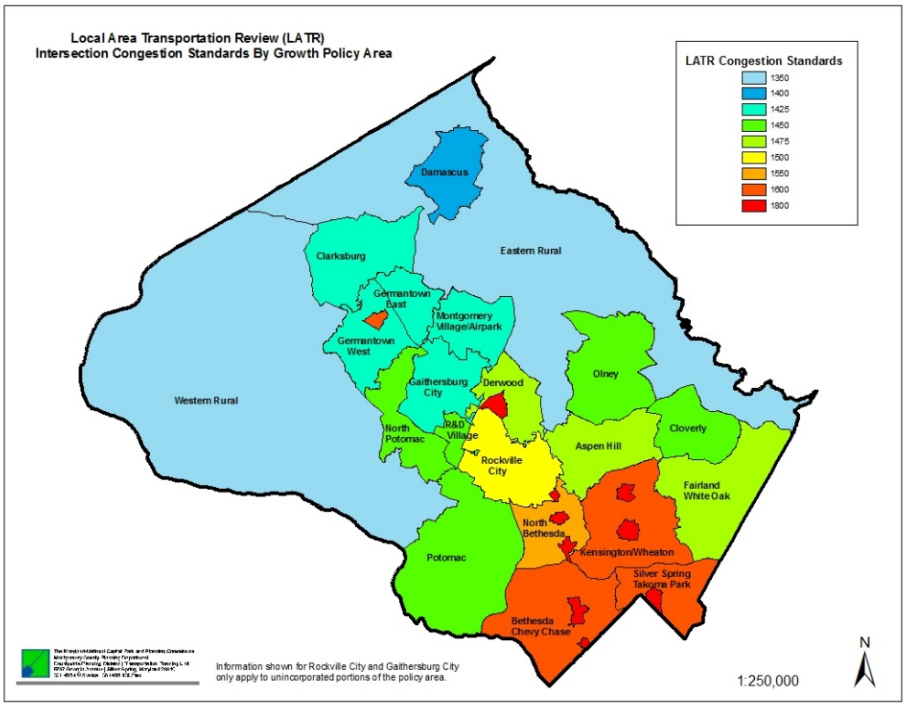


Table 1: Critical Lane Volume/ Volume-to-Capacity Congestion Thresholds by Policy Area

CLV Congestion Standards	***Volume to Capacity Equivalent***	***Policy Area***
1800	***1.13***	***Central Business Districts/Metro Station Locations: Bethesda, Silver Spring, Friendship Heights, Wheaton, Glenmont, White Flint, Grosvenor, Shady Grove, Twinbrook, Rockville Town Center***
1600	*1.0*	*Bethesda/Chevy Chase, Silver Spring/Takoma Park, Kensington/Wheaton, Germantown Town Center*
1550	*0.97*	*North Bethesda*
1500	*0.94*	*Rockville City*
1475	*0.92*	*Fairland/White Oak, Aspen Hill, Derwood*
1450	*0.91*	*Cloverly, Olney, Potomac, North Potomac, R&D Village (R&D Village includes Great Seneca Science Corridor Master Plan)*
1425	*0.89*	*Clarksburg, Germantown West, Germantown East, Montgomery Village/Airpark, Gaithersburg City*
1400	*0.88*	*Damascus*
1350	*0.84*	*Rural East, Rural West*

Traffic Analysis Methodology[2]

Traffic analysis completed in support of this master plan assessed intersection system performance for the 2040 master plan vision, using the regional Metropolitan Washington Council of Governments (MWCOG) travel demand model, Transportation Research Board (TRB) National Cooperative Highway Research Program (NCHRP) 765 post-processing assessments, and Critical Lane Volume (CLV)/Highway Capacity Manual (HCM) techniques as generally used to implement the County's Adequate Public Facilities Ordinance (APFO) as described in the Planning Board's *Local Area Transportation Review / Transportation Policy Area Review (LATR/ TPAR) Guidelines*.

The Bethesda Central Business District (CBD) has a long history of examining congested intersections as part of an overall approach to transportation land use balance, including the 1994 Bethesda CBD Plan, the staging analysis for the 1994 Sector Plan, and the 2006 Woodmont Triangle Plan. In each of these plans, the assessment of intersection congestion has been one element of a multimodal approach to balancing mobility, accessibility, and quality of life. The tenets described below in conjunction with the current Bethesda Downtown Plan analysis are not new to this planning effort. Each of the prior plans has balanced the examination of quantitative traffic delays with a qualitative policy assessment that mobility needs in the Bethesda vicinity are most effectively addressed through travel demand management (TDM) strategies. A key element of the transportation capacity analysis is to demonstrate the level and types of investment needed to achieve APFO objectives. This analysis often indicates that forecasted intersection congestion beyond the appropriate standard may ultimately be acceptable due to the high levels of capital cost or community/environmental impact associated with capital improvements. Similarly, analyses often indicate that, due to latent demand, increased capacity (whether for autos or transit riders) will result in some travelers making longer trips, reducing the effectiveness of the investment if evaluated by capacity-based or delay-based measures.

The current Bethesda Downtown Plan recognizes that increasing land use density and diversity (through an increase in residential development in a job-oriented activity center) improves efficiency for localized travel options. More destinations lead to greater accessibility which provides more opportunity for walk/bike trips and shorter vehicle trips. Greater development density also increases property values, leading to increased prices for parking which helps incentives non-auto travel, particularly the use of transit for longer trips.

Increased density does also lead to more total travel demand (even if at lower levels per capita), which tends to result in additional congestion. From a policy perspective, the Bethesda CBD 1800 CLV standard (a LOS F) recognizes that overall auto travel is not a high priority in the CBD relative to transit and non-motorized travel. The adjacent Bethesda-Chevy Chase Policy Area CLV standard of 1600 is set at the LOS E/F threshold, which is where the greatest motor vehicle throughput occurs, recognizing the importance of system capacity rather than the convenience of less auto delay in the more urban, downcounty portions of Montgomery County. While the policy priority is clearly oriented towards non-auto modes of travel, congestion management remains a policy interest, in part due to the higher value of time associated with many goods movement and deliveries and the need to keep moving the many transit vehicles that operate in mixed traffic.

[2] Intersection analysis and traffic modeling completed by Renaissance Planning Group and Parsons Transportation Group: Final Draft June 18, 2015.

The Bethesda CBD has a fairly robust street grid, developed prior to World War II, which allows traffic to disperse across several routes to reach destinations within or across the CBD. The problems related to congestion are generally between the Bethesda CBD and the Capital Beltway (I-495) where that street grid ends and communities are more auto-dependent.

In summary, the current Bethesda Downtown Plan shares many characteristics with its policy predecessors:

- The scale of proposed growth is generally in line with prior planning efforts for 1992/1994 Plans and subsequent limited plan amendments; with slight increases in total density that would increase congestion offset with greater diversity (a lower jobs-to-housing ratio) that reduces congestion
- Downtown streets will generally work within congestion standards
- Intersections forecasted to exceed the applicable APFO standard are outside the CBD; some minor capacity improvements at these locations are likely prudent, whereas identified solutions needed to meet APFO standards at the junctions of greatest concern may never be found cost-effective for implementation. The two intersections of note fitting this latter category include:
    - The junction of Rockville Pike (MD 355) and Cedar Lane where a proposed grade-separated interchange could ultimately be required in order to meet the current APFO standard.
    - Additional through lanes at Connecticut Avenue (MD 185) and East-West Highway (MD 410) would still be needed to reach APFO objectives.

Policy Considerations

This Appendix provides background information and context on selecting the right tools for managing Downtown Bethesda growth from a development capacity perspective.

This policy discussion will focus in several possible tools:

- Stronger TDM requirements help to reduce vehicle trips generated within the CBD. Establishing stronger non-auto driver mode share (NADMS) goals for work trips will not eliminate congestion problems; latent demand establishes the value of delay at a level higher than the current CLV standards. While TDM programs are most effective at addressing journey to work (JTW) travel they don't address traffic generated by other trip purposes. Like prior plans, this Plan appears generally in balance without additional TDM efforts above and beyond those that the marketplace brings. The goal for JTW NADMS should therefore be made more on the basis of general feasibility than on a mathematical balance. A 50% NADMS goal would provide a reasonable stretch from existing conditions to help improve transportation system efficiency, support multimodal improvements, and bring Bethesda in line with White Flint and Silver Spring, three centers of similar size and proximity to transit
- Transit improvements will be incorporated via the Purple Line light rail and Bus Rapid Transit (BRT) along MD 355
- Roadway capacity improvements would include retention of the MD 355/Cedar Lane interchange as feasible but expensive and the MD 185 / MD 410 improvements such as those incorporated in the Chevy Chase Lake Sector Plan. Other minor improvements described in this Appendix Paper have less cost or controversy.

Absent from the policy considerations described above is discussion of Master Plan Staging requirements. Staff finds that Master Plan staging is most appropriate in planning areas where the local transportation network is in transition and is awaiting major infrastructure improvements (e.g., Corridor Cities Transitway or multiple BRT corridors). In these areas of transition, the planned transportation infrastructure is often assumed a prerequisite to achieve the land use/transportation balance. In the case of Downtown Bethesda, an established urban area, future development is largely organic and supported by existing (and planned) infrastructure. Given the multimodal network and available transportation capacity, the plan area is considered to be "in balance" and not predicated on staging requirements. For these reasons, staff believes that Master Plan staging, as a tool for achieving balance outside of the Plan Area, could prove both counter-productive and likely ineffective – given the amount of through traffic and major traffic generators just beyond the plan area. It is worth noting that the County's Subdivision Staging Policy is currently undergoing review, a process that takes place every four years. One approach under review for ensuring balance is achieved in a systematic way through the life of a plan is to consider applying the White Flint pro-rata share model to discrete well defined areas like the Bethesda CBD. In general, the consensus at the staff level is that this approach has some merit but there are numerous details to yet be examined and the application to date (in White Flint and potentially in White Oak) are in areas where there is a significant planned transition – something that cannot be said (to the same extent) for the Bethesda CBD.

In addition to the policy tools discussed above, this Appendix also presents a sensitivity analysis of two potential transportation system elements that warrant further study:

- Removal of one-way streets
- Lane repurposing of 355 for BRT north of the Bethesda CBD from Jones Bridge Road to the Capital Beltway

In both cases, the analysis was limited to an evaluation of intersection congestion as a "sensitivity test" for the proposed operational changes. For both potential elements, the sensitivity test finds that intersection congestion would not be materially affected by implementation, in part due to the fact that when vehicular capacity is removed, some travel needs are fulfilled by a change in destination, travel mode, route choice, or time of day. On the other hand, the intersection congestion sensitivity test does not evaluate other essential planning, design, or operational considerations that are needed before an affirmative recommendation to implement the respective elements should be made. Furthermore, the two elements have some potential for overlap; the sensitivity analysis did not investigate how the removal of one-way streets could complicate transit vehicle access to the Bethesda Metrorail station (either in mixed traffic within the CBD or with transit-priority treatments).

Travel Demand Forecasting Analysis Process

The following steps were undertaken to develop peak hour forecasts and conduct operational analysis of plan area intersections. The first section describes the travel demand modeling conducted to generate 2040 daily forecasts, and the second outlines the process used to gather existing intersection counts and develop 2040 peak hour forecasts.

Travel Demand Modeling

- Obtained 2015 and 2040 models from M-NCPPC
  - Travel demand model version: MWCOG V2.3.52
  - Baseline model incorporates land use from the Round 8.1[3] Cooperative Forecasts
- Model Assumptions
  - No modifications were made to the network or Traffic Analysis Zone (TAZ) structure of the model
  - The model structure was used as-is, including the year 2020 transit constraint and two-step assignment for High Occupancy Toll (HOT) lanes
    - The 2020 constraint year utilized baseline land use; not an interim Vision land use plan
    - The multistep distributed processing was deactivated for the model run due to licensing constraints
    - Intrastep distributed processing was included in the model run with four subnodes
- Bethesda 2040 Vision Plan Model Run
  - The model run for the 2040 Vision Plan included the following land use inputs (see Table 2) for the TAZs representing downtown Bethesda. The travel model also included Vision Plan inputs for the Westbard and Lyttonsville plan areas.
  - Daily traffic was extracted from the model
    - Using daily volumes from the model – as opposed to peak period volumes – makes for a simpler comparison to available Average Annual Daily Traffic (AADT) data

Table 2: Land Use Inputs for 2040 Vision Plan

TAZ	Households	Population			Employment				
		Household	Group Quarters	Total	Industrial	Retail	Office	Other	Total
637	6,371	14,791	0	14,791	369	3,503	6,105	465	10,442
662	6,093	11,433	16	11,449	31	3,171	28,510	801	32,513
663	5,492	10,442	106	10,548	26	2,077	3,693	609	6,405
Total	17,956	36,666	122	36,788	426	8,751	38,308	1,875	49,360

- Daily traffic forecasts were estimated utilizing procedures from the *NCHRP 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design*
  - The forecasts were developed individually for each intersection in isolation
    - Forecasts were not balanced between intersections
    - The 2013 AADT daily traffic was used as the existing count data (see below for source of the counts)
    - The 2015 baseline model results (using Round 8.1 land use) were used as the base year traffic assignment

[3] The current round of TPAR analysis is based on MWCOG Round 8.1 Cooperative Forecasts while the local area transportation review analysis completed for the Bethesda Downtown Plan is based on Round 8.2. It should be noted that the differences between these two forecasts for the Bethesda Chevy Chase policy are relatively minor and of little concern for this traffic analysis.

        - The 2040 Vision Plan model results (using Round 8.1 land use with the exception of Vision Plan data within downtown Bethesda) were used as the future year traffic assignment
        - No interim year model results were used for the post-processing
        - At locations where an analyzed intersection was not explicitly coded/available from the model network, some surrogate links were used for the post-processing. Some examples include:
            - East-West Hwy and Old Georgetown Rd are one-way westbound at Wisconsin Ave while Montgomery Ln and Montgomery Ave are one-way eastbound at Wisconsin Ave. In the model, East-West Hwy and Old Georgetown are coded as two-way links while Montgomery Ln and Montgomery Ave are not coded in the network. For analysis, the model links representing East-West Hwy and Old Georgetown Rd were used to develop growth factors for the east and west legs of both analyzed intersections.
            - The intersection of Arlington Rd and Bethesda Ave is not in the model. The nearest link in the network is one that represents Elm St and Clarendon Road. The growth on this link was used to represent the growth, uniformly, for the Arlington Rd and Bethesda Ave intersection.
    - The daily forecasts resulting from the NCHRP 765 post-processing were taken as-is with minimal manual adjustments
        - For example, the forecasts at Wisconsin Ave and Elm St showed higher growth on the north leg than the south leg. Due to the higher volumes on Wisconsin Ave relative to Elm St, this differential growth would lead to unrealistic intersection turning movement volumes, so the growth of the north and south legs were averaged together.

Existing and 2040 Intersection Analysis

- Acquired count data from Montgomery County's Intersection Analysis website (http://www.mcatlas.org/Intersections/)
    - Used most recent count only; most counts were taken during 2013 or 2014
    - Counts for a number of locations were unavailable from the website; these locations were supplemented with data from the county on 1/22/15
    - AM and PM peak hours were extracted for each location based on the peak hour as indicated in count file
        - The peak hour did not necessarily align with a clock hour, e.g., it could be 7:45-8:45 AM
        - The peak hour listed in the count file generally, but not always, aligned with the highest total traffic hour (i.e., the hour with the highest number of total turn movements)
    - While existing traffic data was available for a range of years between 2010 and 2014, the traffic counts were all assumed to be consistent with existing conditions; therefore, no growth was applied to the data
- Acquired daily roadway volume data from the Maryland State Highway Administration (SHA)
    - Traffic data was extracted from shapefiles provided at the SHA website: http://www.roads.maryland.gov/pages/GIS.aspx?PageId=838
    - The data used for this study was AADT from SHA for the year 2013

- Development of peak hour forecasts
    - K-factors were calculated for each approach of the analysis intersections based on the existing intersection (Turning Movement Counts) TMCs and AADT data, where available
    - The k-factors were applied to the post-processed daily traffic volume on each approach of each intersection to calculate an initial estimate of peak hour traffic
        - Where a k-factor was unavailable due to incomplete AADT data, approach volume was estimated based on available data at the intersection. The ratio of existing year approach volumes and forecasted approach volumes (on available approaches) was used to scale existing year approach volumes (for approaches without data).
            - For example, if an intersection had existing year AADT data for the north, south, and east legs but not the west leg, future year approach volume was calculated for the north, south, and east legs. Then, a ratio of existing TMC volume and this calculated approach volume was calculated for these three approaches. These ratios were averaged and applied to the existing approach volume on the west leg to obtain a future year approach volume for the west leg.
    - The intersection traffic was balanced. The initial estimates of traffic on inbound links to the intersection were summed, as were the estimates of the outbound traffic. These two sums were averaged, and the individual inbound and outbound approaches were scaled proportionally based on this total. This was done because each approach link has its own k-factor and growth rate from the traffic forecasts which will often lead to unbalanced traffic coming into and out of the intersection.
    - Forecast turning movements were estimated based on the existing TMCs and the approach link volumes calculated above
        - Utilized a Fratar (iterative balancing) technique
        - The existing TMCs act as a seed value for the balancing
        - The 2040 forecast link volumes are the target values for the balancing
        - No manual adjustments were made to the resulting balanced turning movement volumes; some link volume totals differed slightly from those forecasted due to rounding of numbers during the balancing process

Non-Auto Driver Mode Share

The 1994 Bethesda CBD Sector Plan recommends attainment of a 37% non-auto driver mode share (NADMS) for employees who work in the Sector Plan area. The Bethesda Transportation Management District (TMD), called Bethesda Transportation Solutions, is responsible for conducting biennial surveys of area employees to determine progress towards this mode share goal. Partial progress towards the mode share goal is part of the 1994 Plan's staging element, and resulted in a fairly lengthy discussion in the first few years of the century regarding the readiness of the CBD to move into Stage 2.

Based on the three most recent Bethesda surveys, the estimated NADMS for employees (or NADMS-E) is estimated at 37%, equal to the 1994 Plan objective. For comparison sake, the White Flint Sector Plan adopted in 2009 set an aggressive 50% NADMS-E goal as well as a 51% NADMS goal for employed residents in the plan area (NADMS-R). The current Bethesda NADMS-R value is also estimated at 51% based on American Community Survey results from the US Census Bureau.
Several characteristics influence NADMS, chief among them:

- Land use patterns – increasing density and diversity (jobs/housing balance) puts more opportunities within walking or biking distance,
- Increased costs of car ownership, primarily related to parking costs for both residential and commercial uses, and
- Increased investment in transit services and TDM programs – especially those that serve to increase access to employment opportunities in Bethesda from nearby neighborhoods and those best served by transit such as communities further north along the Red Line and eastward along the Purple Line corridor, and those that serve to increase access for Bethesda residents to reach jobs where the most jobs are located (e.g., the DC Core).
- Increased congestion which makes alternative modes more attractive

Table 3 summarizes the NADMS-E and NADMS-R values for both the "raw" MWCOG model output and refined values based on NCHRP 765 adjustments for calibration correction. As indicated, the MWCOG model indicates that the 2040 Vision Plan, through the increased density and diversity of land uses and increased transit system investment, would tend to increase NADMS-E from 51% to 56%. The MWCOG model overestimates NADMS-E, so when these values are adjusted for calibration, the effect (as shown in yellow highlight) is to increase the current NADMS-E of 37% to a value of 43%. Similarly, the MWCOG model indicates that the 2040 Vision Plan would have a more modest effect on the NADMS-R values, with the current 51% NADMS-R rising to 54%. A more detailed summary of the NADMS-Journey to Work data is provided in Table 3.1. This table shows Bethesda within the context of the nearby Greater Lyttonsville and Westbard Sector Plan areas and breaks the data down into both inbound and outbound trips.

The White Flint Sector Plan implementation process is examining how to achieve a 50% NADMS-E value despite the fact that both current and 2040 forecasted NADMS-E values are lower than Bethesda's. It would appear appropriate to increase the 37% NADMS goal to at least a similar 50% NADMS-E value for the Bethesda CBD to provide consistency in the TDM approaches for the two plan areas. Additional TDM programs would be needed to move from the 43% forecasted NADMS-E forecast for 2040 to the 50% goal.

The effect of removing a traffic lane on MD 355 north of the CBD has a very modest effect on mode share, increasing transit ridership for the journey to work trip to a job in the Bethesda CBD by about 100 riders, with less than a 1% effect on overall NADMS-E. These effects are only associated with the increased roadway delay; no change to transit service was included in the test. This sensitivity test is also described in greater detail in a subsequent section.

Table 3: Bethesda CBD Non-Auto Driver Mode Shares (NADMS)

2015 Model Output
Journey to Work

	To jobs in Bethesda CBD (attractions)							From residences in Bethesda CBD (productions)						
	SOV	HOV 2	HOV 3+	Transit (via walk)	Transit (via P&R, K&R)	Walk	TOTAL	SOV	HOV 2	HOV 3+	Transit (via walk)	Transit (via P&R, K&R)	Walk	TOTAL
Person Trips	20,668	3,451	1,001	11,760	6,388	2,582	45,849	4,085	731	207	4,807	512	1,929	12,271
Vehicle Trips	20,668	1,725	286				22,679	4,085	366	59				4,510
NADMS	0%	50%	71%	100%	100%	100%	51%	0%	50%	72%	100%	100%	100%	63%
Compare to "established" ground truth value							37%							51%

2040 Vision Plan Model Output
Journey to Work

	To jobs in Bethesda CBD (attractions)							From residences in Bethesda CBD (productions)						
	SOV	HOV 2	HOV 3+	Transit (via walk)	Transit (via P&R, K&R)	Walk	TOTAL	SOV	HOV 2	HOV 3+	Transit (via walk)	Transit (via P&R, K&R)	Walk	TOTAL
Person Trips	22,396	3,442	3,059	15,633	9,239	3,501	57,270	7,559	1,395	406	9,097	885	4,717	24,059
Vehicle Trips	22,396	1,721	874				24,991	7,559	697	116				8,372
NADMS	0%	50%	71%	100%	100%	100%	56%	0%	50%	71%	100%	100%	100%	65%

2040 Vision Plan with BRT Take A Lane on 355 Model Output
Journey to Work

	To jobs in Bethesda CBD (attractions)							From residences in Bethesda CBD (productions)						
	SOV	HOV 2	HOV 3+	Transit (via walk)	Transit (via P&R, K&R)	Walk	TOTAL	SOV	HOV 2	HOV 3+	Transit (via walk)	Transit (via P&R, K&R)	Walk	TOTAL
Person Trips	22,381	3,437	2,997	15,726	9,225	3,501	57,268	7,532	1,395	403	9,125	887	4,717	24,060
Vehicle Trips	22,381	1,718	856				24,955	7,532	698	115				8,345
NADMS	0%	50%	71%	100%	100%	100%	56%	0%	50%	71%	100%	100%	100%	65%

2015 Conditions - Calibration Adjusted
Journey to Work

	To jobs in Bethesda CBD (attractions)								From residences in Bethesda CBD (productions)							
	SOV	HOV 2	HOV 3+	Transit (via walk)	Transit (via P&R, K&R)	Walk	TOTAL	(check)	SOV	HOV 2	HOV 3+	Transit (via walk)	Transit (via P&R, K&R)	Walk	TOTAL	(check)
Person Trips	26,267	4,384	1,271	7,673	4,535	1,719	45,849	45,849	5,406	968	273	3,481	339	1,805	12,271	12,272
Vehicle Trips	26,267	2,192	363				28,823	28,822	5,406	484	78				5,968	5,968
NADMS	0%	50%	71%	100%	100%	100%	37%	37%	0%	50%	71%	100%	100%	100%	51%	51%

2040 Vision Plan - Calibration Adjusted
Journey to Work

	To jobs in Bethesda CBD (attractions)							From residences in Bethesda CBD (productions)							
	SOV	HOV 2	HOV 3+	Transit (via walk)	Transit (via P&R, K&R)	Walk	TOTAL	SOV	HOV 2	HOV 3+	Transit (via walk)	Transit (via P&R, K&R)	Walk	TOTAL	(check)
Person Trips	28,464	4,373	3,885	10,200	6,559	2,332	55,812	10,004	1,847	535	6,588	586	4,414	23,973	
Vehicle Trips	28,464	2,187	1,110				31,761	10,004	923	153				11,080	
NADMS	0%	50%	71%	100%	100%	100%	43%	0%	50%	71%	100%	100%	100%	54%	

Table 3.1: Bethesda CBD Non-Auto Driver Mode Share Journey to Work

NADMS for Journey to Work							
Plan Area		**From Area**			**To Area**		
		Total Ps	Auto Ps	NADMS	Total Ps	Auto Ps	NADMS
Bethesda	637	3090.15	1158.148	62.5%	9344.33	4960.89	46.9%
	662	4211.55	1462.301	65.3%	28464.97	13331.92	53.2%
	663	4969.46	1889.119	62.0%	8039.25	4386.052	45.4%
	Total	**12271.16**	**4509.568**	**63.3%**	**45848.55**	**22678.86**	**50.5%**
Westbard	641	1091.41	581.125	46.8%	1141.77	870.9707	23.7%
	642	3343.1	2194.889	34.3%	1592.08	1268.876	20.3%
	Total	**4434.51**	**2776.014**	**37.4%**	**2733.85**	**2139.847**	**21.7%**
Greater Lyttonsville	626	5104.13	1997.914	60.9%	940.43	550.7414	41.4%
	628	1826.22	817.55	55.2%	1695.44	996.8821	41.2%
	630	668.01	359.5836	46.2%	2883.14	1896.926	34.2%
	631	1205.22	597.125	50.5%	306.89	181.135	41.0%
	Total	**8803.58**	**3772.172**	**57.2%**	**5825.9**	**3625.685**	**37.8%**

Intersection Analysis

Table 4 summarizes the CLV and Synchro analysis for the existing conditions and future 2040 Vision Plan, including several alternative permutations and sensitivity tests. For each location, three scenarios are presented; the existing conditions, the 2040 Vision Plan scenario, and a scenario with the 2040 Vision Plan but with the 355 lane repurposing for BRT between Jones Bridge Road and the Capital Beltway.

These locations are all located either within the Bethesda CBD Policy Area or the greater Bethesda/Chevy Chase Policy Area. Locations with a CLV value greater than 1600 are colored in yellow to denote levels of notable congestion warranting operational analysis using a Highway Capacity Manual technique such as Synchro, recognizing that the CLV standard for the Bethesda/Chevy Chase Policy Area is 1600 but the Bethesda CBD Policy Area has a higher congestion

standard of 1800 CLV. In either case, the appropriate CLV standard was used in assessing potential improvements.

For each intersection with a substandard 2040 Vision Plan scenario CLV, potential improvement scenarios are identified on subsequent lines, with the rightmost column indicating the number of lanes on each intersection approach for that scenario.

Table 4 demonstrates some general trends:

- The CBD intersections generally operate at satisfactory levels of service due both to the higher congestion standard and the robust street grid; the substandard locations are generally beyond the CBD boundary in the Bethesda/Chevy Chase Policy Area where the roadway network is relatively sparse.
- The differences between the 2040 Vision Plan scenario and the 2040 Vision Plan scenario with lane reduction on MD 355 are fairly minor at most locations, particularly within the CBD. The reduction in general purpose capacity results in substantial redistribution and reassignment of traffic (and a minor change in mode share). More traffic destined to or from the CBD to the north uses Jones Bridge Road and Connecticut Avenue as a relief route for the narrowed section of MD 355.

More information on the 355 lane repurposing, the removal of one-way streets in the CBD, and the Arlington Road road diet are presented in the sensitivity test sections of the report. Highlights of the Table 4 findings and concerns at specific intersections not associated with sensitivity tests include:

- The intersection of East-West Highway and Connecticut Avenue (location #5) benefits from relatively minor improvements in the form of right turn lanes in the AM peak period. During the PM peak period, the intersection would require an additional northbound through travel lane along Connecticut Avenue to make a further significant improvement, but the intersection would remain slightly below standard. The improvements recommended in the Chevy Chase Lake Sector Plan also do not achieve the congestion standard. Prior master planning efforts have also acknowledged that capacity improvements at this location are not likely to be viewed as cost-effective.
- The intersection of Rockville Pike and Cedar Lane (location #9) remains a candidate for the grade-separated interchange in the Bethesda-Chevy Chase Master Plan. The at-grade improvements examined in the BRAC mandatory referral, including addition of a 4th through lane on both northbound and southbound Rockville Pike, would result in essentially meeting the 1600 CLV congestion standard. However, the introduction of planned BRT service along MD 355 as well (resulting in the loss of a general purpose travel lane in the peak direction) would likely require substantial additional improvement to achieve the CLV standard.

Table 4: Traffic Congestion Scenario – 2040 Land Use Vision with Operational Scenarios

Location			CLV Results								Configuration (if different than existing)**
			Existing		2040 Vision Plan		2040 Vision w/ lane reduction on MD 355*		2040 Vision w/ increased LU in Bethesda CBD		
E-W Road	N-S Road	Conditions	AM	PM	AM	PM	AM	PM	AM	PM	
Battery Lane	Wisconsin Avenue	Existing	828	735	933	821	898	800	988	837	
Elm Street	Wisconsin Avenue	Existing	778	904	829	960	821	952	835	969	
Bradley Blvd/Bradley Lane	Wisconsin Avenue	Existing	1,333	1,425	1,412	1,533	1,409	1,535	1,435	1,568	
Old Georgetown Rd/East-West Hwy	Wisconsin Avenue	Existing	1,060	1,093	1,179	1,203	1,140	1,172	1,223	1,222	
		One-way pair to two-way c	-	-	1,375	1,427	-	-	1,396	1,449	NB: L | L+T | T | T+R / SB: L+T | T | T / EB: L+T | T | T+R / WB: L+T | R
East-West Hwy	Connecticut Avenue	Existing	1,551	1,778	1,644	1,902	1,627	1,917	1,667	1,905	
		Test improvements	1,363	1,722	1,452	1,837	-	-	-	-	NB: L | 2T | T+R | R / SB: L | 2T | T+R | R / EB: 2L | T | T+R / WB: L | T | T+R | R
		Test improvements	1,363	1,561	1,452	1,658	-	-	-	-	NB: L | 3T | T+R | R / SB: L | 2T | T+R | R / EB: 2L | T | T+R / WB: L | T | T+R | R
		CCL Master Plan	-	-	1,439	1,846	-	-	-	-	EB: 3L | T | T+R / SB (AM): L | 2T | T+R | R; SB (PM): 2L | 2T | T+R
		Synchro analysis	F (84.2)	F (123.9)	F (99.9)	F (150.9)	-	-	-	-	
Bethesda Avenue	Arlington Road	Existing	884	1,055	1,161	1,388	1,151	1,375	1,149	1,372	
		Road diet	-	-	1,470	1,723	-	-	-	-	NB: L | T+R / SB: L | T+R / EB: L | T+R / WB: L | T | R
Woodmont Avenue/Leland St	Wisconsin Avenue	Existing	880	1,328	901	1,376	897	1,368	922	1,402	
West Cedar Lane	Old Georgetown Road	Existing	1,364	1,331	1,478	1,432	1,503	1,433	1,494	1,444	
		BRAC Mandatory Referral	-	-	1,308	1,166	-	-	-	-	NB: L | T | T | T | R / SB: L | T | T | T+R / EB: L+T+R / WB: L | L+T | R
		Synchro analysis	C (31.7)	C (30.5)	D (40.4)	D (39.9)	-	-	-	-	
Cedar Lane	Wisconsin Avenue	Existing	1,623	1,590	1,857	1,788	1,991	2,005	1,888	1,801	NB: L | T | T+R / SB: L | 2T | R / EB: L | L+T | T+R / WB: L | L+T | T+R (for MD 355 reduction)
		BRAC Mandatory Referral	-	-	1,605	1,459	-	-	-	-	NB: L | 3T | T+R / SB: L | 3T | T+R / EB: 2L | 2T | R / WB: 2L | T | T+R
		Test improvements	-	-	1,557	1,329	-	-	-	-	NB: L | 4T | R / SB: L | 4T | R / EB: 2L | 2T | R / WB: 2L | T | T+R
		Synchro analysis	F (98.4)	F (84.8)	F (150.8)	F (123.7)	-	-	-	-	
Jones Bridge Road	Wisconsin Avenue	Existing	1,226	1,136	1,421	1,293	1,710	1,299	1,451	1,287	NB: L | 2T | R / SB: L | T | T+R / EB: L+T | T | R / WB: L | L+T | T | R (for MD 355 reduction)
		BRAC Mandatory Referral	-	-	1,415	1,326	-	-	-	-	NB: L | 3T | R / SB: 2L | T | T+R / EB: L | 2T | R / WB: 2L | T | R
Huntington Pkwy	Bradley Blvd	Existing	1,267	1,434	1,433	1,629	1,455	1,656	1,438	1,635	
		Test improvements	-	-	1,180	1,404	-	-	-	-	NB: T | R / SB: L | T / WB: L | R
		Synchro analysis	C (30.1)	D (51.1)	D (52.2)	E (79.7)	-	-	-	-	
Wilson Ln/St. Elmo St/Arlington Rd	Old Georgetown Road	Existing	1,187	1,323	1,255	1,427	1,267	1,429	1,261	1,434	
Montgomery Avenue	Wisconsin Avenue	Existing	890	1,155	959	1,249	933	1,217	1,011	1,310	
		One-way pair to two-way c	-	-	1,360	1,765	-	-	1,422	1,838	NB: L | T | T+R / SB: L | 2T | T+R / EB: L+T | R / WB: L | T+R
Bradley Lane	Connecticut Avenue	Existing	1,415	1,367	1,623	1,635	1,593	1,608	1,623	1,564	
		Test improvements	-	-	1,484	1,485	-	-	-	-	NB: L+T | T | T+R / SB: 2T | T+R / EB: L+T | R / WB: L+T | R
		Synchro analysis	C (27.8)	F (132.9)	D (36.3)	F (204.8)	-	-	-	-	

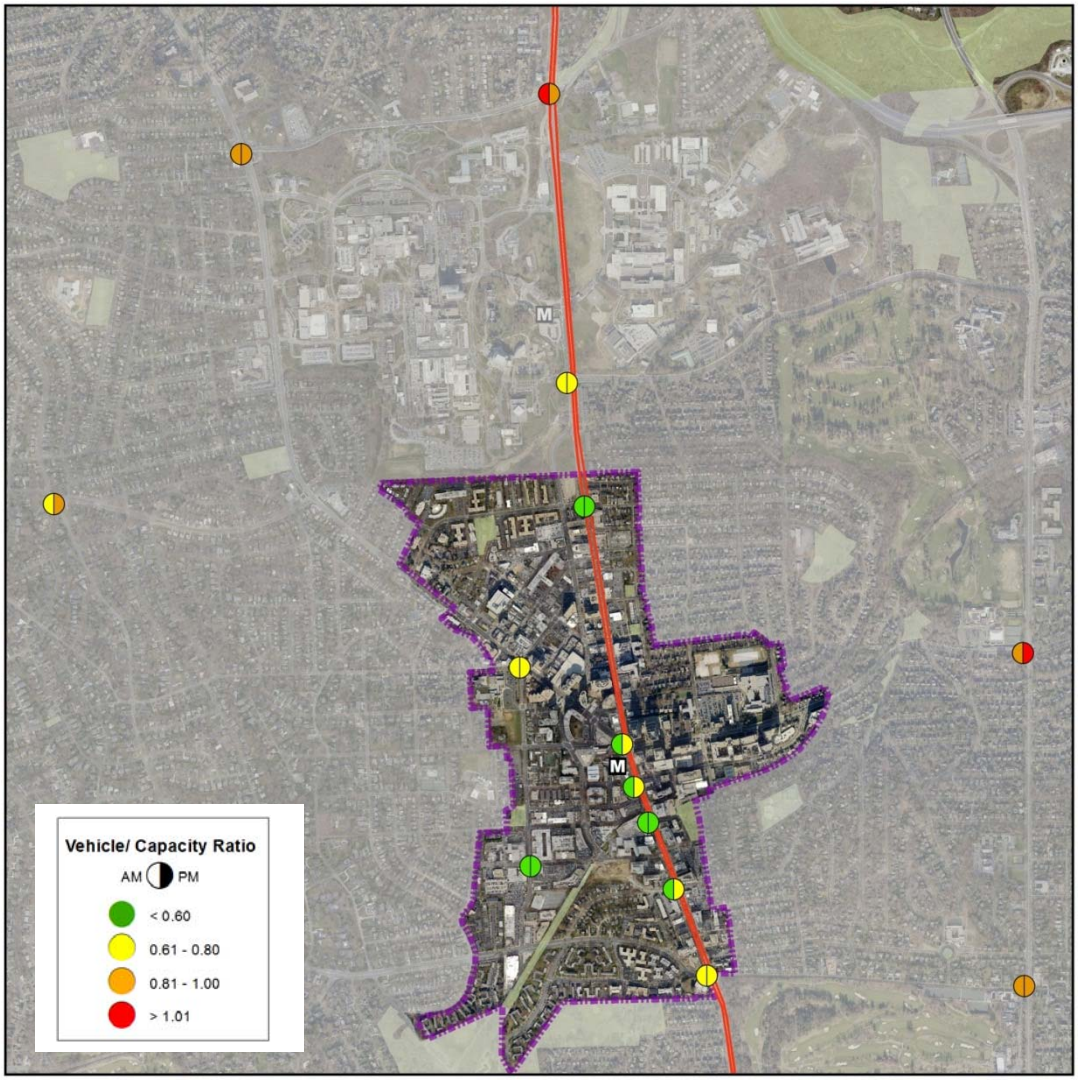
* - MD 355 BRT take-a-lane scenario uses different intersection volumes at the intersection than the combined three-area plans

** - Full intersection configuration is listed if the analysis was conducted with a different configuration on any approach. Configuration is shown as the number of each type of lane: L = left-turn, L+T = shared left-turn and through, T = through, T+R = shared through and right-turn, R = right turn. If more than one lane of particular type, number shown inidicates the nubmer of lanes (e.g. 2T

Synchro analysis presented as: LOS (control delay in seconds)

Results of spreadsheet CLV may differ from Renaissance's program

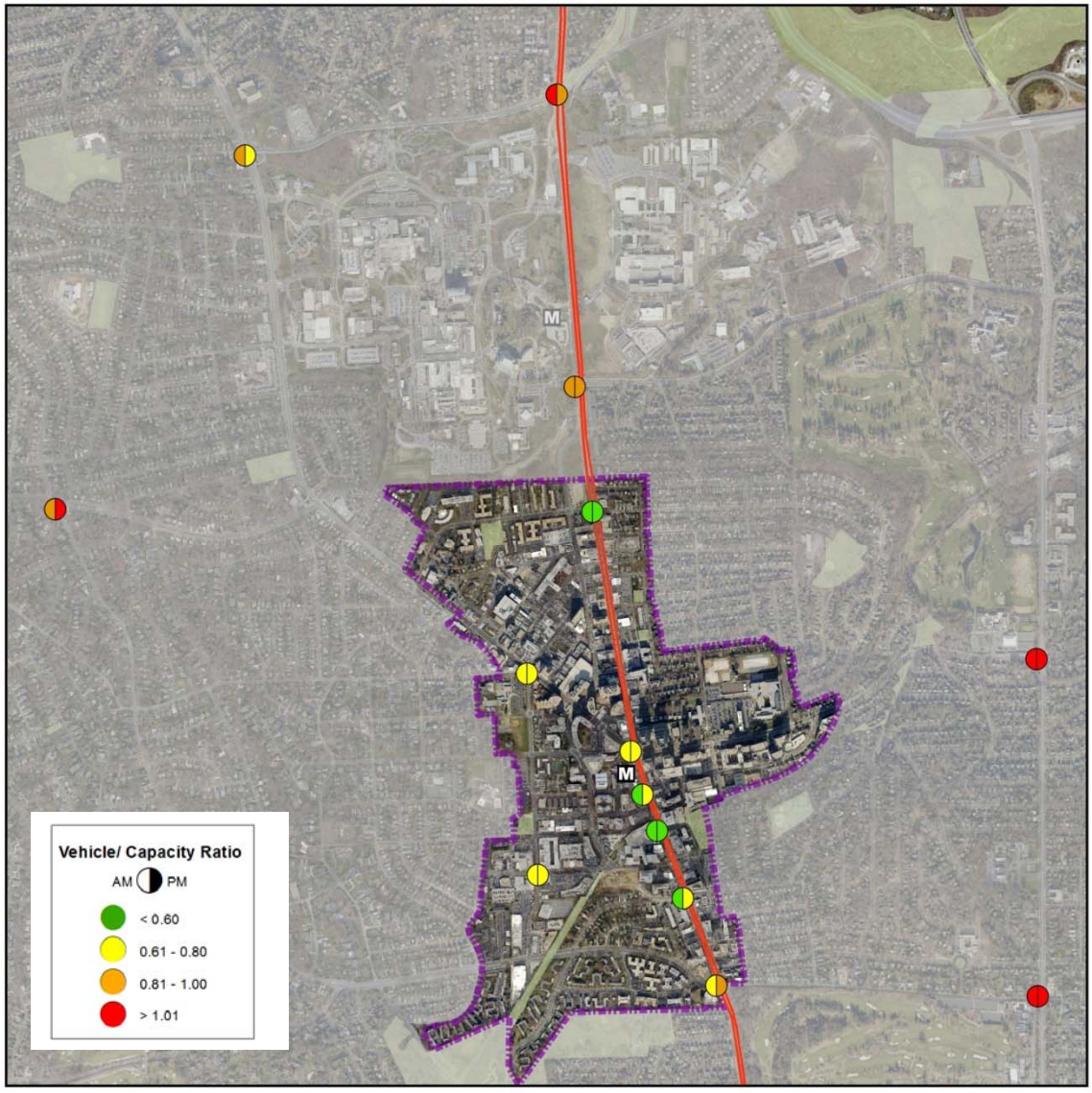
Figure 6: Traffic Congestion Scenario – Existing Traffic



Congested Intersections

1) **<u>Cedar Lane/ Rockville Pike</u>:** Exceeds the congestion standard in the morning peak-hour, and
2) **<u>East-West Hwy/ Connecticut Ave</u>:** Exceeds the congestion standard in the evening peak-hour.

Figure 7: Traffic Congestion Scenario – 2040 Land Use Vision



Assumptions

- *BRAC Improvements*
- *Bethesda Downtown Plan 2040 Land Use Vision*
- *Greater Lyttonsville Sector Plan2040 Land Use Vision*
- *Westbard Sector Plan 2040 Land Use Vision*

Congested Intersections

1) ***Cedar Lane/ Rockville Pike:*** *Exceeds the congestion standard in the morning peak-hour, and*
2) ***East-West Hwy/ Connecticut Ave:*** *Exceeds the congestion standard in the morning and evening peak-hours.*
3) ***Bradley Lane/ Connecticut Ave:*** *Exceeds the congestion standard in the morning and evening peak-hours.*
4) ***Huntington Pkwy/ Bradley Blvd:*** *Exceeds the congestion standard in the evening peak-hour.*

Conceptual Intersection Mitigation

There are four intersections within the Bethesda Chevy Chase Policy Area (but not within the Bethesda CBD proper) where it is projected the 1600 CLV standard would be exceeded. These intersections are discussed below.

1) ***Cedar Lane/ Rockville Pike:*** *Exceeds the congestion standard in the morning peak-hour,*

As noted above, the current CLV at this intersection is 1623 in the morning peak hour – just above the Policy Area Standard of 1600. Construction of BRAC related intersection geometric changes are currently underway and expected to be completed by fall 2016. The project limits on Rockville Pike are along two segments: (1) from Wilson Drive to Broad Brook Drive / Elsmere Avenue and (2) in the vicinity of West Cedar / Cedar Lane from a point about 850 feet west of the intersection to a point about 1,050 feet east of the intersection.

The specific geometric changes to intersection capacity include:

- Additional northbound lane on Rockville Pike North Wood Road to Locust Hill Road
- Conversion of the existing southbound Rockville Pike right turn lane at West Cedar Lane to a through-right lane and construct an additional southbound through lane on Rockville Pike from West Cedar Lane to Wilson Drive.
- Construct an additional lane on both westbound Cedar Lane and eastbound West Cedar Lane to separate the functions of the current middle through-left lane, increasing the number of left lanes and through lanes to two each.

The projected CLV with these geometric changes is 1605 in the morning peak hour – essentially at the current Policy Area Standard of 1600 CLV.

2) ***East-West Hwy/ Connecticut Ave:*** *Exceeds the congestion standard in the morning and evening peak-hours.*

Based on a relative comparison of existing and Vision scenario conditions, the CLV in the evening peak hour for this intersection is estimated to increase from 1778 to 1902. The analysis indicates the HCM 2000 V/C ratio in the evening peak hour increases from 1.24 to 1.34. The control delay is estimated to increase from 123.9 seconds to 150.9 seconds (per vehicle) – or 22% longer than the existing condition. A review of the cordon counts confirms the primary conflict at this intersection is between east – west commute trips to and from the Bethesda CBD and north – south commute trips to and from the DC core.

As a result of the projected CLV exceeding the congestion standard, an initial set of potential geometric changes to the intersection were analyzed. Those geometric changes included separate right turn lanes on the northbound, southbound, and westbound approaches to mitigate traffic impacts of the plan vision. Although the additional capacity generated by the initial improvements reduced the CLV to 1837 in the evening peak hour, the intersection is still projected to operate well above the Policy Area standard of 1600.

The introduction of an additional (or fourth) northbound through lane and a separate southbound right turn lane resulted in a CLV of 1591 in the afternoon peak period – slightly below the 1600 CLV standard. The impacts on adjacent property with the addition of a separate through lane and turn lane are significant and past master plans have discouraged this or any similar approach in order to achieve mitigation of this magnitude at this location.

The Approved and Adopted 2013 Chevy Chase Lake Sector Plan recommends considering the following geometric changes to the intersection as a means of mitigation:

- add a third eastbound to northbound left turn lane, and;
- add a fifth lane from the north on Connecticut Avenue, allowing for an exclusive right turn lane in the morning peak period and a second southbound to eastbound left turn lane in the evening peak period.

In general, however, it is not anticipated that any set of geometric changes, whether the addition of through travel lanes or grade separation at this intersection would result in a level of service within the Policy Area CLV Standard. An interchange or grade separation would have what has already (from a policy perspective) been deemed to result in unacceptable impacts to adjacent property. Instead, the approach is to introduce transportation alternatives (e.g., the Purple Line) for commuters.

3) ***Bradley Lane/ Connecticut Ave:*** *Exceeds the congestion standard in the morning and evening peak-hours.*

The projected CLV for this intersection is 1635 in the evening peak hour and 1623 in the morning peak hour – both over the Policy Area Standard of 1600. The HCM 2000 Control Delay in the evening is 204.8 seconds per vehicle which represents a HCM Level of Service F. The Control Delay in the morning is 36.3 seconds per vehicle which represents a HCM Level of Service D.

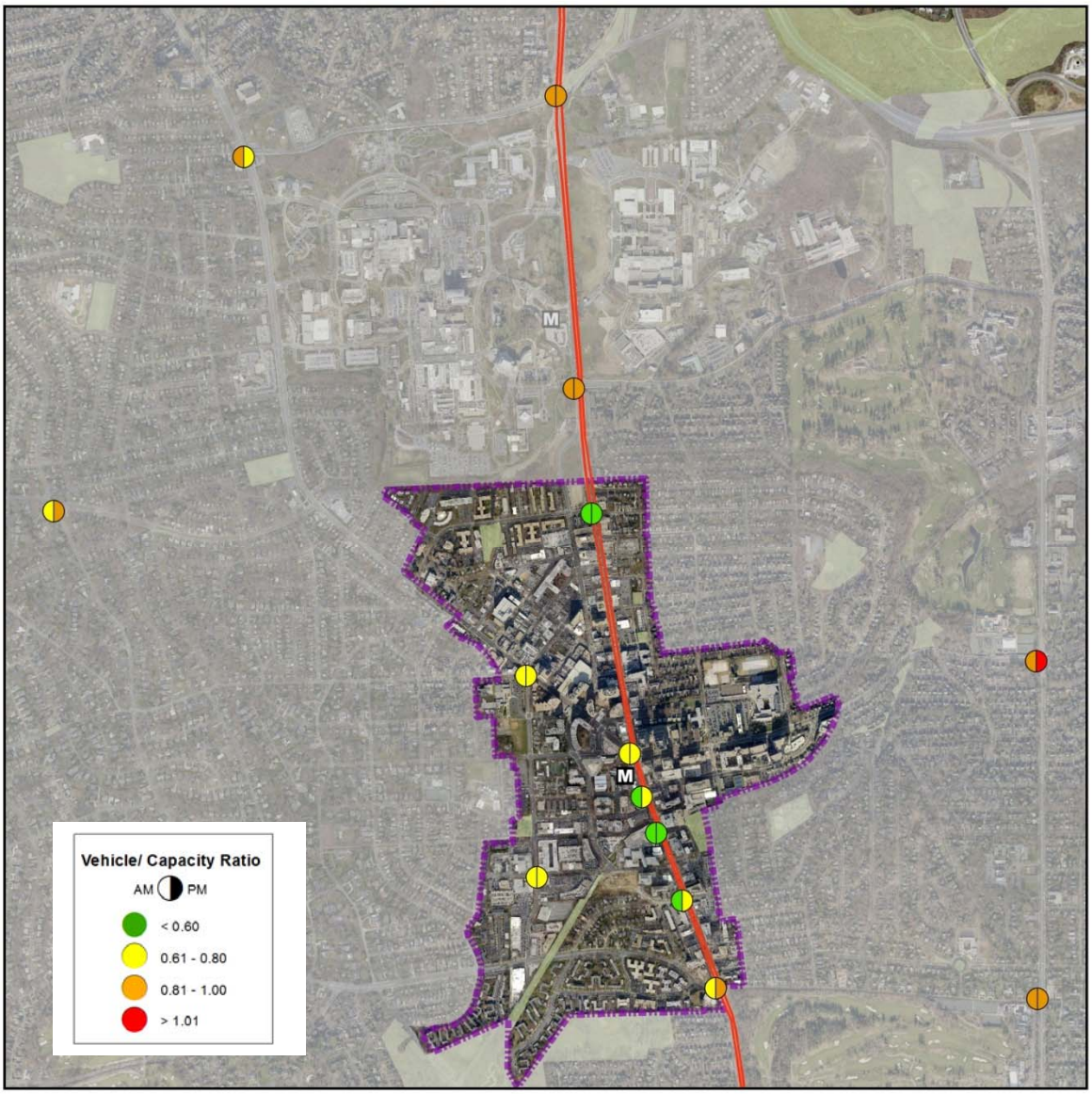
The projected CLV with the addition of an eastbound right turn lane and a westbound left turn lane is reduced to 1485 in the evening peak hour and 1484 in the morning peak hour. The introduction of these additional lanes would have impacts on adjacent properties and similar to the intersection of Connecticut Avenue and East West Highway, would not be a location where increasing intersection capacity or other steps that could result in increased vehicle approach speeds is desired.

4) ***Huntington Pkwy/ Bradley Blvd:*** *Exceeds the congestion standard in the evening peak-hour.*

The projected CLV for this intersection is 1629 in the evening peak hour – slightly above the Policy Area Standard. The HCM 2000 Control Delay is 79.7 seconds per vehicle which represents a HCM Level of Service E.

As a result of the projected CLV exceeding the congestion standard, an initial set of potential geometric changes to the intersection were analyzed. Those geometric changes included a new separate northbound right turn lane from Bradley Boulevard to eastbound Huntington Parkway, which reduces the CLV to 1404 in the evening peak hour.

Figure 8: Traffic Congestion Scenario – 2040 Land Use Vision with Conceptual Intersection Improvements



Assumptions

- *BRAC Improvements*
- *Bethesda Downtown Plan 2040 Land Use Vision*
- *Greater Lyttonsville Sector Plan2040 Land Use Vision*
- *Westbard Sector Plan 2040 Land Use Vision*
- *Conceptual Intersection Improvements*

Congested Intersections

1) ***East-West Hwy/ Connecticut Ave:*** *Exceeds the congestion standard in the evening peak-hour.*

Sensitivity Tests

As indicated in Table 4, several sensitivity tests were performed to examine the effect of different network parameters on CLV values. The following sensitivity tests were presented in the executive summary and are described in greater detail in the sections below:

- Removing the one-way street segments of East-West Highway, Montgomery Avenue, Old Georgetown Road, and Woodmont Avenue and restoring two-way traffic on these segments
- Repurposing one travel lane on MD 355 for BRT between Jones Bridge Road and the Capital Beltway
- Road diet on Arlington Road between Bradley Boulevard and Old Georgetown Road to replace the four-lane section with a three lane section.

Removal of One-Way Streets

East-West Highway and Montgomery Avenue form a one-way couplet for MD 410 and MD 187 in the heart of the Bethesda CBD. A two-block segment of Woodmont Avenue is part of the one-way couplet for MD 187 and the one-way segment extends another block to the south. The potential for removing one-way streets has several potential benefits, as one-way streets tend to increase circuitous, "around the block" travel (and therefore VMT), make roads feel wider, thereby increasing off-peak period speeds, and increase the complexity of the street network, particularly for pass-by retail opportunities and transit system legibility (where bus stops for opposing directions of a given transit route are not visually connected). One way streets are more efficient at reducing points of conflicts for both motor vehicles and pedestrians where travel demands warrant.

Therefore, a primary concern associated with the potential to remove the one-way streets in the Bethesda CBD is the effect on congestion at the confluence of state highways (MD 355, MD 187, and MD 410), consisting of the intersection of Wisconsin Avenue and Old Georgetown Road/East West Highway (location #4 in Table 4) and the intersection of Wisconsin Avenue and Montgomery Avenue (location #13 in Table 4). The 2040 Vision Plan traffic volumes for these locations were reassigned into a two-way street couplet. At both locations, the removal of the one-way streets would increase CLVs, as generally expected, but still within acceptable CLV standards.

This CLV assessment is only an initial step in considering the feasibility of two-way street conversions. Several operational elements need to be considered, most notably the effects on transit system routing to and from the Bethesda Metrorail station. While the intersection CLV standard of 1800 allows all vehicles to experience what would be described as "failing" levels of delay in other parts of the County, the need to move transit vehicles expeditiously to and from the Metro station means that increased delay for those vehicles may be an element of concern. Similarly, Metrorail station access onto Old Georgetown Road and Woodmont Avenue would be complicated by two-way street operations, and the potential for dedicated transit vehicle treatments would be more difficult with two-way streets rather than one-way streets. From a master plan assessment of intersection capacity, however, the two-way street operation passes muster.

MD 355 Lane Repurposing for BRT

The MWCOG model was used for a first step high level assessment of the impact upon vehicular traffic of removing one lane in each direction between Jones Bridge Road and the Capital Beltway. The general premise is the lanes lost would be used for BRT, although due to the complexity of potential BRT service parameters, no change to transit service was assessed in this analysis. This segment has fairly few intervening land uses other than the NIH and National Naval Medical Centers. Those

campuses are served by Metrorail, which is already a fixed-guideway system with operating speeds between stations higher than the congested speed on MD 355. Therefore, the modeled Metrorail service provides a reasonable assessment of the general attractiveness of commuter-oriented transit in the corridor whose attractiveness might be increased due to the increased roadway delays associated with removal of a lane on MD 355.

Table 5 shows the effect of the take-a-lane approach on traffic volumes on MD 355 and the adjacent roadways (MD 187 to the west and MD 185 to the east) where these roads cross a screenline between Cedar Lane and Jones Bridge Road (where the roadway network is most constrained). The removal of one lane in each direction on MD 355 reduces 2040 Vision Plan traffic volumes in this segment by roughly 10,000 vehicles per day, or nearly 20%. Only some of this volume is picked up by the parallel routes.

Table 5: Effect of MD 355 Lane Repurposing on Screenline Traffic Volumes

Facility	Location	Direction	2040 Three-Area Plans											
			Full MD 355			Take-a-lane for MD 355 BRT			Delta			Percent Difference		
			AM Pk Hr	PM Pk Hr	Day	AM Pk Hr	PM Pk Hr	Day	AM Pk Hr	PM Pk Hr	Day	AM Pk Hr	PM Pk Hr	Day
MD 187 (Old Georgetown Rd)		Two-way	3,750	4,050	48,700	3,900	4,200	49,800	150	150	1,100	4%	4%	2%
	South of Cedar Ln	SB	2,350	1,750	24,600	2,450	1,800	25,100	100	50	500	4%	3%	2%
		NB	1,400	2,300	24,100	1,450	2,400	24,700	50	100	600	4%	4%	2%
MD 355 (Rockville Pike)		Two-way	4,150	4,750	53,500	3,150	3,500	43,300	-1,000	-1,250	-10,200	-24%	-26%	-19%
	South of Cedar Ln	SB	2,700	2,000	26,700	2,000	1,500	21,300	-700	-500	-5,400	-26%	-25%	-20%
		NB	1,450	2,750	26,800	1,150	2,000	22,000	-300	-750	-4,800	-21%	-27%	-18%
MD 185 (Connecticut Ave)		Two-way	8,300	8,650	116,800	8,550	8,900	118,500	250	250	1,700	3%	3%	1%
	South of I-495	SB	5,100	3,800	58,000	5,300	3,850	59,000	200	50	1,000	4%	1%	2%
		NB	3,200	4,850	58,800	3,250	5,050	59,500	50	200	700	2%	4%	1%
Screenline		Two-way	16,200	17,450	219,000	15,600	16,600	211,600	-600	-850	-7,400	-4%	-5%	-3%
		SB	10,150	7,550	109,300	9,750	7,150	105,400	-400	-400	-3,900	-4%	-5%	-4%
		NB	6,050	9,900	109,700	5,850	9,450	106,200	-200	-450	-3,500	-3%	-5%	-3%

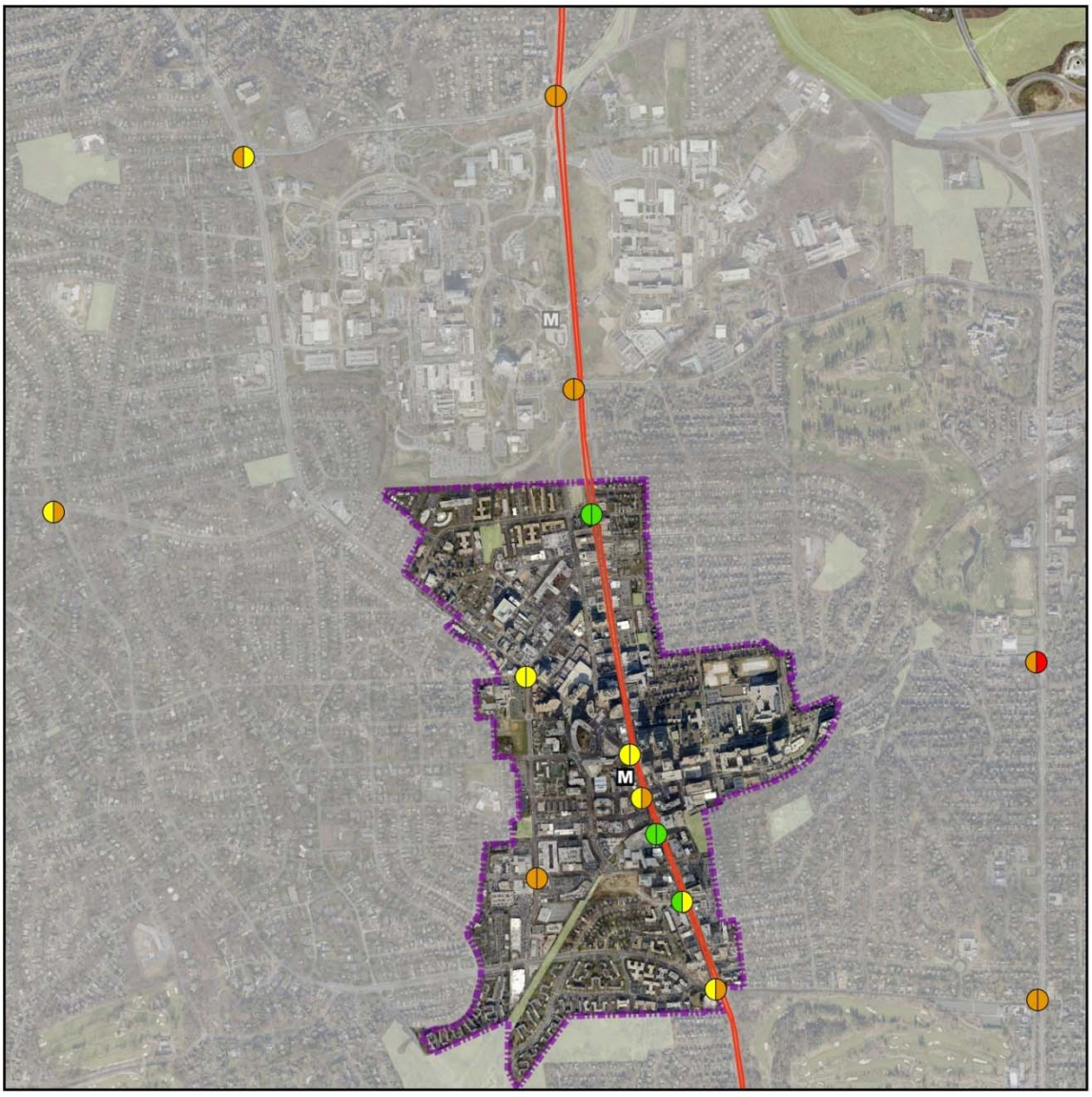
The reduction of traffic volume on MD 355 by 20% is less than the 33% reduction in general link capacity. The capacity effect at individual intersections varies. As shown previously in Table 4, the CLVs at both Cedar Lane and Jones Bridge Road are notably higher with the lane reduction on MD 355. At Jones Bridge Road, the PM peak period CLV effect is dampened by the fact that a key diversion route uses Jones Bridge Road instead of MD 355 to reach the Beltway from the Bethesda CBD, balancing the traffic load between the reduced number of through lanes and the turning movements at this location. Even with this observed diversion, traffic redistributes itself so that the effect of the MD 355 lane repurposing is to increase traffic volumes on Connecticut Avenue (MD 185) just south of the Beltway by only about 200 peak hours, peak direction vehicles (or a 4% increase) in both AM and PM peak periods. The Cedar Lane location is already planned as a grade-separated interchange, although the feasibility and desirability of interchange construction has not been ascertained. At Jones Bridge Road, the forecast AM peak period CLV would change from acceptable to unacceptable under the lane repurposing scenario (unless the lane repurposing was ended north of the junction allowing for three through travel lanes). Neither of these findings are considered a fatal flaw for further assessment of lane repurposing potential. MCDOT is coordinating with MTA and SHA on a more detailed assessment of the MD 355 South BRT service that will consider the potential for lane repurposing on MD 355.

Arlington Road Lane Repurposing ("Road Diet")

The Sector Plan considers the conversion of Arlington Road from a four-lane undivided roadway to a three-lane undivided roadway between Bradley Boulevard and Old Georgetown Road to provide additional space for on-road bicycle facilities. The proposal is functionally similar to the re-purposing of Fenton Street in Silver Spring after adoption of the 2000 Silver Spring CBD Sector Plan (although the reallocation of space in that case was focused on providing on-street parking).

The conversion would need to transition to provide auxiliary travel lanes at both ends of the segment and the concept for on-road bicycle lanes would also likely transition (particularly at the south end of the segment to connect to the Capital Crescent Trail bridge over Bradley Boulevard). As the intermediate cross street with the highest traffic volumes, the analysis intersection of Arlington Road and Bethesda Avenue serves as a testbed for this road diet concept. At this location, the three-lane segment provides adequate CLVs with one caveat. Due to the high number of right turns from westbound Bethesda Avenue to northbound Arlington Road, a separate right turn lane is needed for this movement to provide individual lanes for left, through, and right turning vehicles on the westbound approach. This improvement can be achieved by removing a few parking spaces from the south side of Bethesda Avenue (east of Arlington Road) and restriping the approach.

Figure 9: Traffic Congestion Scenario – 2040 Land Use Vision with Operational Scenarios



Assumptions

- *BRAC Improvements*
- *Bethesda Downtown Plan 2040 Land Use Vision*
- *Greater Lyttonsville Sector Plan2040 Land Use Vision*
- *Westbard Sector Plan 2040 Land Use Vision*
- *Conceptual Intersection Improvements*
- *One-Way/ Two-Way Street Conversion*
- *Arlington Road "Road Diet"*

Congested Intersections

1) ***East-West Hwy/ Connecticut Ave:*** *Exceeds the congestion standard in the evening peak-hour.*

Right-of-Way and Street Classification

Table 6 summarizes all Business District and Residential streets within the Downtown area. This table is intended to provide guidance on minimum right-of-way dedication widths for streets falling below the Minor Arterial roadway classification in the transportation hierarchy.

Table 6: Business District and Residential Street Right-of-Way Summary

Designation	Roadway	Limits	Minimum Right-of-Way
Business District			
	47th Street	***Elm Street to Willow Lane***	***60'***
	Auburn Avenue	***Old Georgetown Road to Rugby Avenue***	***60'***
	Battery Lane	***Woodmont Avenue to Wisconsin Avenue***	***70'***
	Bethesda Avenue	***Clarendon Road to Wisconsin Avenue***	***60'***
	Chase Avenue	***Wisconsin Avenue to Tilbury Street***	***60'***
	Cheltenham Drive	***Wisconsin Avenue to Tilbury Street***	***80'***
	Commerce Lane	***Old Georgetown Road to Wisconsin Avenue***	***50'***
	Cordell Avenue		
		Old Georgetown Road to Woodmont	***60'***
		Avenue	***65'***
		Woodmont Avenue to Wisconsin Avenue	
	Del Ray Avenue	***Old Georgetown Road to Rugby Avenue***	***60'***
	East Lane	***North Lane to Hampden Lane***	***50'***
	Edgemoor Lane	***Arlington Road to Old Georgetown Road***	***80'***
	Elm Street		
		Arlington Road to Wisconsin Avenue	***60'***
		Wisconsin Avenue to 47th Street	***60'***
	Fairmont Avenue		
		Old Georgetown Road to Norfolk Avenue	***60'***
		Woodmont Avenue to Wisconsin Avenue	***60'***
	Hampden Lane	***Arlington Road to Wisconsin Avenue***	***60'***
	Leland Street	***Wisconsin Avenue to 46th Street***	***60'***
	Maple Avenue	***Wisconsin Avenue to Tilbury Street***	***60'***
	Middleton Lane	***Wisconsin Avenue to Mid-block Closure***	***60'***
	Miller Avenue	***Woodmont Avenue to Wisconsin Avenue***	***50'***
	Montgomery Avenue	***Wisconsin Avenue to East-West Highway***	***80'***
	Montgomery Lane		
		Woodmont Avenue to East Lane	***80'***
		East Lane to Wisconsin Avenue	***70'***
	Moorland Lane	***Arlington Road to Old Georgetown Road***	***70'***
	Norfolk Avenue	***Rugby Avenue to Wisconsin Avenue***	***80'***
	North Lane	***Woodmont Avenue to East Lane***	***50'***

Designation	*Roadway*	*Limits*	*Minimum Right-of-Way*
Business District			
(Continued)	***Pearl Street***	***Middleton Lane to S. Sector Plan Boundary***	***60'***
	Rugby Avenue		
		Norfolk Avenue to Auburn Avenue	***50'***
		Auburn Avenue to Woodmont Avenue	***60'***
	St Elmo Avenue	***Old Georgetown Road to Rugby Avenue***	***70'***
	Stanford Street	***Wisconsin Avenue to West Avenue***	***60'***
	Walsh Street	***Wisconsin Avenue to 46th Street***	***60'***
	Waverly Street	***East-West Highway to Wisconsin Avenue***	***60'***
	Willow Lane	***Wisconsin Avenue to 47th Street***	***70'***

Designation	*Roadway*	*Limits*
Residential		
	Avondale Street	*Wisconsin Avenue to End*
	Battery Lane	*Old Georgetown Road to Keystone Avenue*
		Keystone Avenue to Woodmont Avenue
	Brook Lane	*North of Keystone Avenue*
	Chelton Road	*Sleaford Road to East-West Highway*
	Chestnut Street	*Wisconsin Avenue to Tilbury Street*
	Chevy Chase Drive	*Hillandale Road to Bradley Boulevard*
	Edgemoor Lane	*W. Sector Plan Boundary to Arlington Road*
	Elm Street	*W. Sector Plan Boundary to Arlington Road*
	Glenbrook Road	*Old Georgetown Road to End*
	Highland Avenue	*Wisconsin Avenue to Tilbury Street*
	Hillandale Road	*Bradley Boulevard to S. Sector Plan Boundary*
	Keystone Avenue	*Battery Lane to W. Sector Plan Boundary*
	Maple Avenue	*Tilbury Street to E. Sector Plan Boundary*
	Middleton Lane	*Mid-block Closure to Pearl Street*
	Montgomery Lane	*Arlington Road to Woodmont Avenue*
	Offutt Lane	*Bradley Boulevard to Chevy Chase Drive*
	Pearl Street	*N. Sector Plan Boundary to Middleton Lane*
	Rosedale Avenue	*Wisconsin Avenue to E. Sector Plan Boundary*
	Sleaford Road	*Tilbury Street to E. Sector Plan Boundary*
	Strathmore Street	*Leland Street to Bradley Boulevard*
	Tilbury Street	*Chestnut Street to Sleaford Road*
	Wellington Drive	*Bradley Boulevard to Strathmore Street*
	West Lane	*Montgomery Lane to End*
	West Virginia Avenue	*Wisconsin Avenue to Tilbury Street*

Transit

One of the reasons Bethesda is able to promote multimodal transportation as a viable alternative to single-occupancy vehicles is its robust transit network (Figure 10). WMATA Metrorail, WMATA Metrobus, Montgomery County Ride On bus, and the Bethesda Circulator all serve the sector plan area. The entire Bethesda Downtown area is within a 10-minute walk of the existing Bethesda North Metrorail Red Line station, which is located just south of the Old Georgetown Road/ Wisconsin Avenue/ East West Highway intersection. In addition to providing access to the Metrorail Red Line, the Bethesda North Station serves as a major bus transportation hub. Local and regional bus routes are supplemented with the free Bethesda Circulator bus service, which runs approximately every 10 minutes from stations within the sector plan area core. Facility planning is underway for a Bethesda South Station, which will include a new south entrance to the Red Line and the planned Purple Line station on Elm Street. Ridership volumes for each of the transit systems serving the Downtown area are provided in table 7, below.

Figure 10: Bethesda Transit. Source: WMATA

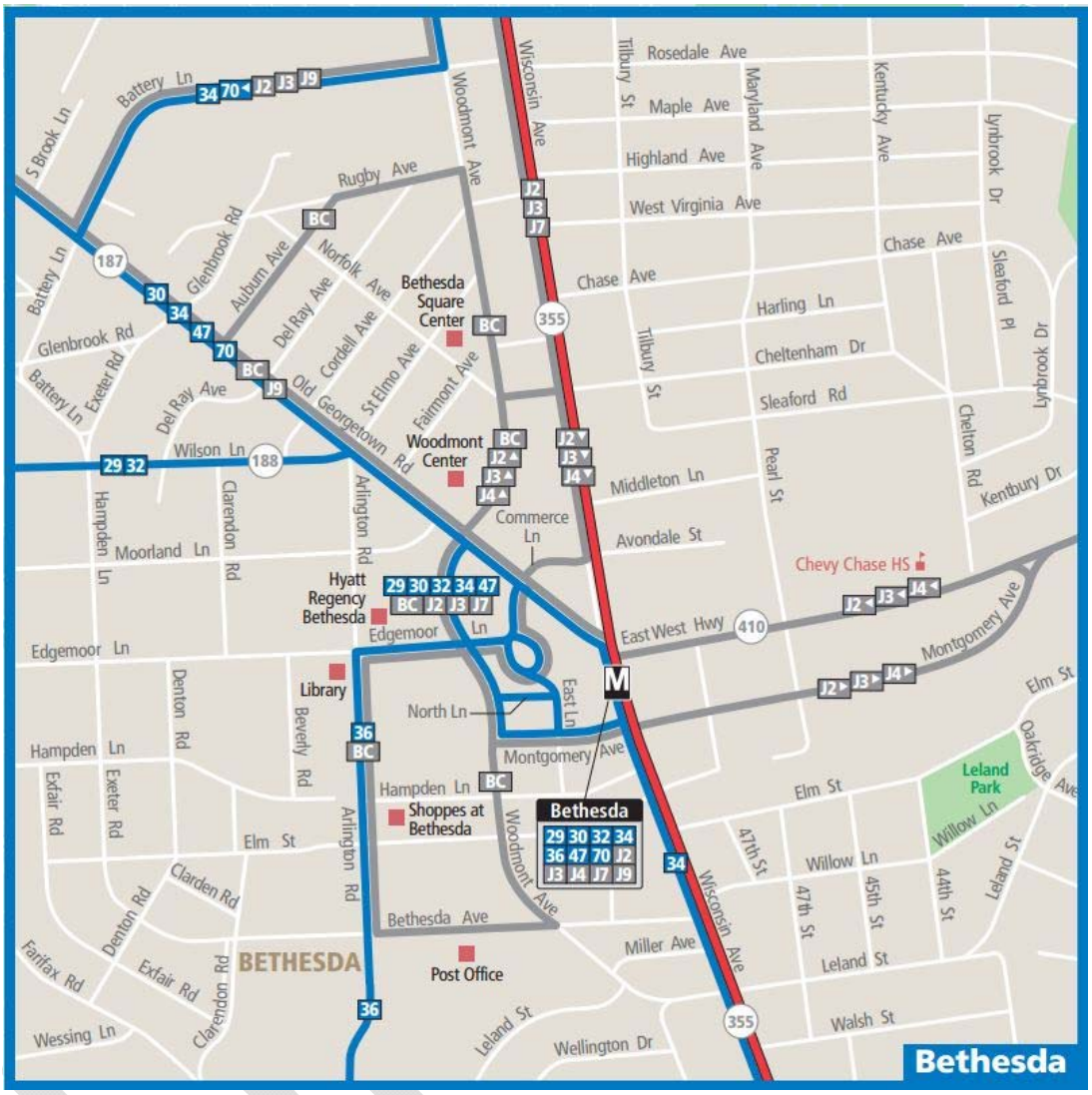

Bethesda
Battery Ln
S Brook Ln
Glenbrook Rd
Exeter Rd
Rugby Ave
Woodmont Ave
Wisconsin Ave
Auburn Ave
Norfolk Ave
Del Ray Ave
Cordell Ave
St Elmo Ave
Fairmont Ave
Old Georgetown Rd
Bethesda Square Center
Woodmont Center
Wilson Ln
Hampden Ln
Moorland Ln
Clarendon Rd
Arlington Rd
Commerce Ln
Hyatt Regency Bethesda
Edgemoor Ln
Library
Denton Rd
Beverly Rd
Exfair Rd
Exeter Rd
North Ln
East Ln
Montgomery Ave
Hampden Ln
Shoppes at Bethesda
Elm St
Clarden Rd
Bethesda Ave
Post Office
BETHESDA
Fairfax Rd
Wessing Ln
Leland St
Wellington Dr
Miller Ave
Willow Ln
47th St
45th St
44th St
Leland Park
Oakridge Ave
Lynbrook Dr
Sleaford Pl
Sleaford Rd
Chelton Rd
Kentbury Dr
Tilbury St
Maryland Ave
Kentucky Ave
Rosedale Ave
Maple Ave
Highland Ave
West Virginia Ave
Chase Ave
Harling Ln
Cheltenham Dr
Middleton Ln
Pearl St
Avondale St
Chevy Chase HS
East West Hwy
Walsh St
187
188
355
410
M

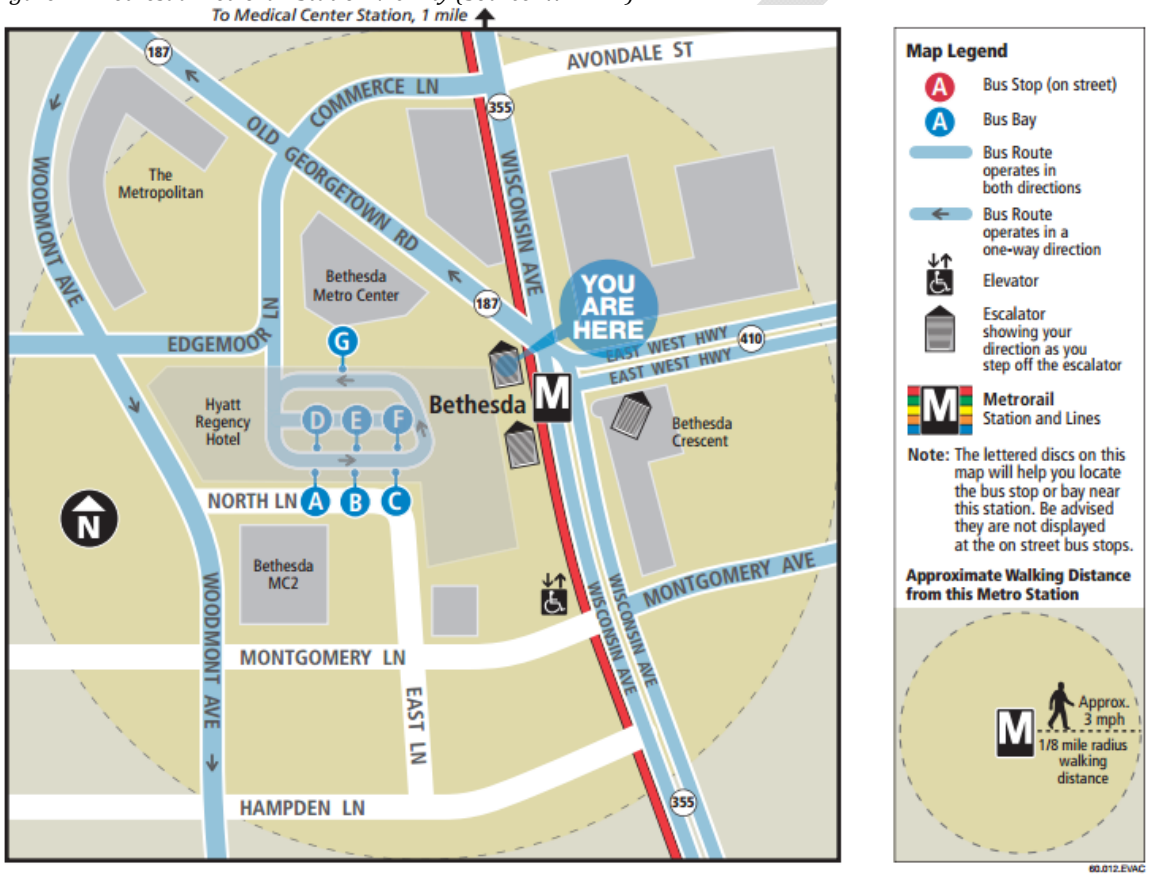
Table 7: Transit Route Ridership

Bethesda Transit Ridership (Passenger Boardings)				
Rank	Route	Average Weekday Ridership	Name	Destination
1	Bethesda Metrorail	10,608	Metrorail Red Line	Shady Grove/ Glenmont via Downtown DC
2	WMATA – J2	4,566	Bethesda/ Silver Spring Line	Montgomery Mall/ Silver Spring Metrorail Station
3	RideOn – 34	2,907	34	Aspen Hill/ Friendship Heights
4	RideOn – 47	1,558	47	Rockville Metrorail Station/ Bethesda Metrorail Station
5	WMATA – J3	1,402	Bethesda/ Silver Spring Line	Montgomery Mall/ Silver Spring Metrorail Station
6	WMATA – J4	1,259	Bethesda/ College Park	Bethesda Metrorail Station/ College Park Metrorail Station
7	WMATA – J1	957	Bethesda/ Silver Spring Line	Montgomery Mall/ Silver Spring Metrorail Station
8	RideOn – 70	733	70	Germantown/ Bethesda Metrorail Station
9	RideOn – 30	730	30	NIH Medical Center/ Bethesda Metrorail Station
10	RideOn – 29	680	29	Friendship Heights Metrorail/ Bethesda Metrorail
11	RideOn – 36	447	36	Bethesda Metrorail Station/ Bradley Blvd - River Road
12	WMATA – J9	369	I-270 Express	Lakeforest Transit Center/ Bethesda Metrorail Station
13	RideOn – 32	250	32	Bethesda Metrorail Station/ Carderock Naval Facility
14	WMATA – J7	127	I-270 Express	Lakeforest Transit Center/ Bethesda Metrorail Station

Metrorail

The Bethesda Downtown sector plan area is directly served by the WMATA Metrorail Red Line via the Bethesda Metro Station, located at the corner of Old Georgetown Road/ Wisconsin Avenue/ East West Highway intersection. The station opens at: 5:07 AM - Monday-Friday with the first trains departing for Glenmont at 5:17 AM and Shady Grove at 5:28 AM. The last trains depart for those stations at 11:47 PM and 12:23 AM, respectively. The typical weekend schedule shifts two hours later in the morning (Saturday & Sunday) and shifts three hours later in the evening (Friday & Saturday).

Figure 11: Bethesda Metrorail Station Vicinity (Source: WMATA)



Metrobus

WMATA Metrobus J1, J2, and J3 – Bethesda/ Silver Spring Line
This line provides service between the Montgomery Mall Transit Center and the Silver Spring Metro Station. The J2 line has the highest bus ridership of all lines serving the Bethesda Downtown sector plan area.

WMATA Metrobus J4 – College Park/ Bethesda Line

This line provides express service (limited stops) between the Bethesda Metro Station and the College Park Metro Station (Green Line) every 20 minutes.

WMATA Metrobus J7, J9 – I-270 Express Line
This line provides express service between the Lakeforest Transit Center in Gaithersburg and the Bethesda Metro Station.

Montgomery County Ride On

Montgomery County Ride On 29
This route provides service between the Friendship Heights Metrorail station and Bethesda Metrorail station via Glen Echo Heights and points west of the sector plan boundary. Typical weekday service begins at the Bethesda Metrorail station at 5:35 AM and continues through 8:11 PM with half-hour headways.

Montgomery County Ride On 30
This route provides service between the NIH Medical Center Metrorail station and Bethesda Metrorail station via Pooks Hill and points north of the sector plan boundary. Typical weekday service begins at the NIH Medical Center Metrorail station at 5:40 AM and continues through 7:35 PM with half-hour headways. No weekend service is provided.

Montgomery County Ride On 32
This route provides peak-hour service between the Bethesda Metrorail station and Carderock Naval Facility via points west of the sector plan boundary. Typical weekday service begins at Bethesda Metrorail station at 6:30 AM and continues through 9:00 AM with half-hour headways. Afternoon service begins at 3:50 PM and continues through 7:20 PM with half-hour headways. No weekend service is provided.

Montgomery County Ride On 34
This route provides service between the Friendship Heights Metrorail station and Aspen Hill via Bethesda and Wheaton. Typical weekday service begins at Bethesda Metrorail station at 5:26 AM and continues through 12:30 AM. Peak Hour Service generally has 15-20 minute headways while off-peak service typically has half-hour headways. This route has the highest ridership of any Montgomery County Ride On route within the sector plan area.

Montgomery County Ride On 36
This route provides service between the Bethesda Metrorail station and Potomac (Bradley Boulevard/ River Road) via points west of the sector plan boundary. Typical weekday service begins at Bethesda Metrorail station at 6:23 AM and continues through 7:34 PM with half-hour headways.

Montgomery County Ride On 47
This route provides service between the Bethesda Metrorail station and Rockville Metrorail station via points north of the sector plan boundary. Typical weekday service begins at Bethesda Metrorail station at 5:56 AM and continues through 10:50 PM with half-hour headways.

Montgomery County Ride On 70

This route provides service between the Bethesda Metrorail station and the Milestone Park & Ride in Germantown. Express service is provided between the Milestone (Germantown) stop and the NIH Medical Center Metrorail Station via I-270. Typical weekday service begins at Bethesda Metrorail station at 5:26 AM and continues through 7:55 PM with 15-30 minute headways. No weekend service is provided.

Bethesda Circulator

The Bethesda Circulator is a free local bus service within the sector plan area that provides access to parking facilities, regional transit stops, and retail destinations within Downtown Bethesda. This service was originally proposed in the 1994 Bethesda CBD Sector Plan as the "loop bus" and has also been known as the "Bethesda 8 Trolley" prior to its current iteration as the Circulator. The Bethesda Urban Partnership operates the current service with 10-minute headways under the following schedule:

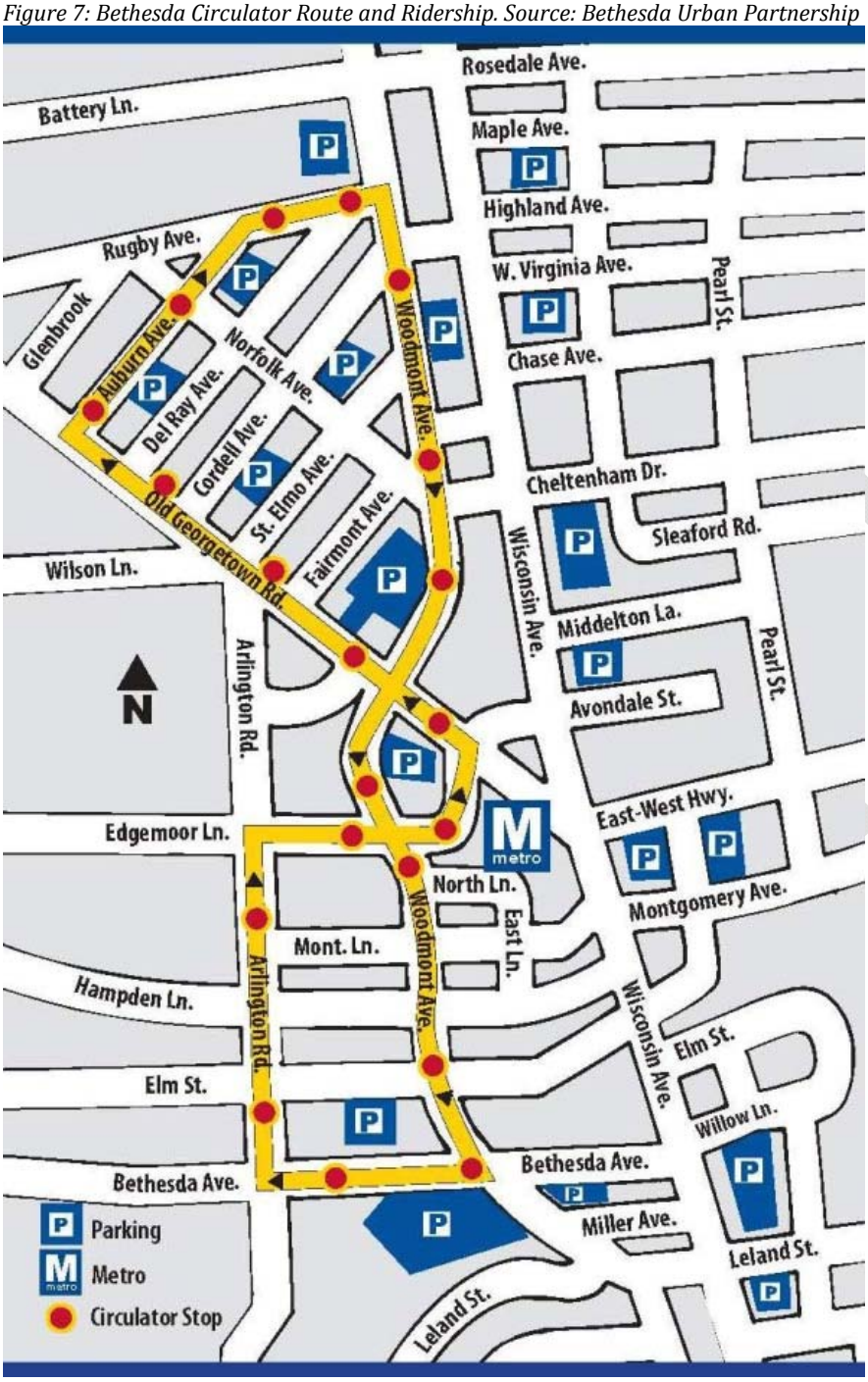
- Monday – Thursday: 7:00 AM – 12:00 AM
- Friday: 7:00 AM – 2:00 AM
- Saturday: 10:00 AM – 2:00 AM

The Circulator generally travels in a counter clockwise loop (Figure 7), originating at the Metrorail station, and has stops in the following locations:

- Bethesda Metro Station
- Old Georgetown Rd. near Commerce Ln. (Safeway)
- Old Georgetown Rd. between Woodmont & Fairmont Aves.
- Old Georgetown Rd. between Fairmont Ave. & St. Elmo Ave.
- Old Georgetown Rd. between Cordell & Del Ray Aves.
- Auburn Ave. & Old Georgetown Rd.
- Auburn Ave. & Norfolk Ave.
- Rugby Ave.
- Rugby & Woodmont Aves.
- Woodmont Ave. between Cordell Ave. & St. Elmo Ave.
- Woodmont Ave. & Norfolk Ave. (Veteran's Park)
- Woodmont Ave. at Garage 11
- Woodmont Ave. at Metropolitan Garage
- Woodmont Ave. between Edgemoor Ln. & Montgomery Ln.
- Woodmont Ave. & Elm St.
- Woodmont Ave. & Bethesda Ave.
- Bethesda Ave. & Garage Entrance
- Arlington Rd. between Bethesda Ave. & Elm St. (Giant)
- Arlington Rd. & Montgomery Ln.
- Edgemoor Ln. near Woodmont Ave.

Ridership for the Circulator has grown considerably in recent years (Figure 7), averaging approximately 1,200 riders during a typical weekday and 800 riders during a typical weekend day in 2014. Consideration should be given to expanding this service as a means of reinforcing and encouraging transit use in the sector plan area.

Figure 7: Bethesda Circulator Route and Ridership. Source: Bethesda Urban Partnership

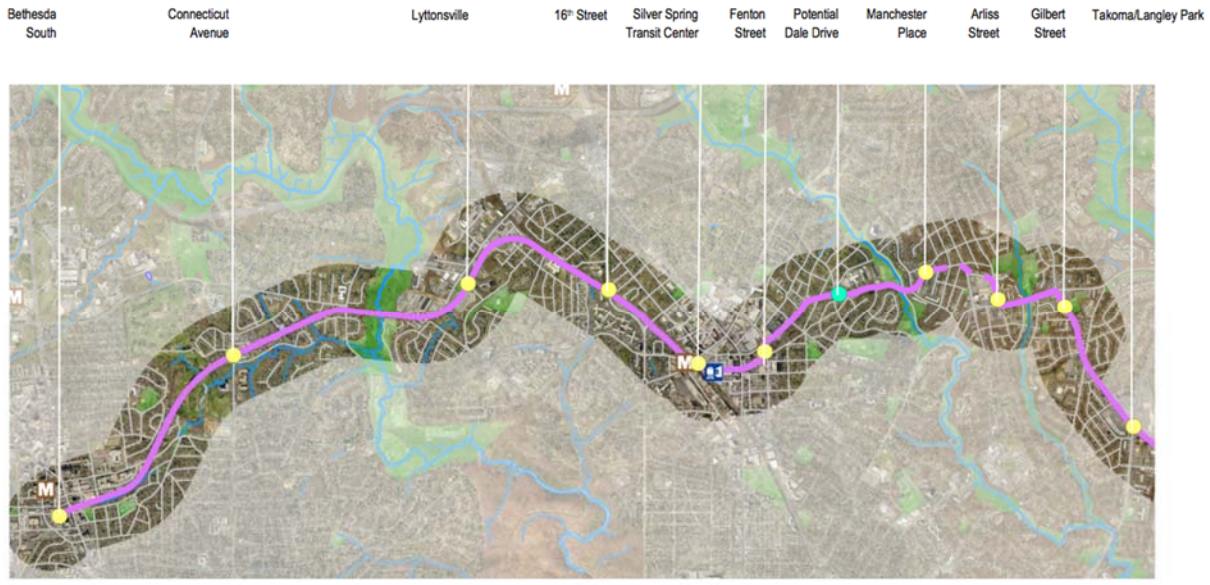


Average Daily Ridership by Year		
	Weekday	Saturday
2007	992	409
2008	902	350
2009	994	466
2010	893	770
2011	898	635
2012	1,067	654
2013	949	604
2014	1,213	811
Peak Year	2014	2014
Growth 2007 - 2014	22%	98%

Future Purple Line Light Rail

As previously noted, the Purple Line is a planned 16-mile long light rail transit facility that will extend from Bethesda to New Carrollton and will include a station within the Downtown Bethesda sector plan area at the corner of Wisconsin Avenue and Elm Street. This station location will also provide a new entrance to the Bethesda Metrorail Red Line station and is formally referred to as the "Bethesda South Station." The Purple Line will provide east-west service between Montgomery and Prince George's County and will result in direct connections to Metrorail Red, Green and Orange Lines, local and inter-city bus, the MARC train and Amtrak. According to an August 2013 Purple Line Travel Forecast, the Purple Line is expected to operate on a 6-minute[4] headway frequency during a typical weekday peak period and serve approximately 14,990 riders per day. No new parking will be provided to serve the new Purple Line station, therefore, it is anticipated that most riders will arrive at the station by means other than car (as is the case with Metrorail in Bethesda now). The M-NCPPC Purple Line Functional Master Plan was approved and adopted in September 2010. The Purple Line alignment through the plan area as depicted in the Functional Plan is shown below in Figures 13, 14, and 15. It should be noted that although the illustrative plans refer to a "potential" Dale Drive station in Silver Spring, the determination has been made to include the Dale Drive station as part of the initial Purple Line construction.

Figure 13: Purple Line Alignment in Montgomery County

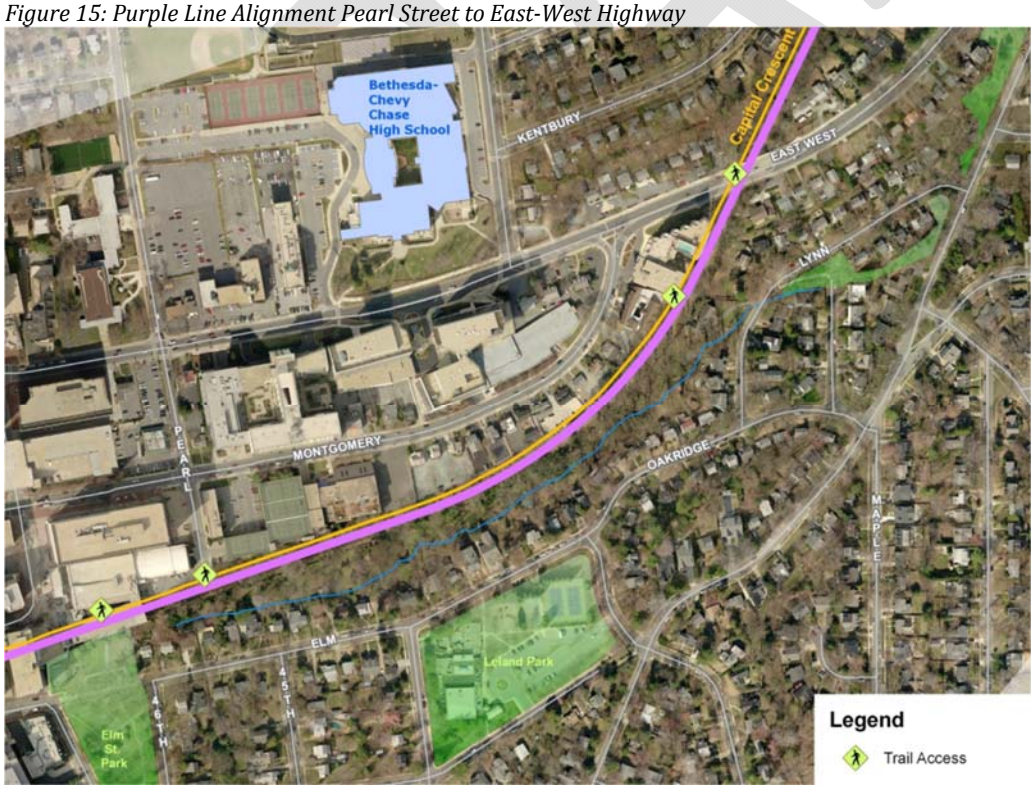


Note: The Takoma/Langley Park Station is in Prince George's County.

[4] Train headways were extended from 6-minutes to 7.5-minutes as part of a project cost savings measure in summer 2015.

Figure 14: Purple Line Alignment Woodmont Avenue to Pearl Street

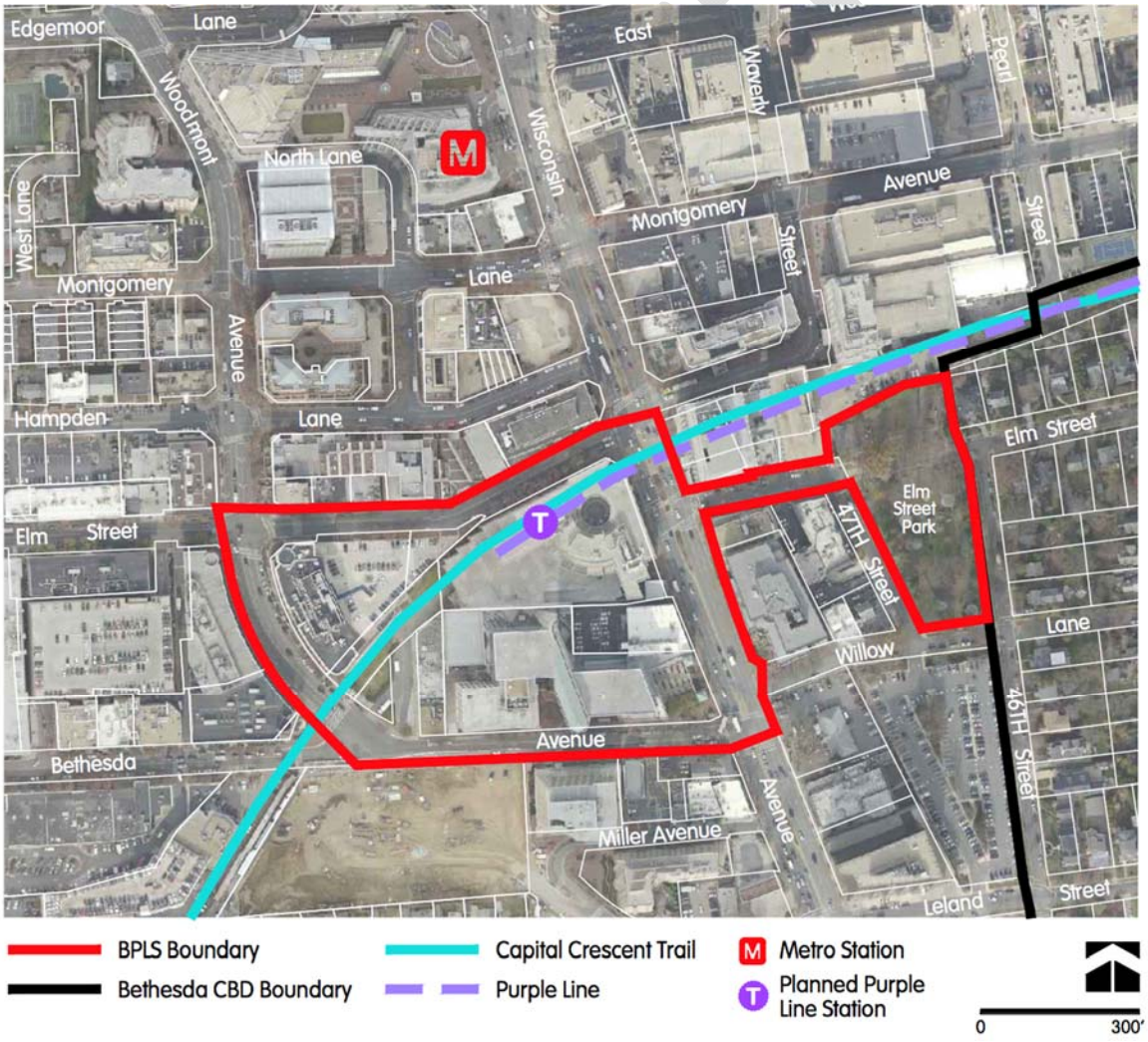
Figure 15: Purple Line Alignment Pearl Street to East-West Highway



Bethesda Purple Line Station Minor Master Plan Amendment

The Bethesda Purple Line Station Minor Master Plan Amendment, adopted February 20, 2014, amended the 1994 Bethesda CBD Sector Plan and the 2010 Purple Line Functional Plan within the vicinity of the proposed Purple Line light rail station (Bethesda South Station) to encourage a redeveloped Apex Building that would permit an enhanced Purple Line Station and a new tunnel for the Capital Crescent Trail, among other things (Figure 16). Recommendations adopted in the Minor Master Plan Amendment are carried-forward as part of the Bethesda Downtown Plan.

Figure 16: Minor Master Plan Amendment Study Area



Future Bus Rapid Transit

As previously noted, Wisconsin Avenue (MD 355) is recommended to be a future Bus Rapid Transit (BRT) corridor by the Approved and Adopted 2013 Countywide Transit Corridors Functional Master Plan (CTCFMP). The CTCFMP envisions 10 rapid transit corridors over a 102 mile long countywide network (Figure 17) as a means of increasing person throughput while managing impacts to private property outside of a very constrained public rights-of-way. The only CTCFMP designated corridor within the Downtown sector plan area is the "MD 355 South Corridor," (Figure 18) which recommends two stations in the following locations:

1) Wisconsin Avenue/ Cordell Avenue, and
2) Bethesda North Station (Bethesda Metrorail).

Figure 17: Countywide Transit Corridors System

Figure 18: MD 355 South Transit Corridor

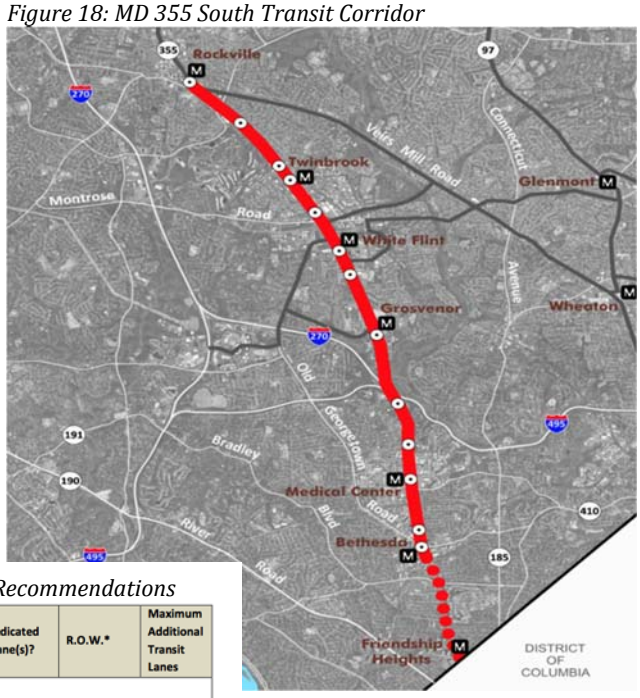


Table 8: MD 355 South Transit Right-of-Way Recommendations

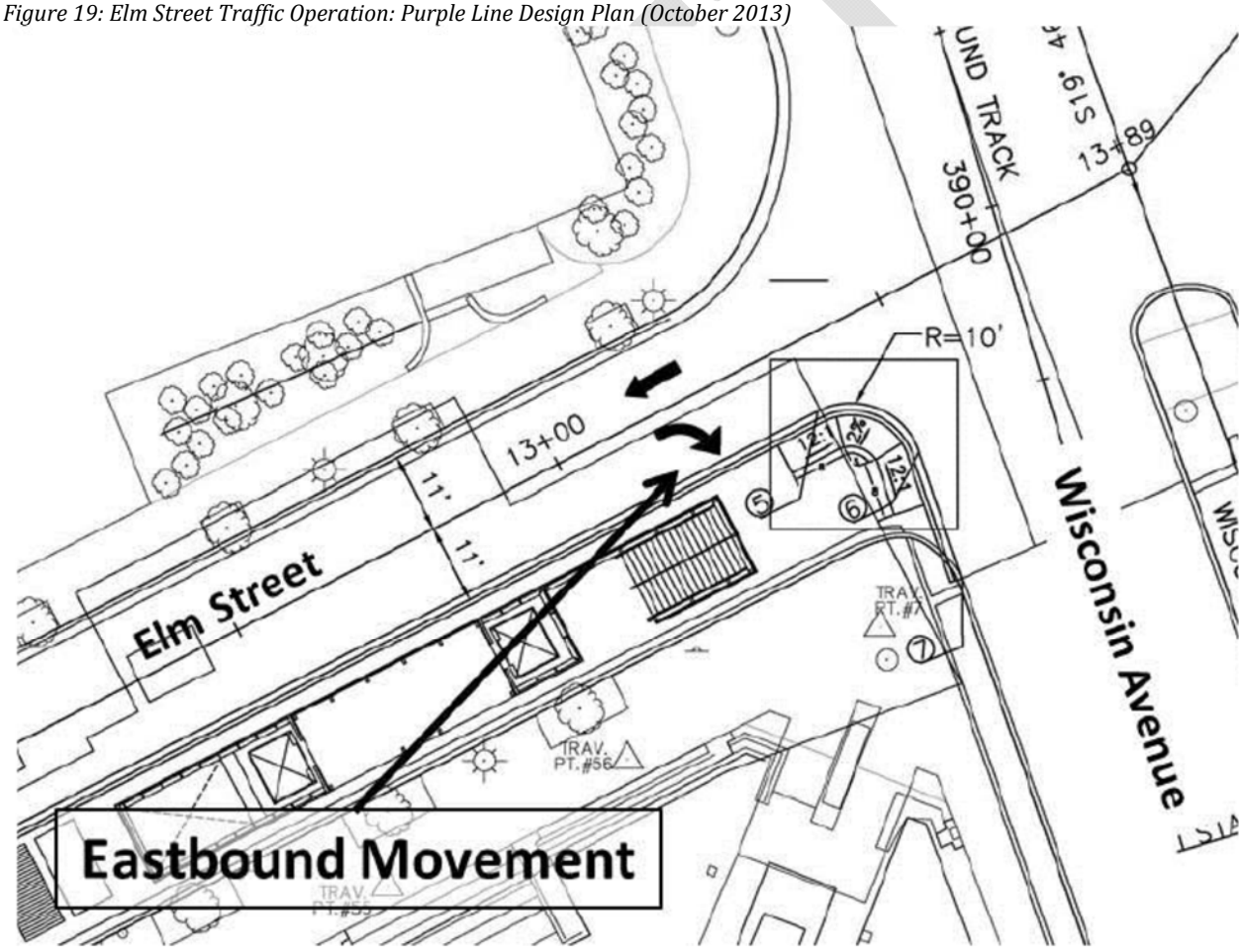
Road	From	To	Dedicated Lane(s)?	R.O.W.*	Maximum Additional Transit Lanes
MD 355	Church Street	Halpine Rd	Yes		
MD 355	Halpine Rd	250 ft south of Twinbrook Pkwy			
MD 355	250 ft south of Twinbrook Pkwy	200 ft south of Hoya St	Yes	150 (162)**	2
MD 355	200 ft south of Hoya St	Edson Ln		150 (162)**	2
MD 355	Edson Ln	Hillery Way		150 (162)**	2
MD 355	Hillery Way	Grosvenor Ln		150	2
MD 355	Grosvenor Ln	I-495		200	2
MD 355	I-495	Cedar Ln		120	1
MD 355	Cedar Ln	Woodmont Ave		123	1
MD 355	Woodmont Avenue	Chestnut St		120	1
MD 355	Chestnut Street	Bethesda Metro		122	1

*Reflects the minimum right-of-way, and may not include land needed for spot improvements such as turn lanes and stations.
** The Rockville Pike 150-foot right-of-way can be expanded to 162 feet (additional space to be obtained through reservation).

In order to encourage transfers between the BRT, Purple Line, Red Line, and local buses, BRT stations should be incorporated into both the North Bethesda and South Bethesda Stations. This plan, therefore, recommends that the MD 355 South BRT Corridor be extended from its current terminus at the Bethesda North Station to the proposed Bethesda South Station (Elm Street/ Wisconsin Avenue).

The final route and alignment of this extension should be determined through the currently in-progress BRT Corridor Study. Planning staff recognize that space constraints on Elm Street will likely preclude bus bays at this location and that additional operational analysis will be warranted before this concept can be realized. Figure 19 depicts the current Purple Line design plans (October 2013), which show eastbound traffic limited to a right-turn movement at the Wisconsin Avenue intersection. M-NCPPC comments on these drawings have requested that MTA and MD SHA permit full movement for eastbound vehicles at this location.

Figure 19: Elm Street Traffic Operation: Purple Line Design Plan (October 2013)



Bicycle and Pedestrian Facilities

Downtown Bethesda streets range from quiet residential side streets and vibrant commercial districts to regional commuter corridors, each of which has an effect on the quality of both bicyclist and pedestrian experiences. In response to its accommodation of pedestrian and bicycle travel, the League of American Bicyclists recently recognized Bethesda as a "Bicycle Friendly Community." Bicycle travel is integral to the sector plan's multimodal transportation network because it provides individuals the choice of transportation mode and extends the reach of existing transportation amenities. When individuals choose to walk or travel by bicycle, they are embracing a healthy, affordable, and efficient mode of transportation and reducing vehicular congestion. Non-motorized transportation also plays an integral role in promoting intermodal transportation (trips that involve more than one mode, e.g.: bus/ bike or Metrorail/ bikeshare, etc.). Both intermodal and multimodal strategies, in turn, contribute to a higher Non-Auto Driver Mode Share (NADMS) during the peak commuting periods. When coordinated with transit use, bicycling and walking helps connect individuals as a "first-mile/ last-mile"[5] means of transportation.

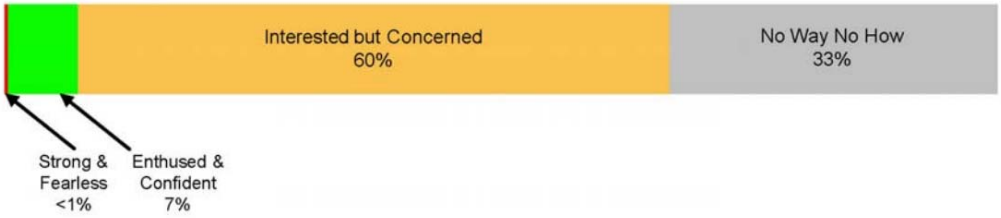
[5] First Mile/ Last Mile refers to an individual's ability to extend transit service through the use of a personal bicycle or bike sharing service, such as bikeshare.

Bicycle Planning

A high-quality pedestrian network is essential to the success of transit-oriented communities because, unlike most other modes of transportation, pedestrian activity is not simply about the modality of walking, it is about experiencing the community between points of origin and destination. That experience is not buffered by the inside of a vehicle or by the relatively faster speed of a bicycle, it is determined by the way the public realm makes a pedestrian feel during the trip. Nearly all other modes of transportation require that at least a portion of each trip be completed as a pedestrian; therefore, the quality of the pedestrian network is an issue for most residents and commuters in Downtown Bethesda.

In addition to the importance of pedestrian-friendly streets, all roads within the Downtown sector plan area should be designed for shared use by motor vehicles and bicycles and are designated as shared roadways unless another higher quality bicycle facility is provided (e.g. bike lanes). The shared roadways specifically identified in this plan are differentiated from all other streets for way finding purposes only. Bicycle planning is a rapidly evolving field with the lexicon, facility types, and the understanding of user groups somewhat in flux. The bikeway recommendations in this plan are intended to convey a quality of service that appeals to the "interested but concerned[6]" category of bicyclists who would ride their bikes more if they felt safer doing so and are based upon the state of the practice at the time of writing. A full spectrum of the population, broken down by their attitude to travel by bicycle, is provided in Figure 20. Traditionally, Montgomery County has planned for the "strong and fearless" and "interested but concerned" populations. However, this chart reveals that the greatest opportunity for increasing bicycling in Bethesda is to providing a low-stress bicycling network that attracts the "interested but concerned" population.

Figure 20: Four Types of Transportation Cyclists. (Source: Portland Office of Transportation. Portland, Oregon)



Bicycle Facility Determination

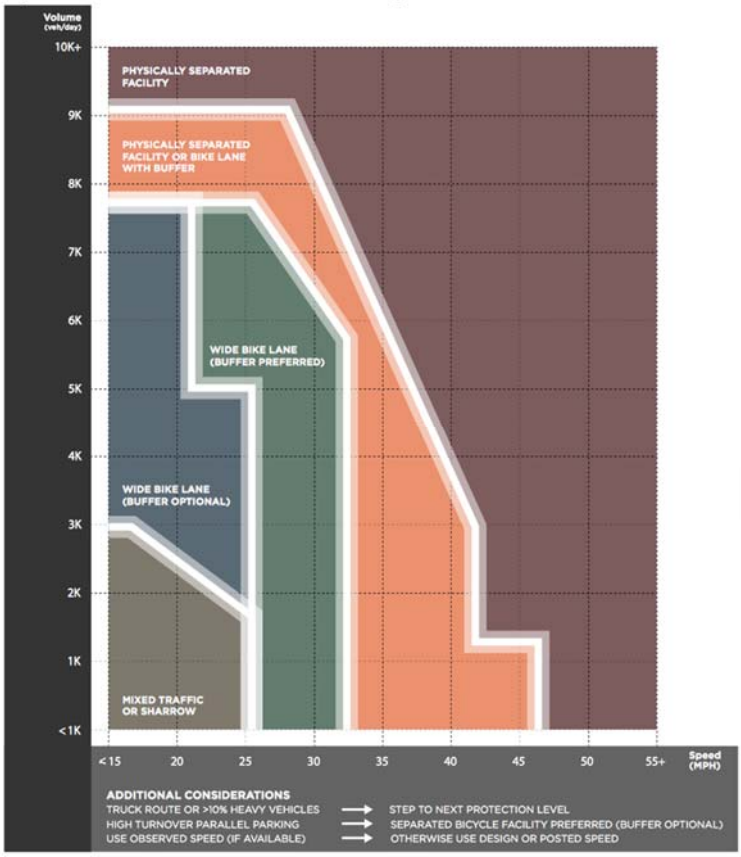
The Montgomery County Bicycle Planning Guidance, developed in July 2014, provides two planning tools for determining the suitability of specific bicycle facilities and identifying alternate bicycle routes around streets with higher vehicular speed and volumes. The first tool is a speed and volume chart, referred to as a nomograph, and the second is an analysis of the "level of traffic stress."

The guidance includes nomographs for two target audiences: the "enthused and confident" population and the "interested but concerned" population. The "strong and fearless" segment of the population does not typically demand dedicated bicycle facilities. The nomograph for the "Interested but Concerned" population is shown in Figure 21. A key take away from this graphic is that to attract

[6] "Interested but Concerned" are those who are interested in bicycling for transportation, like to ride their bicycles, but are concerned about riding on streets with vehicular traffic. Research shows that more individuals from this group would take to bicycle transportation given adequate separation from vehicular traffic.

the general population to bicycling, separated facilities are needed on any road with roughly more than 9,000 vehicles per day and most roads with a speed limit exceeding 35 mph.

Figure 21: Bicycle Facilities for the "Interested but Concerned" Population

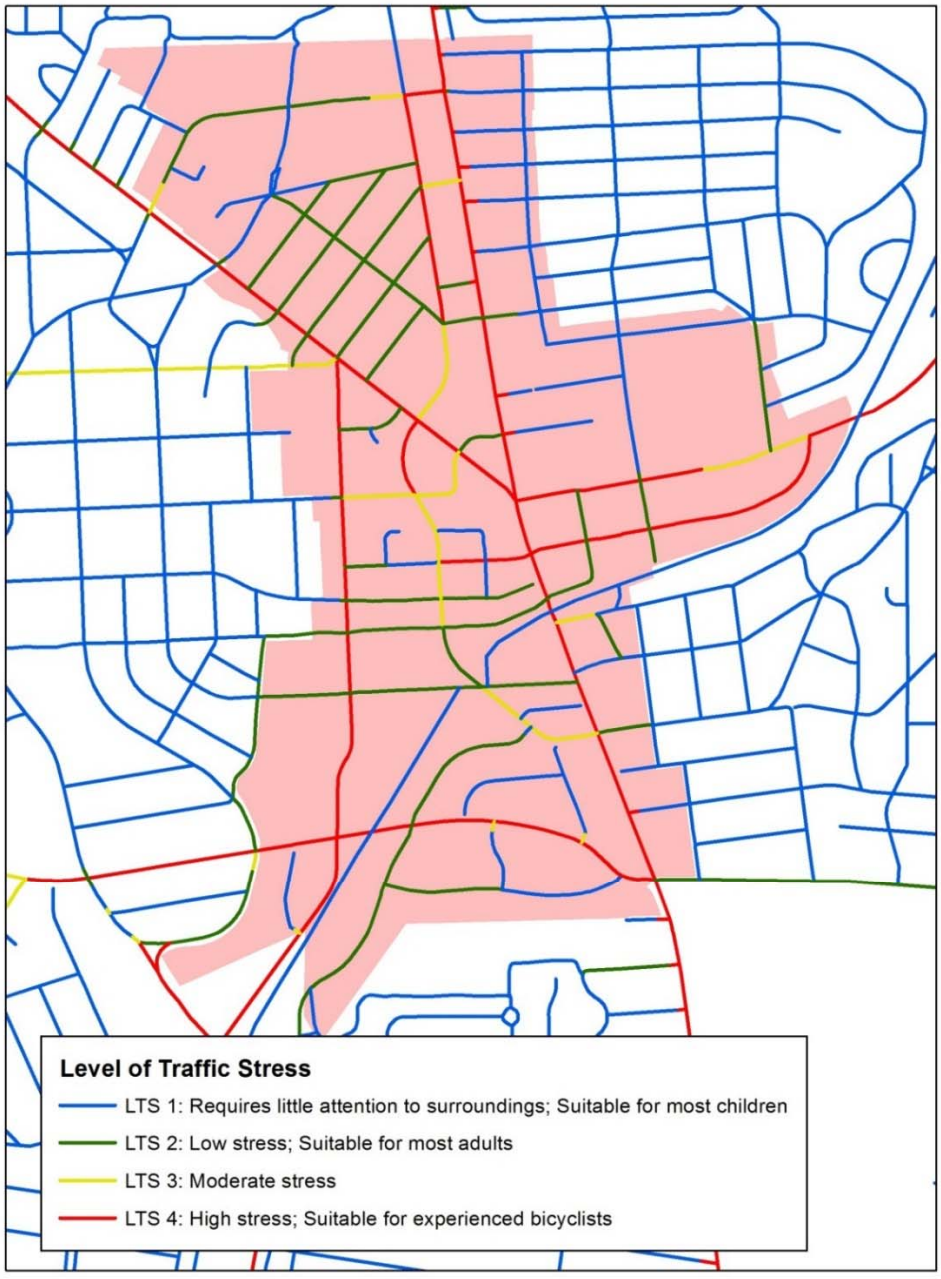


The Level of Traffic Stress methodology, developed for the Mineta Institute in 2012, is gaining acceptance among bicycle planners nationally. The Level of Traffic Stress (LTS) evaluates each road based on a stress level from "1" (lowest stress) to "4" (highest stress) for bicyclists. This approach is linked to the "Four Levels of Transportation Cyclists" shown above, thus enabling planners to estimate the percentage of the population who would feel comfortable using each road segment based on the bicycle facility provided on/ along the roadway and the vehicular speed and volume of adjacent traffic on that roadway. The four levels of traffic stress are:

- LTS 1: The lowest level of traffic stress requiring little attention to surroundings and suitable for many children. Roads considered to have a LTS 1 are typically neighborhood roads, or busier roads that have a separated bikeway, such as separated bike lanes or shared use paths. This level corresponds to the "Interested but Concerned" group.
- LTS 2: Roads that have a low level of stress and are suitable for most adults. This level also corresponds to the "Interested but Concerned" group.
- LTS 3: Roads with a moderate level of stress and that are suitable for the "Enthused and Confident" group. LTS 3 roads are appropriate for roughly 10% of the population.
- LTS 4: Roads with a high level of stress and that are suitable for the "Strong and Fearless" group. LTS 4 roads are appropriate for roughly 1-4% of the population. Examples of LTS 4 roads are Wisconsin Avenue, Old Georgetown Road, and Bradley Boulevard.

A Level of Traffic Stress analysis was conducted for existing conditions (Figure 22) to aid in the determination of appropriate master planned bicycle facilities.

Figure 22: Bicycle Level of Traffic Stress Analysis for Existing Conditions



The analysis of existing conditions shows that there are islands of low-stress bicycling (LTS 1 and LTS 2) surrounded by streets with moderate-to-high levels of traffic stress (LTS 3 and LTS 4). Connecting these low-stress islands at key locations can create a robust bicycling network that spans high stress roadways (and other barriers) that can be comfortable to the majority of the adult population.

Master Plan Approach

The recommendations in this sector plan were based on analysis that followed the Level of Traffic Stress Analysis criteria discussed above. Bicycle recommendations in the sector plan were then refined using the following criteria:

- Accommodate bicyclists with different levels of ability: While some bicyclists are comfortable riding on the road, either sharing the lane with traffic or in separated bike lanes, other bicyclists are more comfortable riding on off-road shared use paths that are physically separated from the roadway. The sector plan includes recommendations for both on-road and off-road bicycle facilities.
- Separation from Pedestrians in Urban Areas: Due to the substantial volumes and meandering travel patterns of pedestrians in urban environments, on-road bikeways (such as separated bike lanes, buffered bike lanes, traditional bike lanes) are recommended instead of shared use paths along roadways. In these urban environments, the speed differential between pedestrian and bicycle traffic on public sidewalks often leads to conflicts and a degradation of quality for both parties. As a result, bicyclists are often reluctant to travel in what is perceived as a pedestrian-only space. The only exception to this criteria exists along independent rights-of-way, such as the Capital Crescent Trail and the North Bethesda Trail, where both pedestrians and bicyclists typically travel in a straight line and there exists an expectation from both parties that the trail is a shared facility.
- Enhance connections to transit: A robust bikeway network with direct connections to the transit can attract people who live beyond the walking area around transit stations, typically considered to be a distance of 0.5 to 1.0 miles (5 – 10 minute walk, respectively). The Capital Crescent Trail, Bethesda Trail, and local bikeways serve as the primary regional bikeways to the transit stations.
- Facilitate east-west connectivity: Located between the Westbard sector plan area, Lyttonsville sector plan area, and ultimately, the Silver Spring Central Business District, bikeway recommendations in this sector plan area are a vital component to create an east-west bikeway network. The Capital Crescent Trail is the primary east-west bikeway connecting Bethesda and Silver Spring.
- Facilitate north-south connectivity: The sector plan area is also located between White Flint and the District of Columbia. The North Bethesda Trail and on-street bicycle network will provide connectivity between these areas.
- Propose new classification, “Separated Bike Lanes (CT)” to cover cycle tracks, buffered bike lanes, and Separated Bike Lanes

Bicycle Facility Classification

Bicycle facilities in Montgomery County are designed to be used by a wide variety of bicyclists with differing travel purposes, abilities, and levels of comfort with vehicular traffic. In response to that variety, there exists a range of bicycle accommodation available for implementation. Existing and proposed bicycle facilities within the sector plan area include the following (See also, Figure 23):

(a) Shared use path: A paved path that is typically 10 feet wide but can vary between 8 and 14 feet wide, designated for bicycles and pedestrians that is separated from motorized traffic by a curb, barrier, or landscape panel.

(b) Bike lane: A portion of a roadway designated by striping, signing, or pavement markings for the preferential or exclusive use of bicycles, and on which through-travel by motor vehicles is not allowed.

(c) Shared use roadway: A roadway open to both bicycle and motor vehicle travel and which is designated as a preferred route for bicycle use by warning or informational signs.

(d) Separated bike lane: also known as a protected bike lane or cycle track; a bikeway that is physically separated from motor vehicles and pedestrian facilities. The separation may be vertical, such as a curb; horizontal, such as a landscape panel or parking lane; or a combination.

(e) Buffered bike lane: a bikeway separated from a motor vehicle travel lane with an area of striped pavement.

Figure 23: Types of Bicycle Facilities

Existing and proposed bikeways, identified in the Master Plan of Bikeways, are illustrated in are illustrated in Figure 25.

Regional Bikeways

North Bethesda Trail[7]

The North Bethesda Trail provides a critical regional trail connection between Downtown Bethesda and Rockville via White Flint. At the sector plan level, this trail provides a direct connection between the Woodmont Triangle, NIH, and points north of the sector plan. This trail is currently improved

[7] The North Bethesda Trail is also referred to as the "Bethesda Trolley Trail."

with a substandard width for a shared use path, resulting in a lower quality experience for those who use the trail.

Capital Crescent Trail

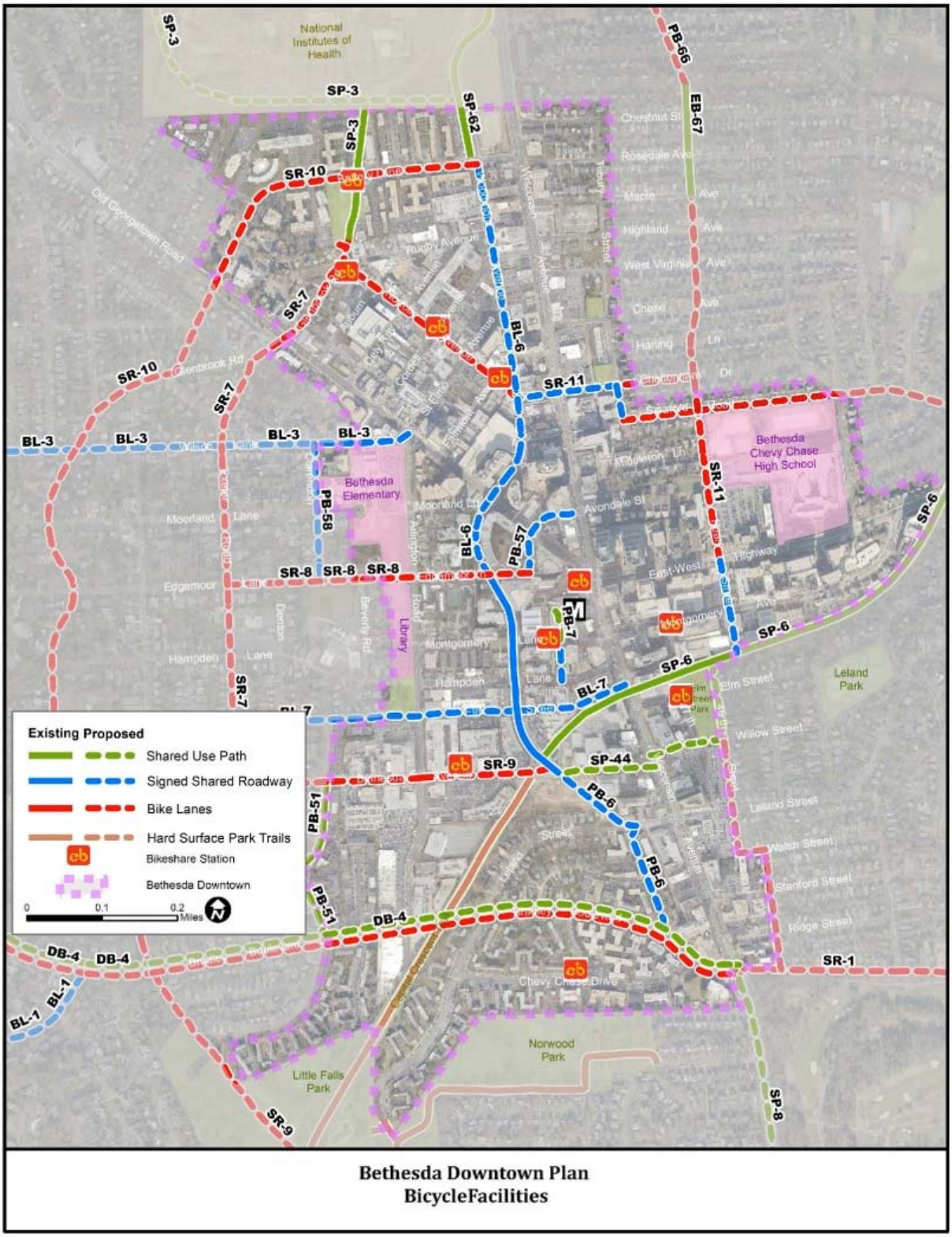
The Capital Crescent Trail is an off-road shared-use path that forms a crescent as it travels from Georgetown to Silver Spring via Bethesda in the Georgetown Branch right-of-way. Montgomery County purchased the right-of-way between the District of Columbia and the CSX rail line just west of Silver Spring in 1988. M-NCPPC has jurisdiction over the portion between the DC Line and Bethesda and the Montgomery County Department of Transportation has jurisdiction over the portion between Bethesda and Silver Spring. In 1990, the National Park Service acquired the Georgetown Branch from Georgetown to the DC Line. The Capital Crescent Trail is currently paved between Georgetown and Bethesda. Between Bethesda and Silver Spring, the trail is currently called the Interim Georgetown Branch Trail and is improved with a gravel surface between Bethesda and Lyttonsville. Between Lyttonsville and Silver Spring, the trail is currently on local streets. A capital project is currently underway to extend the Capital Crescent Trail as a paved off-road shared use path from Bethesda to Silver Spring in conjunction with the Purple Line light rail project (figure 24). Once completed, this trail segment will typically measure 12 feet wide with an additional 2 foot-wide unpaved shoulder on each side. It will serve a recreational and a transportation function, as well as providing direct access to both the Purple Line and the Bethesda and Silver Spring Metrorail stations.

Figure 24: Capital Crescent Trail and Purple Line Light Rail Illustrative Rendering[8]

Source: Maryland Transit Administration

[8] Figure 24 is intended for illustrative purposes only. At the time this Appendix was prepared, the "green track" elements depicted in the image were being considered for removal.

Figure 25: Existing and Proposed Master Plan Bikeways



Bicycle Parking

Bicycle parking facilities are of equal importance to active bicycle facilities (bike lanes, paths, etc.) because bicycle parking at each trip end influences the quality and utility of that particular trip. At this time, short-term "inverted-U" bicycle racks located within the streetscape near building entrances typically provide public bicycle parking. Long-term public bicycle parking is provided at the Bethesda North Station via weather-protected bike lockers. A bicycle parking station is recommended at the Bethesda South Station in the Bethesda Purple Line Station Minor Master Plan Amendment. The Bethesda Downtown sector plan should consider the provision of high-quality, secure bicycle parking infrastructure.

Bike Share

A bicycle sharing system (Figure 26) is a quasi-transit service in which a fleet of bicycles is available for rent on a short-term basis, often measured by the minute. The short-term nature of each trip taken using this system is encouraged through an increasing price structure which becomes more expensive the longer a member uses a bike for a particular trip. As a result of the short-term use of each bicycle, the bike share system can handle a high volume of users during periods of peak demand by virtue of the system's rapid turnover. Membership subscriptions into such a system can be entered into by the day (typically tourist use), month, or year. Many cities around the country currently have some form of bike share system operated by a private sector company. In the Metropolitan Washington Region, that system is referred to Capital Bikeshare[9].

In fall 2013, the Capital Bikeshare program expanded from the District of Columbia into Bethesda, Silver Spring, Takoma Park, and Rockville. MCDOT plans and operates this system in Montgomery County and currently has 10 stations within the Bethesda Downtown sector plan area. These stations are located near conventional transit (e.g.: bus stops, Metrorail, etc.) and facilitate improved options for intermodal transportation within the sector plan area. Additionally, bike share stations better integrate Downtown Bethesda with close-in surrounding neighborhoods and communities within the District of Columbia. A map of proposed and existing bike share stations and bicycle docking capacity is provided in Figure 27 and Table 9. The Bethesda Downtown sector plan should consider potential expansion areas for this service within the sector plan area.

[9] Capital Bikeshare is jointly operated by ALTA Planning + Design and by participating jurisdictions, including Montgomery County, within the MWCOG Contract.

Figure 26: Capital Bikeshare (Source: Capital Bikeshare)

Table 9: Bethesda Vicinity Bikeshare Stations

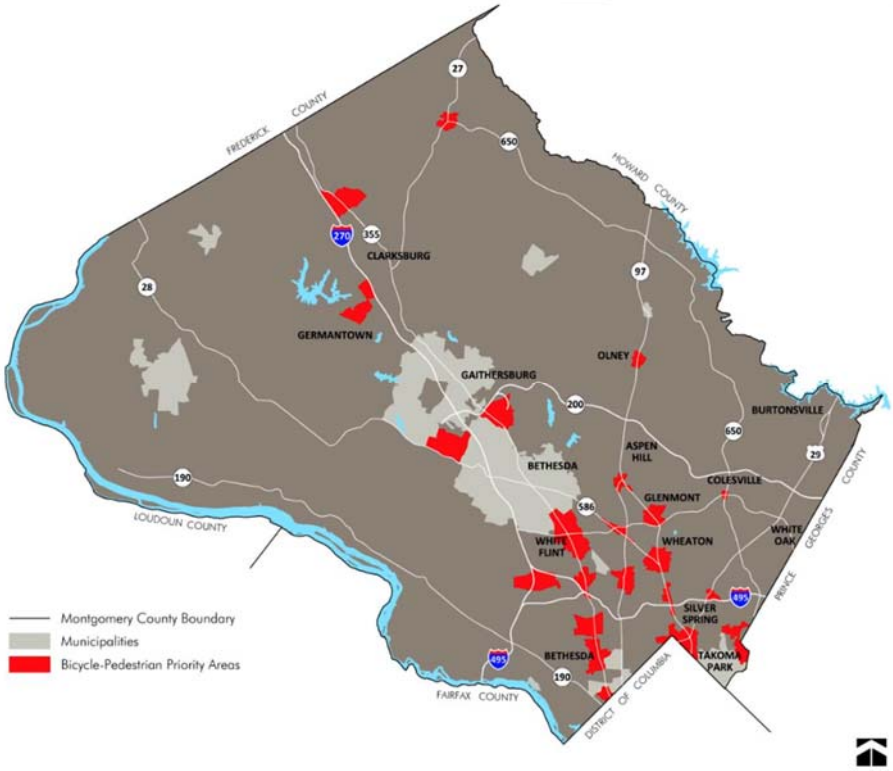
Location	Docks
Chevy Chase Dr & Offut Ln	11
Bethesda & Arlington	19
Elm & 47th	15
Montgomery & Waverly	11
Montgomery Ave & East Ln.	11
Bethesda Metro	12
Norfolk & Fairmont	11
Cordell & Norfolk	11
Norfolk & Rugby	11
Battery Lane & North Bethesda Trail	15

Figure 27: Bethesda Vicinity Bikeshare Stations (Source: MCDOT)

Bicycle Pedestrian Priority Area

The Downtown sector plan area is entirely within a Bicycle-Pedestrian Priority Area (BPPA), designated by Montgomery County as part of the Approved and Adopted 2013 Countywide Transit Corridor Functional Master Plan (figure 28). Prior to formal recognition as a BPPA by the State of Maryland, however, the State Highway Administration must concur with the County's designation. Once formal concurrence has been issued, Downtown Bethesda would become eligible for specific State funding intended to enhance and prioritize bicycle and non-motorized travel within the transportation network. The BPPA designation is authorized through Section 2-604 of the Annotated Code of Maryland. Although the BPPA is not yet recognized by the Maryland State Highway Administration, Montgomery County has a program to enhance bicycle and pedestrian accommodation in these areas through its Capital Improvement Program (CIP). For the fiscal year 2015 to 2021, there is $5.4 million to plan, design, and construct improvements, including but not limited to: sidewalk, curb, and curb ramp reconstruction to meet ADA best practices, bulb-outs, cycle tracks, street lighting, and relocation of utility poles.

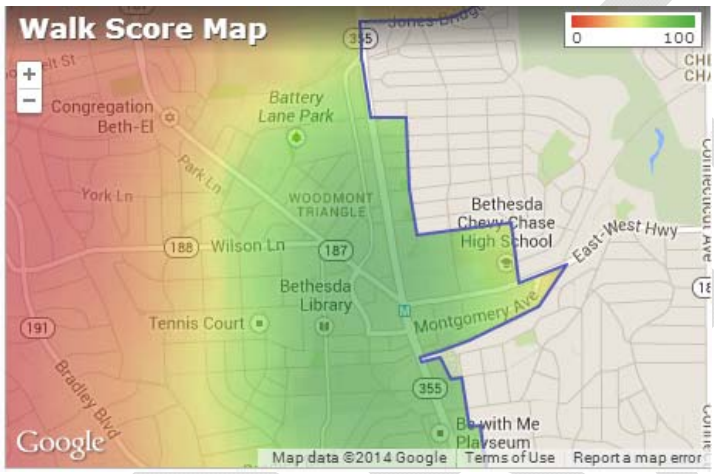
Figure 28: Bicycle Pedestrian Priority Areas



Pedestrian Network

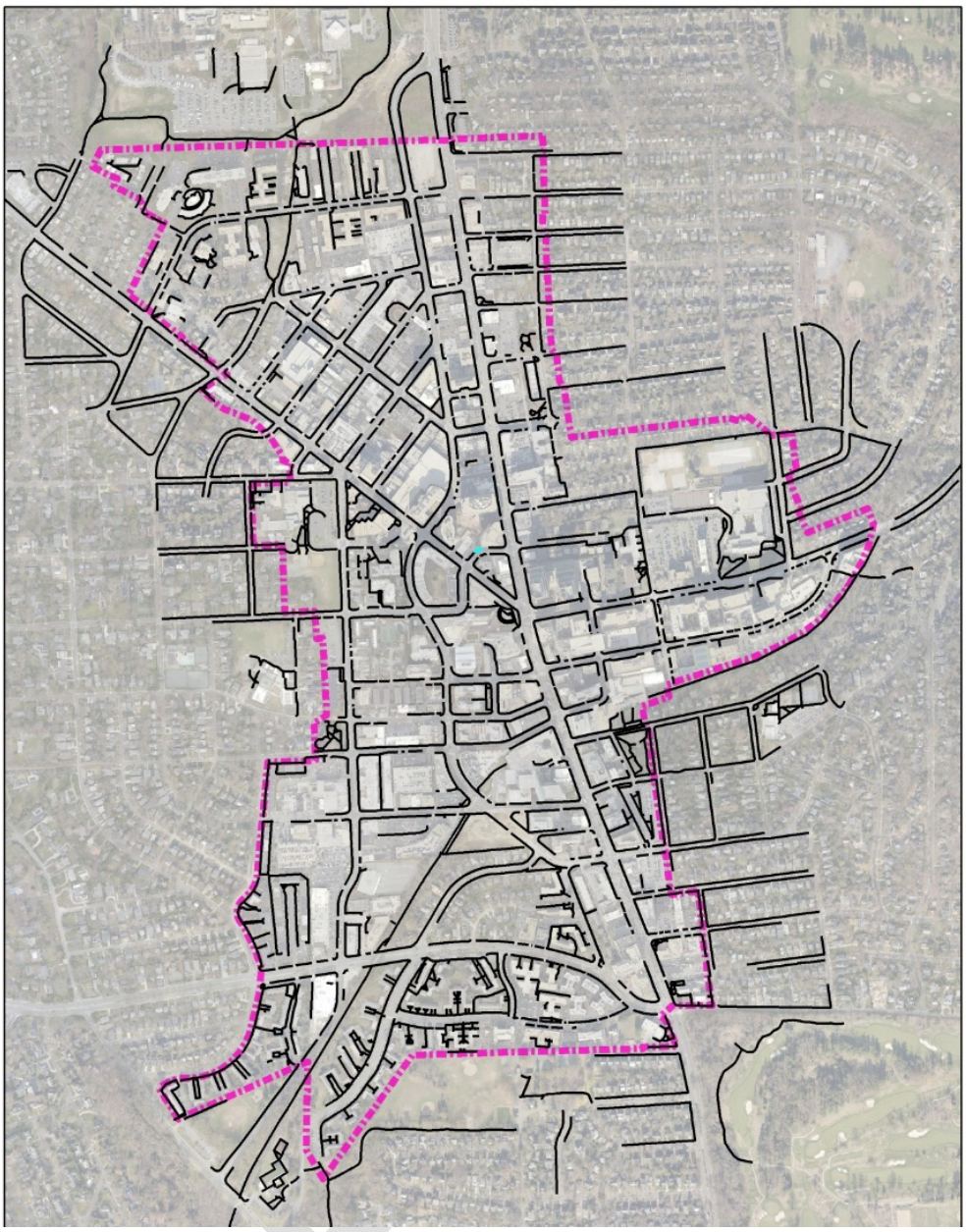
Bethesda is a pedestrian oriented community that offers a wide variety of employment, commercial, and recreational amenities within walking distance of transit facilities and residences. This pedestrian accessibility is demonstrated in the community's "walkscore," a proprietary Internet application (www.walkscore.com) that rates the degree to which neighborhoods are accessible to pedestrians via transit and proximity to neighborhood services. While primarily intended for individuals making real estate decisions and not a scientific measure of accessibility, the walkscore application provides a means to compare Bethesda with other communities around the country. Based on Walkscore's criteria, the Bethesda Downtown sector plan area is rated a "Walkers Paradise" with a score of 95/100. For comparison, the greater Bethesda/ Chevy Chase Policy Area is rated a "Car Dependent City," with a score of 47/100, while the City of Rockville is rated "Somewhat Walkable" with a score of 51/100. New York City is rated "Very Walkable" with a score of 88/100.

Figure 29: Bethesda Walkscore Map (Source: Walkscore.com)



Another measure of walkability is the density of street intersections within a study area. This measure provides a correlation between the physical design of a neighborhood and the degree to which that design supports pedestrian travel. According to neighborhood design principles, intersection density is correlated with a high degree of pedestrian accessibility and general walkability due to shorter blocks and multiple route options between any given origin and destination point. The Bethesda Downtown sector plan area comprises approximately 405 acres and 106 public street intersections, giving the district a density of approximately 168 intersections per square mile. Stemming from these intersections is a well-connected sidewalk network (Figure 30) that provides direct connections for the origin and destination of most trips.

Figure 30: Existing Sidewalk Network



Parking

The purpose of the Parking Lot District (PLD) is to support Montgomery County's CBDs and promote an efficient urban form without excessive amounts of surface parking lots. Adequate parking is a necessary component of a viable and attractive downtown, however, the current state of the practice in transportation planning recommends a balanced approach to parking supply due to the correlation between parking supply and traffic congestion. When designed to fit within an urban context, parking infrastructure supports adjacent land uses and complements a multimodal transportation network. Programmatic elements, such as strategic limitations to both price and supply of parking, contribute to a balanced transportation system with less reliance on single-occupancy vehicles. The proper balance of parking facilities should support commercial viability and reflect the full cost of parking and traffic congestion. Historically, constrained parking has been implemented as a policy in Downtown Bethesda for office uses. The Bethesda Downtown Plan recommends expanding that goal to include all parking facilities within the downtown area. In an attempt to make the PLD boundary and mixed-use zoning consistent, the Sector Plan recommends expanding the PLD Boundary to include properties designated for CR Zoning as part of the Sector Plan. MCDOT should evaluate new programmatic elements to integrate parking management with existing and expanded transportation demand management initiatives.

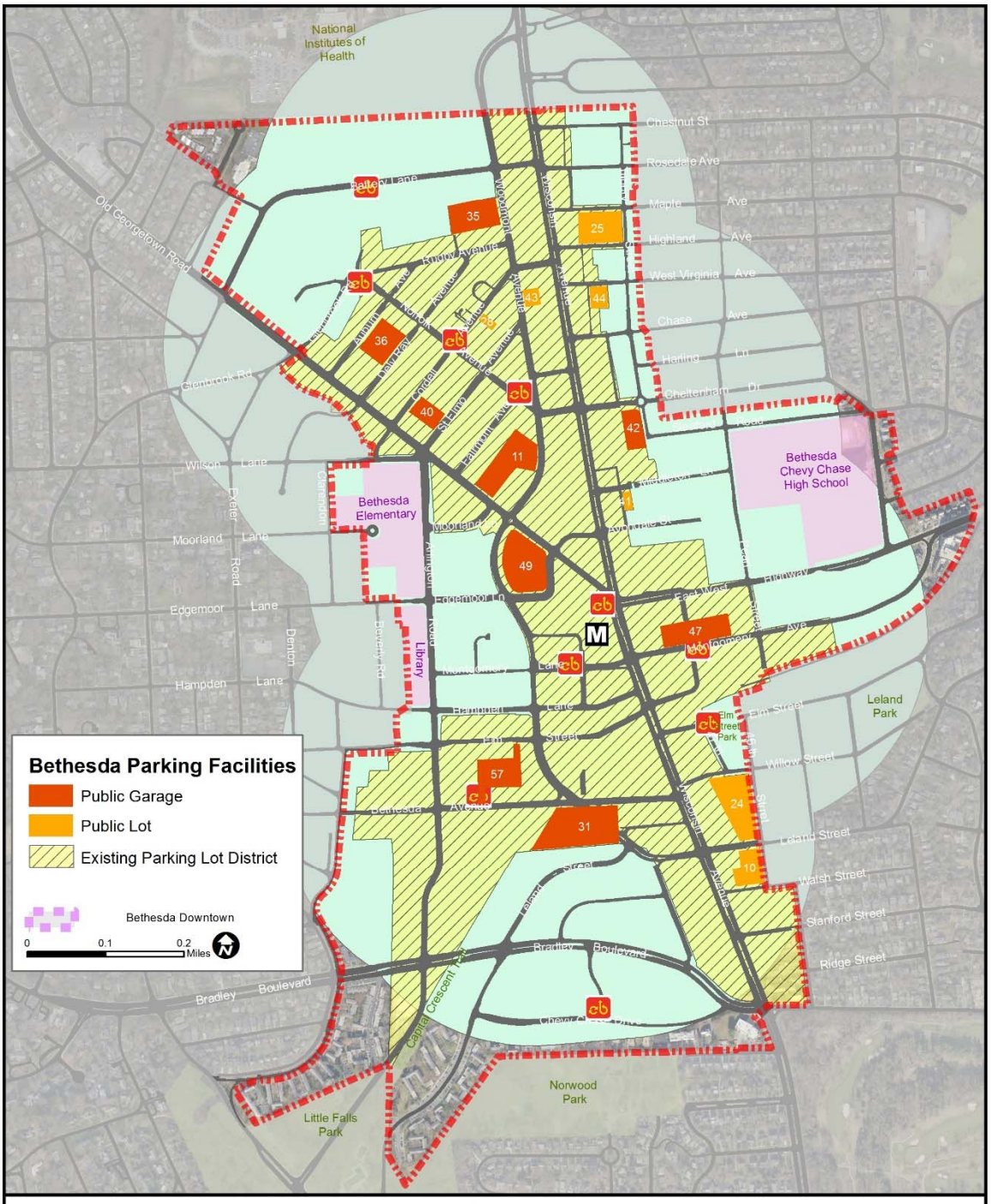
The Bethesda Parking Lot District has 8 public parking garages and 8 public parking lots with a total public parking capacity of 6,190 vehicles. Public parking lots 31 and 31A (approximately 3.3 acres of surface parking) were recently redeveloped, through a partnership between Montgomery County and a private developer, to construct a mixed use retail/ residential building and public garage with 940 new public parking spaces/ 290 private tenant spaces. The redevelopment now includes approximately 40,000 square feet of ground-level retail and 250 high-rise residential dwelling units.

Table 10: Bethesda Parking Lot District Usage Summary FY2013 (Source: MCDOT)

Garage/ Lot	Capacity	Percent Occupied
Garage 11	1095	48%
Garage 35	487	78%
Garage 36	729	55%
Garage 40	327	89%
Garage 42	337	47%
Garage 47	814	72%
Garage 49	949	75%
Garage 57	890	84%
Lot 8	10	94%
Lot 10	94	78%
Lot 24	210	77%
Lot 25	124	50%
Lot 28	18	98%
Lot 41	18	57%
Lot 43	37	79%
Lot 44	51	47%
Total	6190	68%

The sector plan recommends expanding the PLD to include more of the Downtown area. This recommendation is based, in part, on the 5-minute walkshed analysis of existing parking facilities (figure 31), which demonstrates that the majority of Downtown Bethesda is within a reasonable walk to public parking.

Figure 31: Five Minute Walk to Parking Lot District Facilities



Bethesda Downtown Plan
Parking Facilities