



## White Flint 2 Sector Plan Worksession No. 1: Transportation Analysis and Staging

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### Summary

Staff will present the contents of the transportation analysis that provides the foundation to the mobility recommendations in the White Flint 2 Sector Plan Public Hearing Draft Plan. It illustrates the impacts on the existing roadway network based on the recommended level of development. The recently approved Subdivision Staging Policy (SSP), including Highway Capacity Manual (HCM) standards, is not included in this analysis. Staff will return to the Board with the HCM analysis at a later worksession. Key transportation recommendations and policies that are associated with the adjacent White Flint Sector Plan are also summarized in this report. In addition to the transportation analysis, the staging of development recommended in the Draft Plan is also addressed in this memorandum.

The Planning Board held a Public Hearing on the White Flint 2 Sector Plan on January 12, 2017. The Public Hearing record will remain open until January 26, 2017 and it will be summarized after the record is closed. Staff will return to the Board on February 9 to begin the district by district review of the Draft Plan recommendations.

## **PURPOSE OF THIS WORKSESSION**

The purpose of this worksession is to: (1) To provide the transportation analysis to the mobility network in the Public Hearing Draft Plan, including the applicable transportation standards; and (2) to provide an overview and rationale of the proposed staging plan. Background on the 2010 White Flint Sector Plan staging and transportation recommendations are also included in this review to provide context to the White Flint 2 Public Hearing Draft recommendations.

## **TRANSPORTATION REVIEW**

The transportation review performed to date in support of this Plan followed the transportation analysis methods and adequacy guidelines specified by the 2012-2016 Subdivision Staging Policy (SSP) which relied heavily on the Critical Lane Volume (CLV) method to evaluate local intersection performance and the Transportation Policy Area Review (TPAR) process to evaluate policy area transportation adequacy. The results of this analysis are summarized and described in the Plan's Transportation Appendix provided as an attachment to this report. The recently adopted 2016-2020 SSP (adopted November 15, 2016) established a new transportation system analysis and performance adequacy paradigm reflecting two key changes relative to the methods used previously:

- The CLV method is deemphasized in favor of the application for the delay-based Highway Capacity Method (HCM) to evaluate the performance of local intersections in most areas of the County (including the White Flint 2 Plan Area).
- TPAR has been eliminated as a policy area test in the context of the SSP regulatory process.

Additional transportation analysis will soon be underway to reflect these changes. The results of this effort will be provided at a subsequent worksession in support of this Plan.

## BACKGROUND: 2010 WHITE FLINT SECTOR PLAN

The Approved and Adopted 2010 White Flint Sector Plan creates the framework to transform strip commercial centers and an auto-oriented suburban development pattern in North Bethesda into an urban center that is supported by new public amenities, parks and open spaces, and a new street network. The proposed cultural and retail destinations in and around the civic core, the open space system, and the walkable street grid unite to energize White Flint. The Plan also proposes redesigning Rockville Pike (MD 355) as an urban boulevard with a median, street trees and space for future bus rapid transit (BRT).

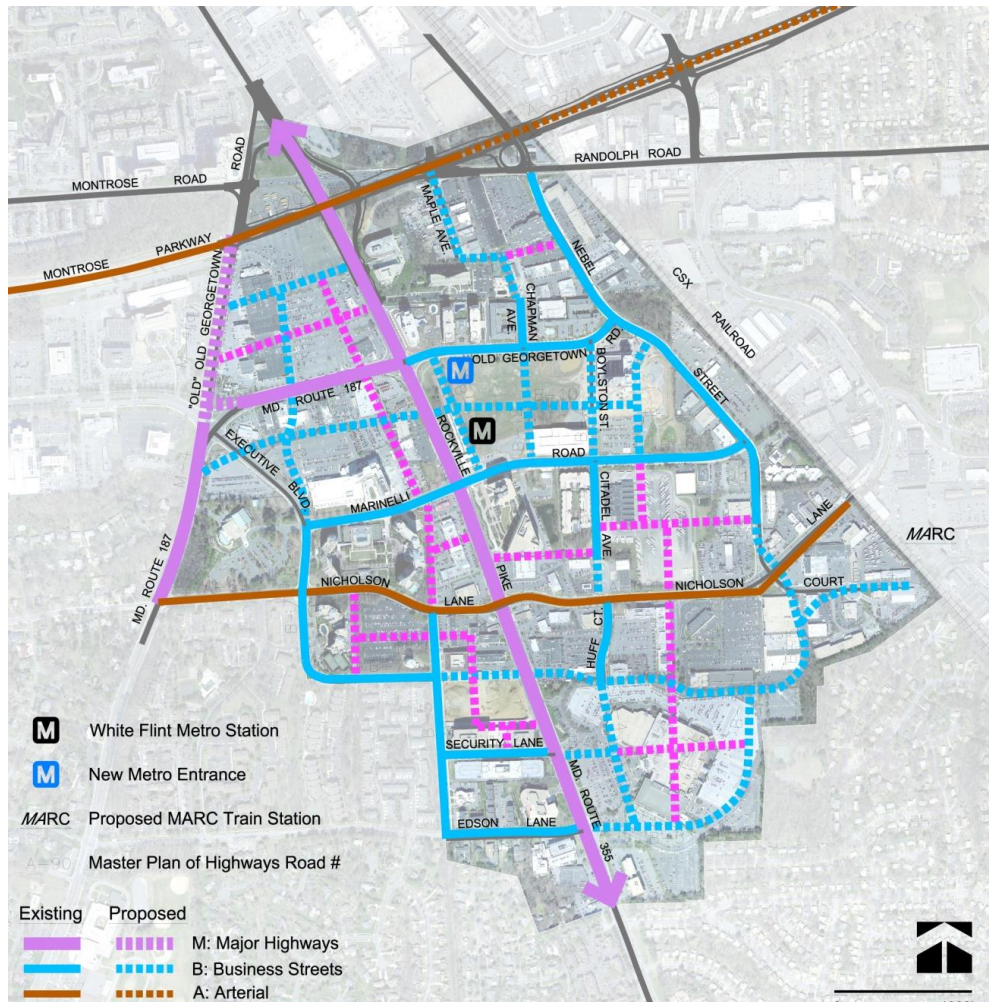
### Staging

The 2010 Plan recommends 9,800 new residential dwelling units and 5.69 million square feet of new non-residential development. This amount of development is divided into three phases in the staging plan with each phase requiring a variety of transportation infrastructure projects that should be funded, contacted or built. Each phase requires the achievement of a specific Non-Automotive Driver Mode Share (NADMS) goal. The overall staging plan is illustrated below.

<b>Table 6 : Staging Plan</b>		
<b>Phase 1</b> 3,000 dwelling units 2 million square feet non-residential	<b>Phase 2</b> 3,000 dwelling units 2 million square feet non-residential	<b>Phase 3</b> 3,800 dwelling units 1.69 million square feet non-residential
<p>Contract for the construction of the realignment of Executive Boulevard and Old Georgetown Road.</p> <p>Contract for construction of Market Street (B-10) in the Conference Center block.</p> <p>Fund streetscape improvements, sidewalk improvements, and bikeways for substantially all of the street frontage within one-quarter mile of the Metro station: Old Georgetown Road, Marinelli Road, and Nicholson Lane.</p> <p>Fund and complete the design study for Rockville Pike to be coordinated with SHA, MCDOT and M-NCPPC.</p> <p>Achieve 34 percent non-auto driver mode share for the Plan area.</p> <p>The Planning Board should assess whether the build out of the Sector Plan is achieving the Plan's housing goals.</p>	<p>Construct streetscape improvements, sidewalk improvements, and bikeways for substantially all of the street frontage within one-quarter mile of the Metro station: Old Georgetown Road, Marinelli Road, and Nicholson Lane.</p> <p>Complete realignment of Executive Boulevard and Old Georgetown Road.</p> <p>Construct the portion of Market Street as needed for road capacity.</p> <p>Fund the second entrance to the White Flint Metro Station.</p> <p>Explore the potential for expediting portions of Rockville Pike where sufficient right-of-way exists or has been dedicated. It should be constructed once the "work-around" roads are open to traffic.</p> <p>Increase non-auto driver mode to 42 percent.</p> <p>The Planning Board should assess whether the build out of the Sector Plan is achieving the Plan's housing goals.</p> <p>The Planning Board must develop a plan to determine how to bring the mode share to 51 percent NADMS for residents and 50 percent NADMS for employees during Phase 3.</p>	<p>Complete all streetscape improvements, sidewalks, and bikeways outside one-quarter mile from the Metro.</p> <p>Reconstruct any remaining portion of Rockville Pike not constructed during prior phases.</p> <p>Achieve the ultimate mode share goals of 51 percent NADMS for residents and 50 percent NADMS for employees.</p>

## Street Network

The 2010 Sector Plan recommends a new grid of streets, east and west of Rockville Pike (MD 355), that increases mobility options for pedestrians, bikes and vehicles. Another key street network recommendation is the transformation of Rockville Pike (MD 355) into an urban boulevard with Bus Rapid Transit (BRT) alternatives.



2010 White Flint Sector Plan Street Network

## White Flint Special Taxing District

The White Flint Special Taxing District is an *ad valorem* property tax that funds specific transportation infrastructure in the 2010 White Flint Sector Plan area. Established in 2011, the Special Taxing District (Bill No. 50-10) exempts new White Flint development from Transportation Policy Area Review (TPAR) and Local Area Transportation Review (LATR). In addition to the creation of the taxing district, the Council also approved the White Flint Sector Plan Implementation Strategy and Infrastructure Improvement List (Resolution No. 16-1570) that specifies the different transportation projects that will be funded.

## Roadways Implementation

The Western Workaround, which includes the extension and realignment of Executive Boulevard (future Grand Park), Main /Market Street, and Towne Road is currently under construction. The FY CIP (P501506) indicates that construction is funded for this project through FY2020.

## **White Flint Traffic Studies**

Since the adoption of the 2010 White Flint Sector Plan, several transportation studies have been conducted for the White Flint Sector Plan area, including the southern portion of the City of Rockville. The State Highway Administration (SHA) expressed concern regarding future potential congestion on Rockville Pike (MD 355) and Old Georgetown Road (MD 187). The various traffic studies, including approaches and techniques are indicated below:

<b>Traffic Impact Study Author</b>	<b>Modeling Tool/ Methods</b>	<b>Performance Measures</b>
Stantec, Inc.	<ul style="list-style-type: none"><li>■ Critical Lane Volume (CLV)</li><li>■ Synchro</li></ul>	<ul style="list-style-type: none"><li>■ CLV</li><li>■ Highway Capacity Manual (HCM) level of service</li><li>■ HCM v/c ratio</li></ul>
STV Group, Inc.	<ul style="list-style-type: none"><li>■ VISSIM (micro-simulation)</li></ul>	<ul style="list-style-type: none"><li>■ CLV</li><li>■ HCM level of service</li><li>■ HCM v/c ratio</li><li>■ Person Throughput</li></ul>
Sabra, Wang & Associates, Inc.	<ul style="list-style-type: none"><li>■ Critical Lane Volume (CLV)</li><li>■ Synchro</li><li>■ VISTRO (micro-simulation)</li></ul>	<ul style="list-style-type: none"><li>■ CLV</li><li>■ HCM level of service</li><li>■ HCM v/c ratio</li><li>■ Connectivity Index</li><li>■ Person Throughput</li></ul>

## Traditional Traffic Impact Study (Stantec)

Between 2012 and 2014, a traditional traffic impact analysis was conducted by the Stantec, an engineering and consulting firm, on behalf of Montgomery County Department of Transportation (MCDOT) and Maryland State Highway Administration (SHA). Stantec analyzed the estimated future traffic impact on the White Flint Sector Plan's recommended development with a focus on two major state roadways: Rockville Pike and Old Georgetown Road. It also utilized the public streets recommended in the White Flint Sector Plan. This study examined existing traffic conditions in the Plan area, and it also estimated future traffic conditions under two planning horizons: 2022 and 2042. Intersections within the Plan area were evaluated using the *Synchro/Highway Capacity Manual* analysis procedures as well as the critical lane volume (CLV) method. The study identifies intersections that are projected to exceed the applicable Local Area Transportation Review (LATR) level-of-service standards and recommends possible intersection geometric changes to mitigate adverse traffic impacts.



# WHITE FLINT SECTOR PLAN AREA TRAFFIC ANALYSIS

Source: White Flint Traffic Operations Analysis (MCDOT, Spring 2015)

Intersection	CLV Results					
	Existing			Year 2022		
	AM	PM	Set	AM	PM	Set
MD 355 @ Montrose Parkway NB Ramps	723	752	616	1,308	1,234	866
MD 355 @ Old Georgetown Road (MD 187)	1,182	1,415	1,283	1,566	2,299	1,201
MD 355 @ Marinelli Rd	935	1,036	884	1,243	1,424	1,049
MD 355 @ Nicholson Lane	1,110	1,516	1,315	1,458	2,236	1,511
MD 355 @ Security Lane	874	921	903	1,212	1,338	1,041
MD 355 @ Edson Lane	902	1,279	981	1,440	1,751	1,154
Hoya Street @ Montrose Road	440	442	392	642	871	699
Hoya Street @ Montrose Pkwy	622	784	609	2,241	2,305	1,486
Montrose Parkway @ Chapman Ave/Maple Ave	791	921	885	1,225	1,534	918
Randolph Road @ Nebel Street	723	1,116	908	637	790	608
MD 187 @ Executive Blvd/Hoya St	1,335	1,405	864	1,799	1,494	866
MD 187 @ Mid Pike/New Executive	587	690	643	619	796	667
MD 187 @ Nebel St	586	585	650	548	760	494
MD 187 @ Tilden Road/Nicholson Lane	1,117	1,260	901	1,041	1,875	1,089
Nicholson Ln @ Executive Blvd	612	667	561	648	677	677
Nicholson Ln @ Nebel St	938	1,001	762	1,190	2,061	901
Hoya St @ Mid Pike East-West (FUTURE)	n/a	n/a	n/a	951	878	534
MD 355 @ Mid Pike East-West	783	932	905	1,315	1,612	944
MD 187 @ Main St/Market St (FUTURE)	n/a	n/a	n/a	962	780	472
MD 355 @ Main St/Market St (FUTURE)	n/a	n/a	n/a	1,254	1,515	907
Marinelli Rd @ Citadel Ave	n/a	n/a	n/a	446	495	232
Nicholson Lane @ Citadel Ave	n/a	n/a	n/a	609	829	634
MD 355 @ Executive Blvd Extended	n/a	n/a	n/a	1,241	1,684	1,105

CLV > 1,800

Existing conditions reflect traffic counts collected during fall 2011.

## Micro-Simulation Analysis (STV Group)

The STV Group, Inc., working on behalf of the White Flint Partnership, performed a multi-modal traffic analysis using Vissim, a transportation analysis tool, to evaluate intersection performance. This micro-simulation tool uses a multi-modal traffic analysis process that includes pedestrian, bicycle and transit travel. This tool also features explicit traffic assignment on all planned streets of the area roadway network (public and private) and reports on a variety of transportation system performance measures, including delay, travel time and person throughput. Completed in Fall 2014, this analysis provided more nuanced traffic analysis results relative to the techniques used in the Stantec traffic impact study.

The Highway Capacity Manual describes level of service (LOS) as qualitative measure of the ability of a transportation facility to handle the vehicles or people for which it is designed. LOS levels range from LOS A (optimal conditions) to LOS F (failing conditions). LOS E is generally considered to be the target for urban areas to maintain. The table below summarizes the observed and year 2022 intersection delay results within the Sector Plan area derived from the application of the VISSIM modeling tool.

Source: White Flint Sector Plan Private Traffic Impact Study (White Flint Partnership, Spring 2015)

HCM Intersection Delay LOS Results				
Intersection	Existing		Year 2022	
	AM	PM	AM	PM
MD 355 @ Montrose Parkway NB Ramps	n/a	n/a	D	D
MD 355 @ Old Georgetown Road (MD 187)	C	C	D	D
MD 355 @ Marinelli Road	C	B	D	D
MD 355 @ Nicholson Lane	D	D	D	D
MD 355 @ Security Lane	n/a	n/a	n/a	n/a
MD 355 @ Edson Lane	B	C	C	D
Hoya Street @ Montrose Road	n/a	n/a	D	D
Hoya Street @ Montrose Pkwy	A	B	D	D
Montrose Parkway @ Chapman Ave/Maple Ave	n/a	n/a	n/a	n/a
Randolph Road @ Nebel Street	A	A	n/a	n/a
MD 187 @ Executive Blvd/Hoya St	C	B	D	D
MD 187 @ Mid Pike/New Executive	n/a	n/a	n/a	n/a
MD 187 @ Nebel St	n/a	n/a	n/a	n/a
MD 187 @ Tilden Road/Nicholson Lane	C	B	D	D
Nicholson Ln @ Executive Blvd	n/a	n/a	n/a	n/a
Nicholson Ln @ Nebel St	n/a	n/a	n/a	n/a
Hoya St @ Mid Pike East-West (FUTURE)	n/a	n/a	n/a	n/a
MD 355 @ Mid Pike East-West	n/a	n/a	n/a	n/a
MD 187 @ Main St/Market St (FUTURE)	n/a	n/a	n/a	n/a
MD 355 @ Main St/Market St (FUTURE)	n/a	n/a	D	D
Marinelli Rd @ Citadel Ave	n/a	n/a	n/a	n/a
Nicholson Lane @ Citadel Ave	n/a	n/a	n/a	n/a
MD 355 @ Executive Blvd Extended	n/a	n/a	C	C
MD 187 @ Edson Lane	n/a	n/a	C	D
MD 187 @ Rose Street	n/a	n/a	C	D

Level of Service

A-C
D
E
F

## WHITE FLINT 2 DRAFT PLAN STAGING RECOMMENDATION

The Draft Plan staging proposal combines required infrastructure for this Plan area with key staging triggers from the 2010 White Flint Sector Plan. The Draft Plan staging recommendations are divided into three phases with residential and non-residential development associated with each phase and infrastructure triggers for each phase. The framework for the White Flint 2 Sector Plan staging is established by a critical factor: the Plan area's adjacency to the 2010 White Flint Sector Plan area and its staging plan requirements.

Components of the Draft Plan staging recommendations are:

- Achievement of higher Non-Automotive Driver Mode Share (NADMS) goals for each phase.
- Funding of specific infrastructure, including the second entrance to the White Flint Metro Station.
- Completion of design and feasibility studies, including Rockville Pike BRT.
- Provision of new bikeways and streetscape improvements.
- Evaluation of new elementary schools by Montgomery County Public Schools (MCPS).

First and second phases of the staging plan requires the funding of new infrastructure, including bikeways, new street connections, and completion of the Rockville Pike BRT study and the Western Workaround. More than 60 percent of the new residential and non-residential development is allocated in the first two phases, while the remaining amount of development is in the last phase. This approach is comparable to the 2010 White Flint Sector Plan staging plan. The overall Draft Plan staging plan is below:

<b>Phase 1</b> Residential: 1,800 dwelling units Non-Residential: 900,000 square feet	<b>Phase 2</b> Residential: 1,800 dwelling units Non-Residential: 900,000 square feet	<b>Phase 3</b> Residential: 2,338 dwelling units Non-Residential: 1,189,857 square feet
Achieve 27% Non-Automotive Driver Mode Share (NADMS) for the Plan area.  Fund the Executive Boulevard and East Jefferson protected bikeway.  Fund and complete the design study for Rockville Pike Bus Rapid Transit (BRT) that will be coordinated with SHA, MCDOT, M-NCPPC and the City of Rockville.	Achieve 35% Non-Automotive Driver Mode Share (NADMS) for the Plan area.  Fund a shuttle or circulator that serves the Plan area, adjacent to residential communities, and Metro station areas.  Fund the acquisition or dedication of a new public park for the Plan area.  Construct streetscape improvements, sidewalk	Achieve 42% Non-Automotive Driver Mode Share (NADMS) for the Plan area.  Fund and implement the Parklawn Drive Shared Use Path.  Montgomery County Public Schools (MCPS) must construct an elementary school for the Walter Johnson School Cluster or determine how elementary school needs



<b>Phase 1</b> Residential: 1,800 dwelling units Non-Residential: 900,000 square feet	<b>Phase 2</b> Residential: 1,800 dwelling units Non-Residential: 900,000 square feet	<b>Phase 3</b> Residential: 2,338 dwelling units Non-Residential: 1,189,857 square feet
<p>Complete the implementation of Western Workaround, including the realignment of Executive Boulevard, Towne Road and Old Georgetown Road (MD 187) for vehicular travel.</p> <p>Fund the roadway realignment of Parklawn Drive and Randolph Road.</p> <p>Montgomery County Public Schools (MCPS) must evaluate the need for a new elementary school within the Walter Johnson cluster and determine how and when a new elementary school will be programmed. Maryland Department of Transportation (MDOT) must conduct a feasibility study for an infill MARC station along the Brunswick Line and determine if a MARC station should be located in the Plan area.</p> <p>The Planning Board must assess that the Sector Plan is achieving its goals and that all the infrastructure items for this Stage 1 are completed, prior to proceeding to Stage 2.</p>	<p>improvements, and bikeways for substantially all of the street frontage within one-quarter mile of the Metro station: Old Georgetown Road, Marinelli Road and Nicholson Lane.</p> <p>Fund the second entrance to the White Flint Metro Station.</p> <p>Construct streetscape improvements, sidewalk improvements, and bikeways for substantially all of the street frontages within one-quarter mile of the Metro Station: Old Georgetown Road, Marinelli Road and Nicholson Lane.</p> <p>The Planning Board must assess that the Sector Plan is achieving its goals and that all the infrastructure items for Stage 2 are completed, prior to proceeding to Stage 3.</p>	<p>will be addressed for the Cluster.</p> <p>Construct a new MARC station, if MDOT determines that a MARC station will be located within the plan area.</p>

Prior to the approval of any new development, the Draft Plan recommends that several pre-staging actions should be taken, including determining if a public finance mechanism will be established to fund public infrastructure in the Plan area. The Draft Plan also recommends establishing a 12-month limit, after the adoption of this Plan's Sectional Map Amendment (SMA), to determine if a financing mechanism will be established to fund public infrastructure. The finance mechanism could include the extension or modification to the existing White Flint Special Taxing District that funds transportation projects in the 2010 White Flint Plan area or the creation of another financing mechanism to fund public infrastructure for the White Flint 2 Plan area. At a future worksession, staff will discuss financing options with the Board.

Expansion or modification of the existing White Flint Staging Allocation Request (SAR) process is another pre-staging recommendation. The SAR procedure would permit the same or similar allocation of development as in the 2010 White Flint Sector Plan area, where the draw down on new development occurs after Site Plan approval, and prior to building permit submission. This procedure would permit different property owners the opportunity to develop, rather than permit the potential hoarding of development capacity. Large properties in the Plan area, such as Montrose Crossing and Willco, which are 31 acres and 21 acres, respectively, can absorb significant amounts of new development that could preclude other property owners from developing within the recommended staging plan.

An additional Draft Plan pre-staging recommendation is the expansion of the White Flint Implementation Advisory Committee to include additional property owners and residents from the White Flint 2 Plan area. Currently, there are property owners and residential representatives on the current White Flint committee who either own property or live within the White Flint 2 Plan area.

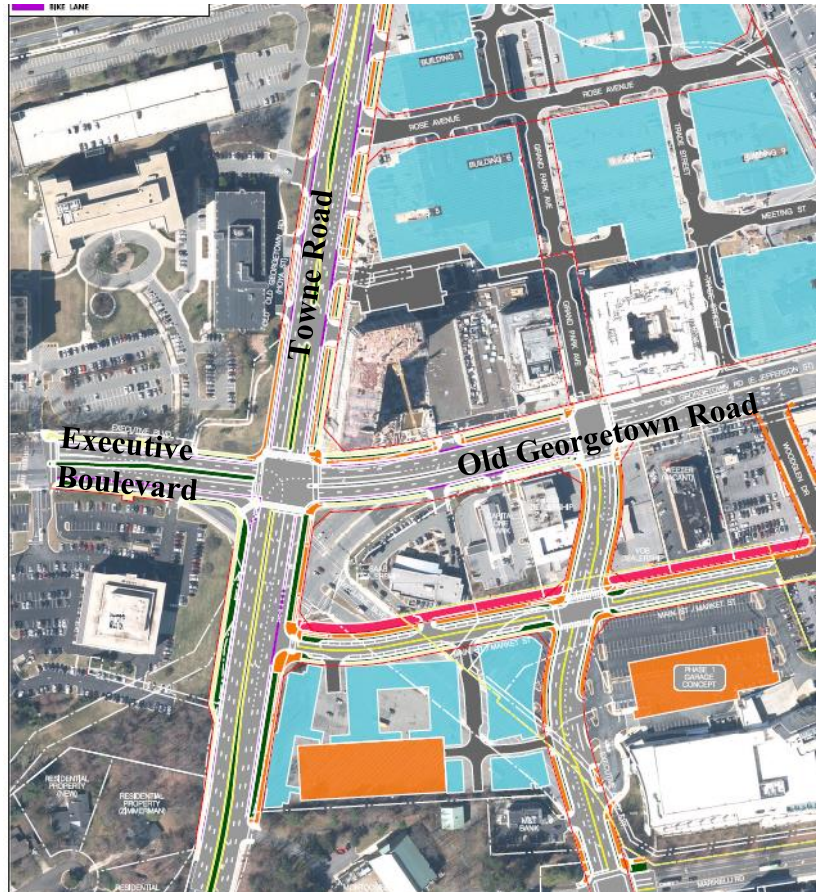
### **Linkages to 2010 White Flint Staging Plan**

The Draft White Flint 2 Plan staging recommendations link important transportation infrastructure requirements from the 2010 White Flint Sector Plan, including the Western Workaround and the second White Flint Metro Station entrance, along with new transportation and public facilities for the White Flint 2 Plan area. This combination approach strives to achieve equity between property owners in both White Flint Plan areas.

## The Western Workaround

The Western Workaround, which is a phase one staging trigger in the 2010 White Flint Plan, is located adjacent to the Executive Boulevard District. This transportation project is included in Draft Plan's staging recommendation because it will significantly enhance vehicular, bike and pedestrian connections to Executive Boulevard and other properties to the north. Towne Road, which is currently a cul-de-sac road, will open and connect to Old Georgetown Road and Executive Boulevard providing north and south bound travel on this roadway.

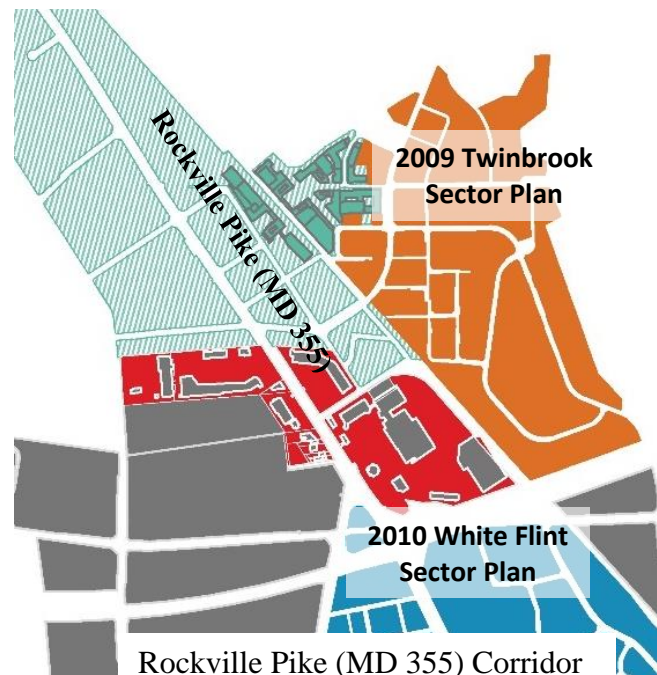
This project is in the CIP (White Flint West Workaround P501506) and the first phase is under construction. It is anticipated that most of this project will be implemented within the current CIP by 2020.



Western Workaround

### Rockville Pike BRT

The Draft Plan recommendation will close a gap between the 2010 White Flint Sector Plan recommendation for an urban boulevard for Rockville Pike (MD 355) with Bus Rapid Transit (BRT) and the City of Rockville's *Rockville Pike Plan*. Maryland State Highway Administration (SHA) and Montgomery County Department of Transportation (MCDOT) are currently conducting a Rockville Pike (MD 355) BRT study. Including this segment within the larger MD355 BRT will permit a comprehensive review of Rockville Pike with the City of Rockville's BRT proposal and the 2010 White Flint Sector Plan recommendation. Further, properties along MD 355, including Montrose Crossing and Pike Center, will benefit from future BRT. SHA will present alternatives for the MD 355 Corridor later this year. The completion of MD 355 will occur when a preferred alternative is selected.



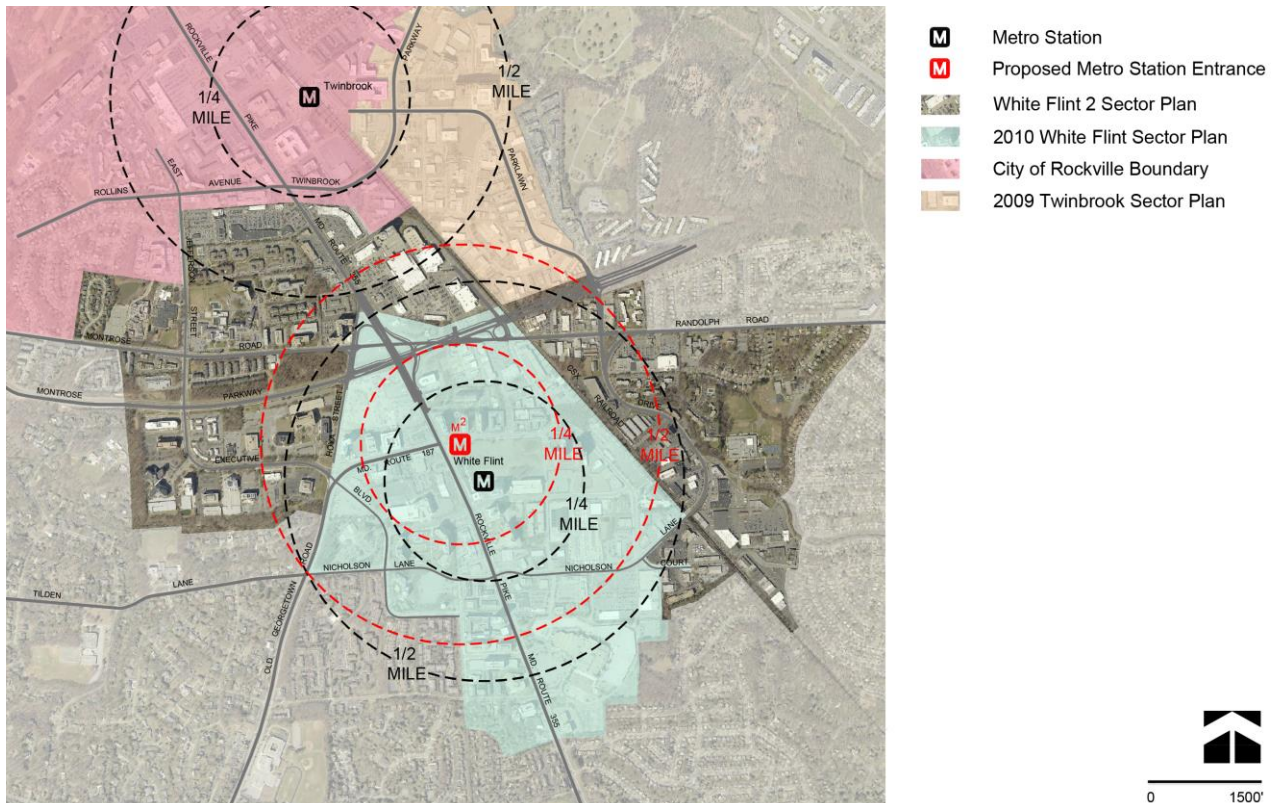
### The Second Metro Station Entrance

The 2010 White Flint Sector Plan recommends a new northern entrance to the White Flint Metro Station at the intersection of Rockville Pike (MD 355) and Old Georgetown Road. This new entrance will significantly enhance transit connections to the Executive Boulevard District and properties along Rockville Pike. Properties north of Old Georgetown Road in the 2010 Sector Plan will also benefit from the new entrance.

The Draft Plan recommends this infrastructure item in stage two, which is the same stage in the 2010 Sector Plan. The second Metro Station is not included in the White Flint Special Taxing District. Therefore, it could be included as a potential financing proposal for the Plan area. In 2010, the estimated cost for the new entrance was \$35 million.

As shown below, the pedestrian walkshed for a significant portion of the Plan area is enhanced with the new Metro station entrance.





Existing and proposed White Flint Metro Station proximity

### Non-Automotive Driver Mode Share

New Non-Automotive Driver Mode Share (NADMS) goals are recommended in each phase to continue to promote multimodal improvements in the Plan area. The North Bethesda Transportation Management District was created in 1995 and it is operated by the Transportation Action Partnership (TAP) as the North Bethesda Transportation Center (NBTC). The NBTC provides services to employers and employees in North Bethesda's commercial areas to promote employers' commuter benefits programs and to inform employees of alternative commuting options.

The overall NADMS for the North Bethesda Master Plan area is 39 percent. The estimated 2015 NADMS estimate for the White Flint 2 Sector Plan area is approximately 21.3 percent. The Draft Plan's first phase recommends increasing the NADMS goal to 27 percent, which is approximately 30 percent higher than the latest estimate. The proposed second and third phases of the staging plan increases the NADMS goals to 35 percent and 42 percent, respectively. These goals will contribute to achieving overall North Bethesda NADMS and will contribute to implementing the County's Climate Protection Plan.

In preparation for the 2010 Sector Plan, the NADMS estimate for the Plan area was 26 percent. The 2010 Sector Plan staging plan requires the achievement of 34 percent NADMS in phase one; 42 percent in phase two; and the ultimate NADMS is 51 percent for residents and 50 percent for employees. The 2014 NADMS estimate for the 2010 White Flint Sector Plan area was approximately 31.7 percent.

Initial public comments from the Friends of White Flint and the White Flint Partnership have suggested the same NADMS goals for both White Flint Plan areas. Achieving the same NADMS between both areas would be challenging for several reasons. First, unlike the 2010 White Flint Plan area, the White Flint 2 Plan area is a fragment area where the eastern area is separated by the CSX rail line from the northern and western areas. Most of the 2010 Plan area is within a ½ mile from the existing White Flint Metro Station and is not separated by the CSX rail line or Montrose Parkway. Second, the 2010 White Flint Sector Plan will be a downtown area, while the White Flint 2 Draft Plan recommendations will provide for infill and urban development at key locations. Further, the Draft Plan recommendations retain a large amount of industrial properties along the CSX tracks to address larger public needs for the types of uses in this area. Finally, Montgomery County Department of Transportation (MCDOT) proposed strategies to implement the 2010 White Flint Sector Plan NADMS goals note that a full suite of TDM measures, including policy, facility and service options are required. Some of these measures include: transit subsidies, parking policy changes, bike share stations, and enhanced services, such as BRT.

### Public Schools

The Draft Plan staging plan recommends that Montgomery County Public Schools (MCPS) evaluate the need for a new elementary school in the Walter Johnson Cluster in phase one. The third phase requires that MCPS construct a new elementary school in the Walter Johnson Cluster or determine how elementary school needs would be met for the Cluster. The implementation of this staging recommendation can be implemented via the proposed monitoring report requirement for the Plan area.

All school levels in the Cluster have experienced significant enrollment growth and consequential space deficits from primarily existing residential development turnover and some from new residential development. In 2015, Montgomery County Public Schools (MCPS) launched a Walter Johnson Roundtable process, with a variety of stakeholders, to develop different approaches to meet the Cluster's growth challenges. This process led to numerous approaches to address enrollment deficits, including the reopening of Woodward High School and opening up a new elementary school.

MCPS' Division of Long-range Planning has conducted long range enrollment forecasts for the cluster, including the six-year forecast for elementary schools, as well as 10 and 15 year forecasts. A 30-year forecast was also conducted as part of the Roundtable process that indicates future enrollment deficits. The projected MCPS enrollment for the cluster is indicated below:



**Walter Johnson Cluster Elementary Schools Projected Enrollment, 2016–2046**

	Off. Enr.	Projected Enrollment*										
	2016	2017	2018	2019	2020	2021	2022					2046
	– 2017	– 2018	– 2019	– 2020	– 2021	– 2022	– 2023	2026	2031	2036	2041	**
<b>Total Walter Johnson Cluster Elementary Schools</b>												
Program Capacity	3812	3812	3812	4086	4402	4402	4402	4631	4631	4631	4631	4631
Enrollment	4250	4345	4424	4471	4457	4573	4513	4800	4800	5100	5300	5500
Space available	-438	-533	-612	-385	-55	-171	-111	-169	-169	-469	-669	-869

\*Projections from 2036 to 2046 assume complete build-out of Kensington and White Flint sector plans and proposed housing not associated with these sector plans. Market conditions and the pace of redevelopment of existing properties could change the number of units built and the timing of full build-out. Most master plans never reach full build-out.

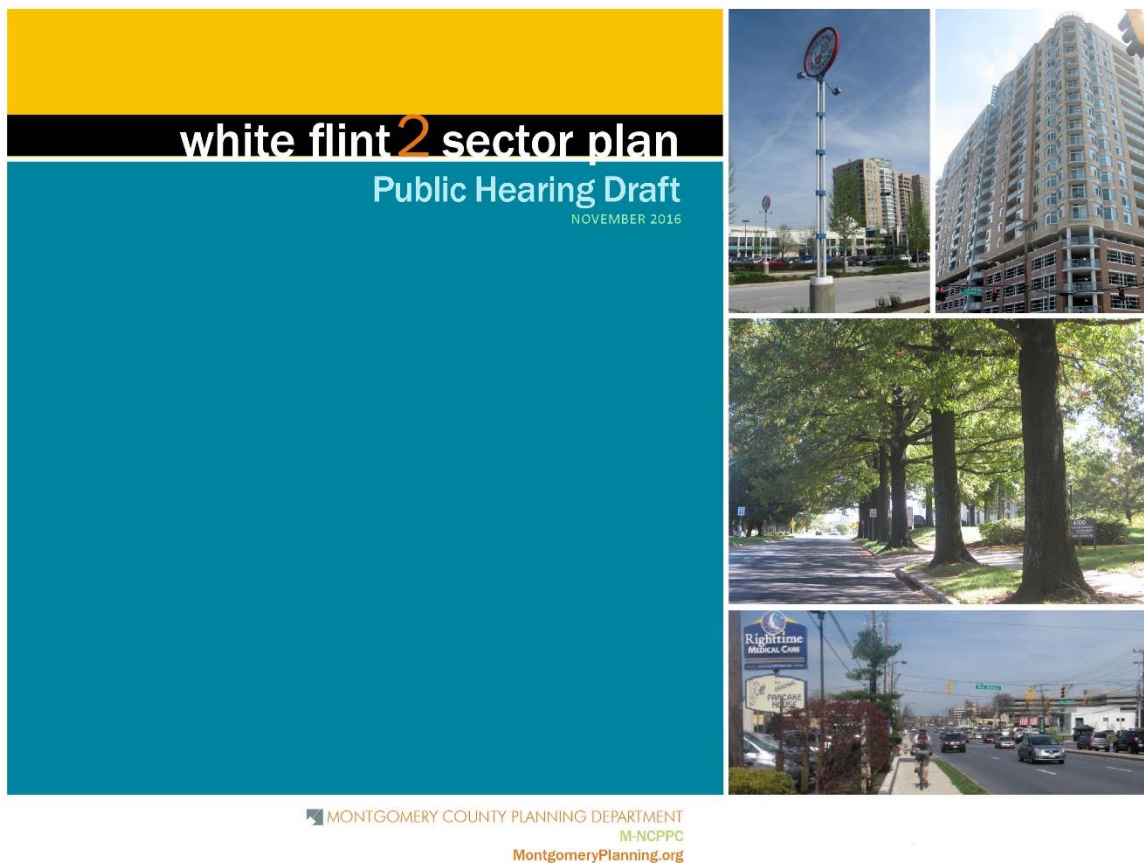
\*\*The projection for 2046 is considered peak enrollment. The projection for 2046 does not include Rock Spring Master Plan and White Flint 2 Sector Plan, as housing unit counts are not finalized at this time. The longer the forecast period, the more error is possible. It is considered equally likely for enrollment to come in below the numbers as it is for enrollment to exceed them.

To justify a new MCPS elementary school, the total cluster space deficit is typically between 450–500 seats. Based on the future housing development in the cluster, a new school will be needed in the long-term; therefore, the proposed phasing plan recommendations will allow for the continued school enrollment assessment. The adjacent 2010 White Flint Sector Plan recommends a new elementary school at the White Flint Mall property, as the preferred site, and the Lutrell property as the alternative. The White Flint Mall property has received a Sketch Plan approval in 2012, but litigation has delayed the submission of a Preliminary Plan. At that time, the Board will determine if the school site will be dedicated, acquired, or placed in reservation under the Adequate Public Facilities finding required by the Subdivision Regulations, Chapter 50. The Lutrell property would require complete acquisition. There is no school site recommendation in the 2009 Twinbrook Sector Plan.

Staff will return at a later worksession, with MCPS Staff, to discuss schools in greater depth. This Draft Plan recommends an elementary school either at the Willco/Wilgus properties or Rocking Horse Road Center. Initial public comments on the Draft Plan support the dedication of school sites, while others recommend schools should be in place prior to additional development in the Plan area.

Attachment: Transportation Index

# Transportation Appendix



# White Flint II Sector Plan Transportation Appendix

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## Introduction

The transportation analysis performed in support of this sector plan focused on an evaluation of intersection system performance for the year 2040 master plan vision using the Department's regional travel demand model (referred to as Travel/4, a Montgomery County-focused adaptation of the Metropolitan Washington Council of Governments (MWCOC) regional travel demand modeling tool), National Cooperative Highway Research Program (NCHRP) 765 and 255 post-processing techniques, and Critical Lane Volume (CLV)/Highway Capacity Manual (HCM) methodologies as generally used to implement the County's Subdivision Staging Policy (SSP) as described in the Planning Board's *2013 Local Area Transportation Review / Transportation Policy Area Review Guidelines*.

Most of the Plan area is located within the North Bethesda policy area and a smaller portion, Nicholson Court, is located within the White Flint Metro Station Policy Area (MSPA). The broader Plan study area included a small portion of the Rockville City Policy Area and the Twinbrook MSPA, as well as a significant portion the White Flint MSPA located in the immediate vicinity of the Plan area. The methodology used to evaluate transportation system network performance is established by the County's SSP. Based on the recently adopted 2016-2020 SSP, the congestion standards for signalized intersections in these policy areas are based the HCM delay-based level of service standards as described in the table below.

**Table 1: 2016-2020 Subdivision Staging Policy Intersection Congestion Standards**

<b>HCM Volume-to-Capacity Standard</b>	<b>Policy Area</b>	<b>HCM Average Vehicle Delay Equivalent (seconds/vehicle)</b>	<b>Critical Lane Volume Congestion Standard</b>
0.97	North Bethesda	71	N/A
1.13	White Flint	120	N/A
1.13	Twinbrook	120	N/A

**With this in mind, it should be noted that the traffic analysis performed to date in support of this Plan is based on the 2012-2016 SSP which relied primarily on the Critical Lane Volume (CLV) methodology to evaluate intersection performance.<sup>1</sup>** CLVs are essentially the sum of vehicles passing through an intersection at a single point during the peak hour. The level of CLVs considered acceptable varies by Policy Area within the County.

CLV is a measurement of intersection capacity used in the Local Area Transportation Review (LATR) process. CLV values are converted to volume to capacity (V/C) ratios by dividing observed or forecasted CLVs by the applicable policy area congestion standard. For reference, the applicable congestion standards for policy areas located in the vicinity of the Plan area are described below.

- North Bethesda –1,550 CLV
- Twinbrook MSPA– 1,800 CLV
- White Flint MSPA –1,800 CLV

### **Sector Plan and Study Area Boundaries**

As noted above, the boundary of the Plan area is located within the North Bethesda policy area and a smaller portion within the White Flint MSPA. However, the transportation analysis Plan study area also considers portions of two neighboring policy areas: White Flint and Twinbrook. The northwest portion of the Plan area is adjacent to the Rockville City policy area. Figure 1 depicts the relationship of the Sector Plan area with the four policy areas.

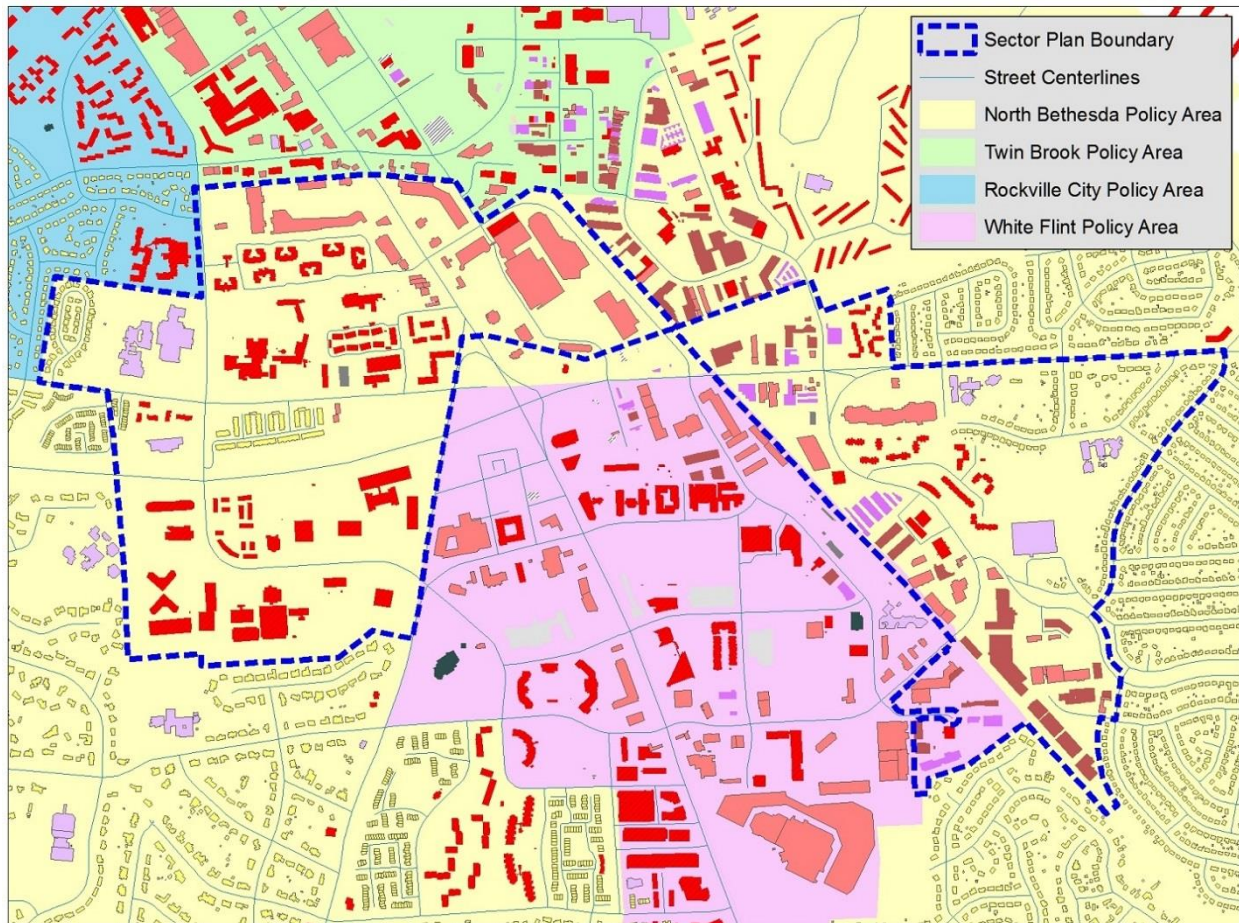
Two major arterials, MD355 Rockville Pike and Montrose Parkway, traverse the middle of study area in the north/south and east/west directions, respectively. The study area is comprised of the traffic analysis zones (TAZs) which are within and contiguous to the Plan boundary. The geographical definition of the Plan area is important in that it is the first step in establishing the interface between the regional transportation model (Travel/4) and the subarea Master Plan-specific local area model (referred to as Travel/4MP<sup>2</sup>).

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<sup>1</sup> The traffic analysis described in this Plan will be updated to reflect average the vehicle delay standard for the White Flint area. The results of this update will be reported in a subsequent version of this appendix.

<sup>2</sup> Travel/4MP reflects a more detailed traffic analysis zone and transportation network structure relative to Travel/4.

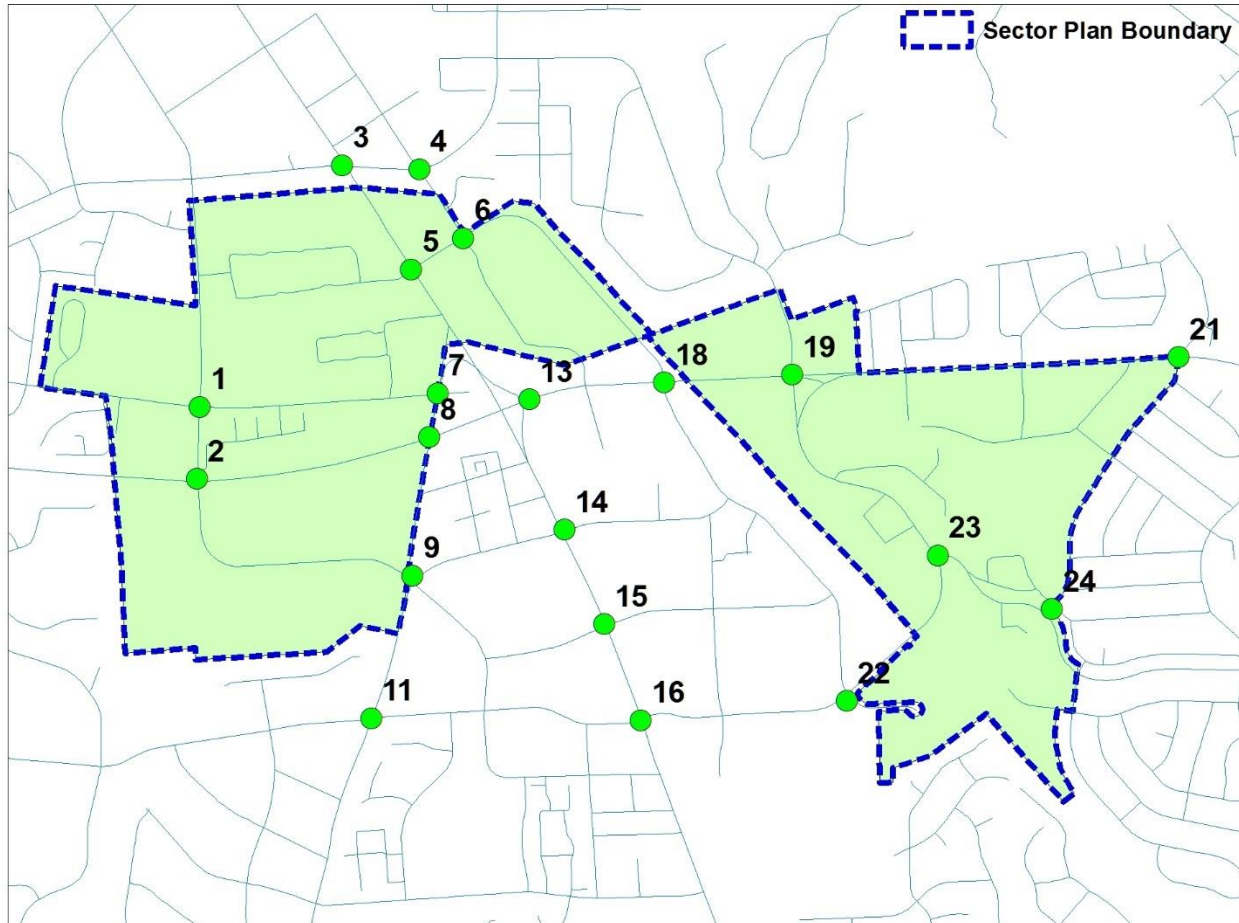




**Figure 1. Relationship of Sector Plan Boundary to Policy Areas**

## **Traffic Count Collection and Evaluation**

Using information derived from the Department's intersection traffic count database (<http://www.mcatlas.org/Intersections/>), observed intersection turning movements at selected locations within the study area were gathered and observed (generally reflecting existing conditions) level of service at these locations was evaluated. Observed counts of vehicles, pedestrians, bicycles per 15-minute intervals (the minimum time interval unit used in traffic engineering analysis), were assembled. Figure 2 depicts the location of intersections identified for intersection performance evaluation.



**Figure 2. Study Area Intersection Locations**

Study area intersections included in this analysis reflect three policy area congestion standards. Table 2 summarizes the analysis results of the year 2015 observed CLVs for 20 selected signalized intersections located within the Study area. Study area intersections within the North Bethesda Policy Area have a 1550 CLV standard. Study area intersections within the Twinbrook and White Flint MSPAs have a 1800 CLV standard. Six intersections as depicted in Figure 2 are located along the boundary of two policy areas that have different CLV standards. Consequently, 13 Study area intersections located within the Twinbrook and White Flint MSPAs have a 1,800 CLV standard and seven intersections located within the North Bethesda Policy Area have a 1,550 CLV standard. Intersections estimated to operate at or above these two CLV standards are considered to be “failing” or not within the acceptable standard for the relevant policy area.

**Table 2. Existing Critical Lane Volumes (2015 CLVs)**

ID	CLV Standard	E-W Road	N-S Road	2015 Existing CLV	
				AM	PM
1	1,550	Montrose Road	East Jefferson Street	710	962
2	1,550	Montrose Parkway	East Jefferson Street	1,058	1,221
3	1,800	Rollins Avenue	MD 355	972	1,138
4	1,800	Twinbrook Parkway	Chapman Avenue	840	1,035
5	1,550	Bou Avenue	MD 355	971	1,170
6	1,800	Bou Avenue	Chapman Avenue	575	766
7	1,800	Montrose Road	Hoya Street	561	578
8	1,800	Montrose Parkway	Hoya Street	548	685
9	1,800	Executive Boulevard	Old Georgetown Road	1,224	1,019
11	1,800	Nicholson Lane	Old Georgetown Road	1,067	1,121
13	1,800	Montrose Parkway	MD 355	672	640
14	1,800	Old Georgetown Road	MD 355	1,206	1,347
15	1,800	Marinelli Road	MD 355	887	933
16	1,800	Nicholson Lane	MD 355	1,072	1,310
18	1,800	Randolph Road	Nebel Street	854	1,145
19	1,550	Randolph Road	Parklawn Drive	1,144	1,174
21	1,550	Randolph Road	Gaynor Road	1,120	1,192
22	1,800	Nicholson Lane	Nebel Street	830	906
23	1,550	Boiling Brook Parkway	Parklawn Drive	1,124	858
24	1,550	Boiling Brook Parkway	Rocking Horse Road	1,021	882

Figure 3 shows the intersection level of service (LOS) “dot map” based on the ratio of observed CLV and the applicable CLV Standard during AM and PM peak period. The colors of the dots depicted on the map is determined by the ratio between CLV number and CLV Standard as described below.

- **Green:** less than 0.6
- **Yellow:** between 0.6 and 0.8
- **Orange:** between 0.8 and 1.0
- **Red:** greater than 1.0

The dot map indicates that all intersections in the study area operate below capacity as reflected by the green and yellow colors in AM and/or PM peak period.



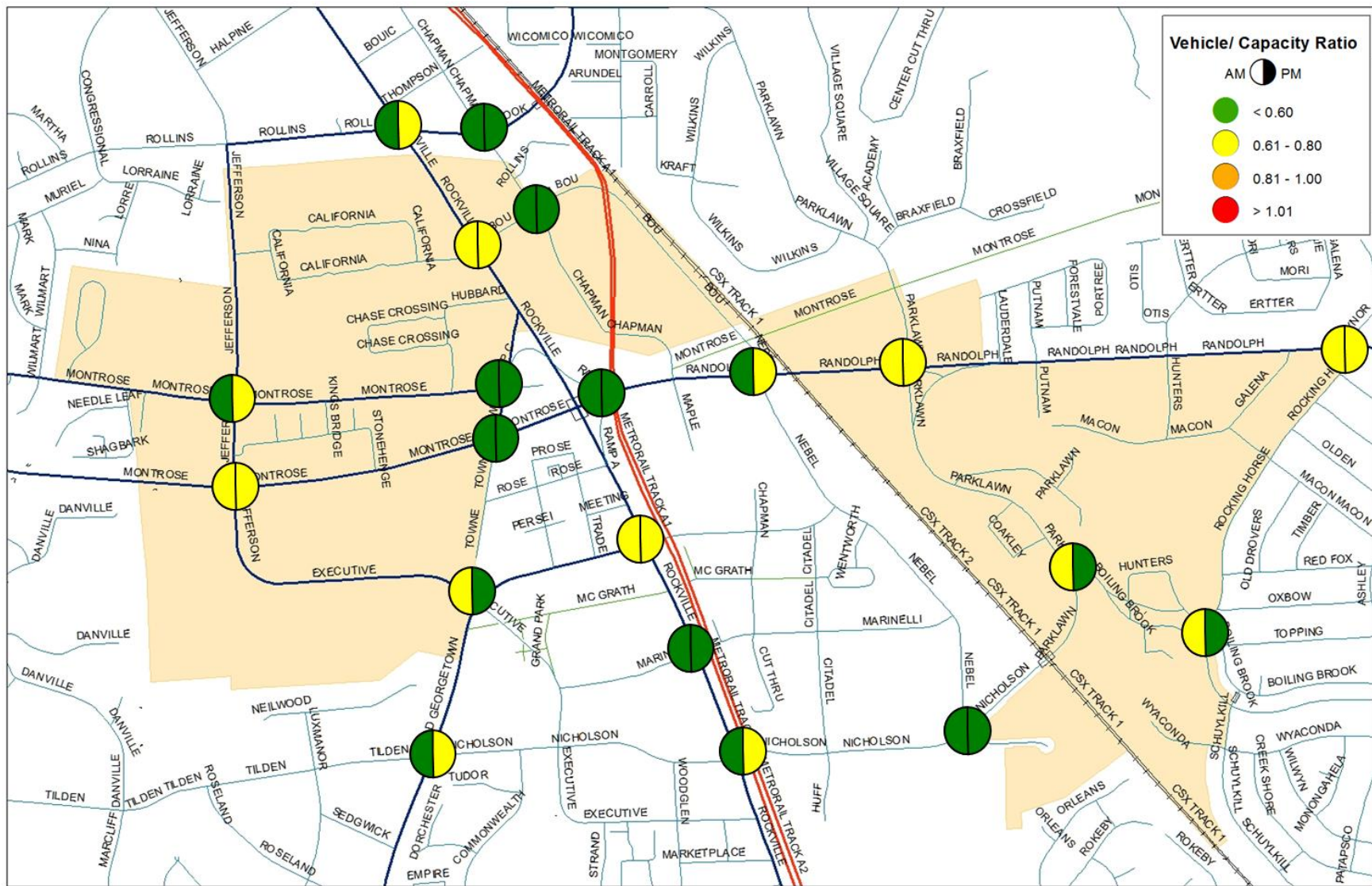


Figure 3. Traffic Congestion Scenario - Existing Traffic Condition (2015)

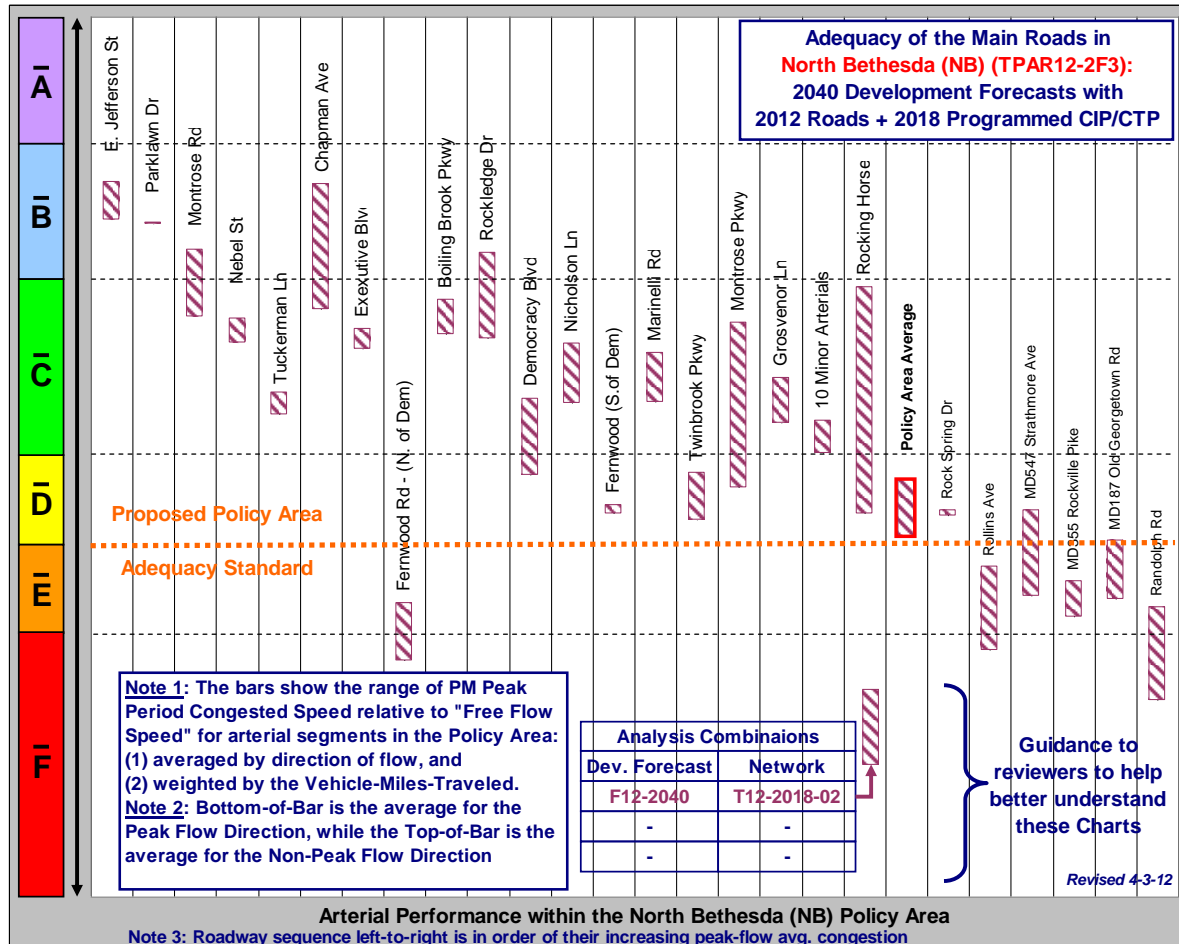
## Traffic Analysis Methodology

A local intersection traffic analysis of three different scenarios was conducted to determine the adequacy of the roadway network assumed in each scenario and to identify potential improvements to support the level of development that would achieve the Plan Vision.

The traffic analysis also included a policy area-wide review of the year 2040 forecasted speed of travel by automobile for the North Bethesda area generally reflecting the adopted land use/transportation recommendations for this Plan area using the Transportation Policy Area Review (TPAR) methodology.<sup>3</sup> The TPAR test evaluates the forecasted speed of travel on each arterial road within the policy area in its peak direction of travel. The ratio of forecast speed to uncongested speed is consistent with the type of analysis recommended by the *Transportation Research Board's Highway Capacity Manual* (HCM). The results of this analysis for the North Bethesda policy area is depicted in Figure 4. The analysis indicates that the overall average policy area-wide roadway congestion is projected to be above the LOS D/E standard at the year 2040 time horizon in the North Bethesda policy area and therefore considered adequate.

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<sup>3</sup> This analysis was conducted in support of the evaluation of the 2012-2016 SSP utilizing the Department's Travel/3 regional travel demand modeling tool. It should be noted that the newly adopted 2016 – 2020 SSP no longer requires the application of TPAR for regulatory purposes. Nevertheless, the roadway component of the TPAR process still retains utility as a transportation analysis tool.



**Figure 4: Year 2040 TPAR Analysis – North Bethesda Policy Area**



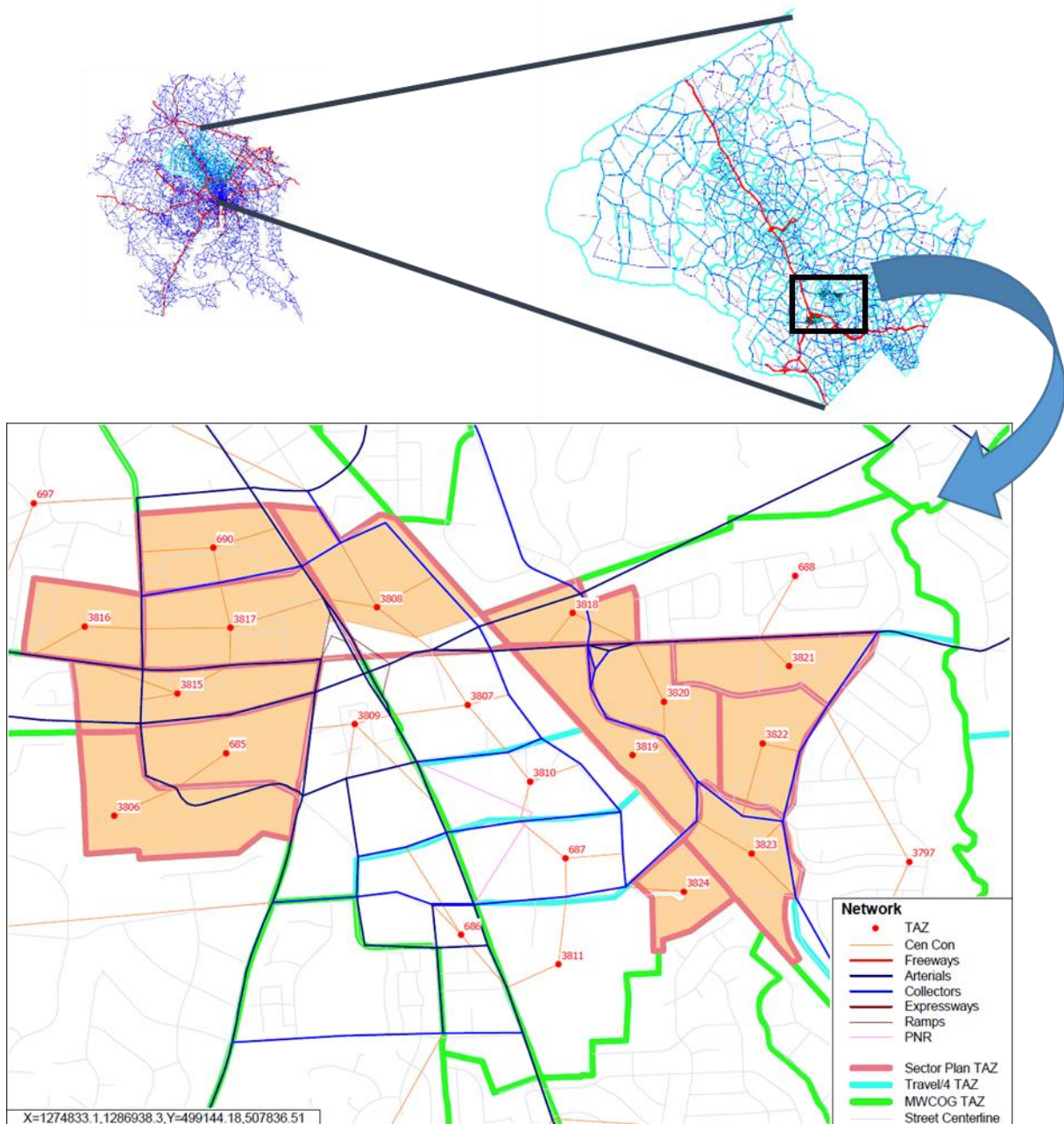
## Travel Demand Forecasting Process and Assumptions

The Department's regional travel demand forecasting model, TRAVEL/4, was used to develop forecast travel demand results for weekday travel and evening peak periods. The application of Travel/4 included the validation of 2010 base year traffic conditions and the forecast of 2040 future traffic conditions in the study area. Travel/4 is a traditional four-step regional travel demand model, 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.

The TRAVEL/4 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 (MWCOC) regional travel demand modeling tool, Version 2.3.52.

Figure 5 shows the relationship of Montgomery County in the regional travel demand network, featuring the coding of street network characteristics to reflect the general level of adjacent development density.



**Figure 5. Study Area Network reflected in the Travel Demand Model, Travel/4MP**

### **Travel/4 for Countywide Traffic Analysis**

Travel/4 is used to reflect county-wide and regional traffic effects. This tool is an adaptation of MWCOG's regional travel demand forecasting model reflecting a more detailed transportation system network structure coupled with refined model inputs that are compliant with the more detailed structure. In addition, a more detailed transportation analysis zone (TAZ) structure is

incorporated into Travel/4 reflecting the expansion from 376 to 466 TAZs in Montgomery County (an increase of 90 TAZs). Consequently, this change resulted in an expansion from 3,709 TAZs reflected in the MWCOG regional travel demand model to 3,799 TAZs in Travel/4.

The Baseline 2010 and 2040 future year model applications incorporated land use data from the Round 8.3 Cooperative Forecasts reflected in the MWCOG V2.3.57a regional travel demand forecasting model. Additional model run scripting enhancements were made to the model code. Aside from these specific adjustments to the network and zone structure, other inputs, such as aggregate socio-demographic data, lookup tables, and model parameters were used. When network and TAZ structures in Montgomery County area were expanded, the regional sum total of socio-demographic data (e.g., population, employment) in the model remained consistent with MWCOG Cooperative Forecasts.

The MWCOG model algorithm structure was retained in Travel/4, including the year 2020 transit constraint and two-step assignment feature for High-Occupancy Toll (HOT) lanes. Intra-step distributed processing was included in the model run applications with four sub-nodes.

### **Travel/4MP for Local Area Traffic Analysis**

The additional model revisions described above, referred to as “Travel/4MP”, were incorporated into Travel/4 in support of the traffic impact analysis of both the White Flint II Sector Plan and Rock Spring Sector Plan area by applying a subarea modeling approach. Travel/4MP provides system-level results that are used as inputs to the finer grain analytic tools described below. The second level of analysis consists of post processing techniques applied to the Travel/4MP forecasts, as described in NCHRP Report 255. 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 255 techniques are used to produce the cordon line analyses.

The third level of analysis includes an evaluation of local intersection congestion, using the Critical Lane Volume (CLV) and Highway Capacity Manual (HCM) methodologies described in the Department’s *2013 Local Area Transportation Review and Transportation Policy Area Review Guidelines*.

## Travel/4MP Model Refinements Incorporated into Travel/4

The TAZ structure in White Flint II Sector Plan and Rock Spring Master Plan areas was expanded by block level land use development plans. Network and centroid connectors were revised based on the expanded TAZ structure, accordingly. The Travel/4MP model represents the White Flint II Sector Plan study area as 14 transportation analysis zones based on block groupings separated by major roads within the Plan area boundary. Figure 6 shows revised TAZ structure of study area in Travel/4MP.

- Eight TAZs in Travel/4MP were expanded into 14 TAZs based on 14 blocks in White Flint II Sector Plan
- Six TAZs in Travel/4MP were expanded into 9 TAZs based on 9 blocks in Rock Spring Master Plan.
- Land use data of new 23 TAZ were prepared per development scenarios by replacing the original land use data with new land use data for both Mater Plans.
- Land use data of adjacent neighbor TAZ area were also revised accordingly.
- Land use data of three TAZs were split along the boundary of the White Flint II Sector Plan area and adjusted accordingly.
- Land use data of two TAZs were split along the boundary of the Rock Spring Sector Plan area and adjusted accordingly.

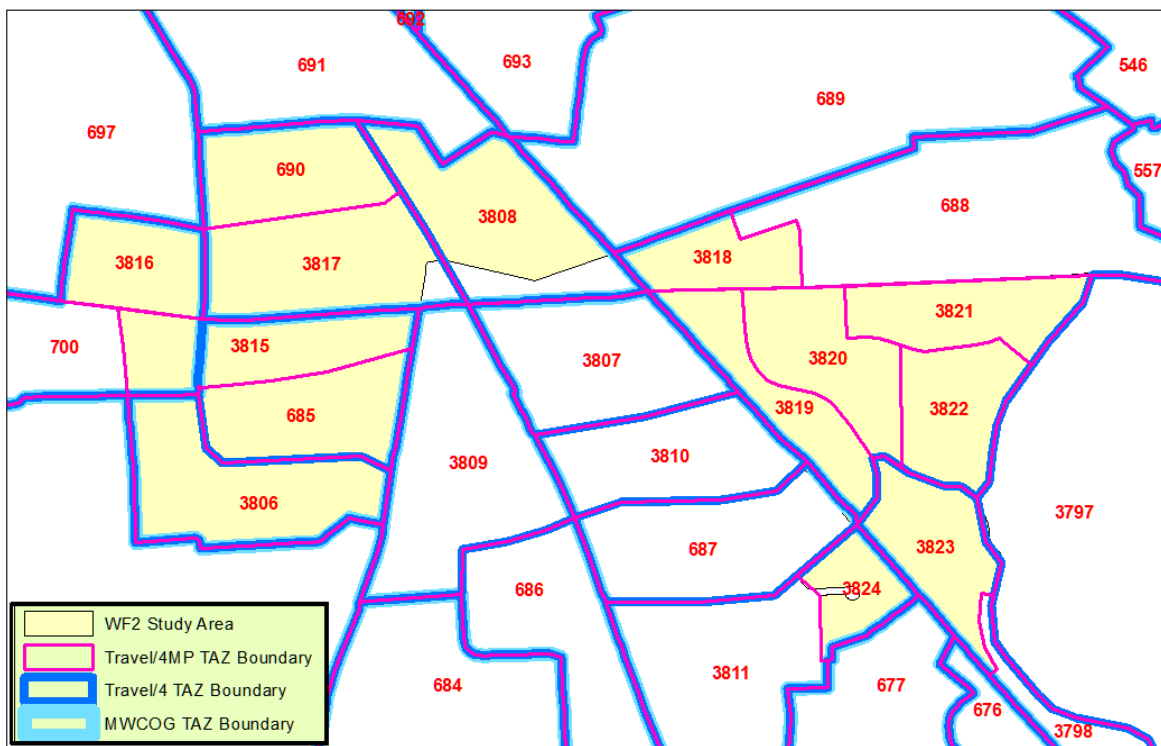


Figure 6. TAZ Structure of Study Area

The Travel/4 model network does not reflect minor level local streets and/or other refinements needed to represent traffic movement within the Plan study areas. The networks within the White Flint II study area and nearby Rock Spring area were revised to better represent traffic patterns.

- Network revisions for the White Flint II Sector Plan area
  - Local road between MD355 and East Jefferson Street were added in the network within the White Flint II Sector Plan area.
  - Simplified intersection coding between Randolph Road at Parklawn Drive in Travel/4 were revised to represent all directional movements.
- Network revisions for the Rock Spring Master Plan area
  - Simplified network coding between Rockledge Drive and I-270 were revised to represent all movements between two. There are no frontage roads along I-270 on both directions in Travel/4.
  - Add a new 2-lane north-south public street to the Master Plan of Highways and Transitways (MPOHT) between Democracy Boulevard and Rock Spring Drive, along the western edge of Georgetown Square and eastern edge of Walter Johnson High School.

### **Travel/4MP Modeling Scenarios for White Flint II Sector Plan**

Intersection performance was evaluated within the Plan study area in the context of four (4) land use/transportation network scenarios. Each of these scenarios is briefly described below. The traffic analysis was based on development recommended in the public hearing and assumptions about which properties would develop.

Scenario 1: 2015 Existing Conditions

Scenario 2 (Alternative 1): 2040 Adopted Master Plan and Approved Land Use

- includes existing development, pipeline development in the White Flint area, proposed WMAL property development in the Rock Spring Sector Plan area, and some additional development based on existing zoning.
- Master-planned Bus Rapid Transit (BRT) was not assumed

Scenario 3 (Alternative 2): 2040 Proposed Land Use (Low level development)

- includes existing development, pipeline development in the White Flint area, proposed WMAL property development in the Rock Spring Sector Plan area, and some additional development based on existing zoning.
- assumes a **low** level of additional development based on the land use associated with the Plan vision
- Master-planned Bus Rapid Transit (BRT) was not assumed

#### Scenario 4 (Alternative 3): 2040 Proposed Land Use (high level development)

- includes existing development, pipeline including White Flint, WMAL in Rock Spring Master Plan area, and some additional development based on existing zoning.
- assumes a **high** level of additional development based on the land use associated with the Plan vision
- Master-planned Bus Rapid Transit (BRT) was not assumed



**Table 3. Land Use Inputs for 2040 Existing Likely (Alternative 1)**

TAZ	Population				Employment				
	Household	Household Population	Group Quarters	Total	Industrial	Retail	Office	Other	Total
685	211	356	0	356	0	60	3,224	32	3,316
690	921	2,167	412	2,579	0	1,776	1,042	521	3,339
3806	141	346	0	346	0	80	6,634	42	6,756
3808	1,969	4,044	0	4,044	0	2,231	404	296	2,931
3815	270	456	0	456	49	323	1,021	168	1,561
3816	40	153	0	153	0	0	0	366	366
3817	564	1,327	592	1,919	0	256	1,069	1,075	2,400
3818	120	273	0	273	479	30	50	0	560
3819	0	0	0	0	880	430	590	0	1,901
3820	717	1,632	0	1,632	0	464	213	37	714
3821	174	396	0	396	0	0	0	128	128
3822	29	66	0	66	0	0	0	360	360
3823	0	0	0	0	1,125	677	0	33	1,834
3824	0	0	0	0	732	305	0	0	1,038

**Table 4. Land Use Inputs for 2040 Low Level Development (Alternative 2)**

TAZ	Population				Employment				
	Household	Household Population	Group Quarters	Total	Industrial	Retail	Office	Other	Total
685	423	714	0	714	0	456	4,278	243	4,977
690	1,069	2,515	412	2,927	0	1,640	468	351	2,459
3806	283	695	0	695	0	292	7,356	78	7,726
3808	2,160	4,437	0	4,437	0	2,339	1,499	331	4,169
3815	459	775	0	775	49	186	654	95	983
3816	40	153	0	153	0	0	0	366	366
3817	1,069	2,515	592	3,107	0	670	1,564	1,089	3,324
3818	120	273	0	273	431	8	50	0	489
3819	0	0	0	0	848	394	590	0	1,832
3820	717	1,632	0	1,632	0	441	288	19	747
3821	192	437	0	437	0	0	0	128	128
3822	29	66	0	66	0	0	0	360	360
3823	0	0	0	0	960	524	0	6	1,490
3824	0	0	0	0	539	212	0	0	751

**Table 5. Land Use Inputs for 2040 High Level Development (Alternative 3)**

TAZ	Population				Employment				
	Household	Household Population	Group Quarters	Total	Industrial	Retail	Office	Other	Total
685	703	1,187	0	1,187	0	497	4,389	265	5,152
690	1,182	2,781	412	3,193	0	1,374	447	149	1,969
3806	377	926	0	926	0	232	7,537	186	7,956
3808	2,034	4,178	0	4,178	0	2,838	1,183	391	4,412
3815	532	898	0	898	49	216	734	166	1,164
3816	40	153	0	153	0	0	0	366	366
3817	1,111	2,614	592	3,205	0	431	1,558	1,739	3,728
3818	120	273	0	273	474	56	50	0	580
3819	173	394	0	394	876	418	628	0	1,921
3820	855	1,946	0	1,946	0	547	373	33	953
3821	200	455	0	455	0	0	0	128	128
3822	29	66	0	66	0	0	0	360	360
3823	265	674	0	674	1,002	680	53	53	1,789
3824	106	295	0	295	593	313	32	16	955

**Local Area Transportation Review (LATR) Analysis Modeling Assumptions**

Daily traffic forecasts were estimated utilizing procedures from the *NCHRP Report 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design*. *NCHRP Report 255* techniques were used to convert the Travel/4MP system level forecasts to intersection-level forecasts. From travel demand modeling analysis using Travel/4MP, general assumptions as described below were applied.

- 2010 base year and 2040 horizon year
- Transportation improvements reflected in the region's Constrained Long Range Plan (CLRP), a fiscally constrained transportation network.
- No geometric/operational local intersection improvements
- No Bus Rapid Transit (BRT)
- No Non-Auto Driver Mode Share (NADMS) goal/target was applied
- White Flint II and Rock Spring Sector Plan scenarios evaluated concurrently
- Constrained Long Range Transportation Plans (CLRP) for both highway and transit is integrated in the model (both MWCOG regional wide and Montgomery County wide)

In support of the transportation analysis of White Flint II Sector Plan, specific assumptions as following assumptions were applied:

- Outside the Plan study areas, regional growth per the MWCOG Cooperative Forecasting Process, using the most current Cooperative Forecasts (Round 8.3).
- White Flint Transportation Projects
  - White Flint District West Workaround (No.501506)
  - White Flint West: Transportation (No.501116)
  - White Flint District East: Transportation (No.501204)
  - White Flint Traffic Analysis and Mitigation (No.501202)
- Land use data consistent with that assumed in support of the *White Flint Traffic Operations Analysis* Report released by Stantec (2014)
- New 300 household development plan in the WMAL Radio Tower area
  - New 300 households and corresponding number of population were added to existing land use inputs in TAZ 3748 (WMAL Radio Tower area between I-270 Spur and I495 Beltway).
- Montrose Parkway East
- The addition of new I-270 Spur HOV ramps on the south side of the Westlake Terrace Bridge in Rock Spring Sector Plan area.

## Intersection Analysis

Table 6 summarizes the CLV analysis for the future 2040 Vision Plans. The results for three scenarios are presented: (1) the 2040 Existing Likely scenario (Alternative 1); (2) 2040 scenario with low level land use development (Alternative 2) and; (3) 2040 scenario with high level land use development (Alternative 3). When compared to the 2015 CLV existing condition, CLV results of all three scenarios show very similar level of increased traffic volumes and travel pattern changes throughout the Plan study area.

Figure 7 shows CLV dot maps for 20 intersections for both AM and PM peak periods. Comparing the 2040 Alternative 1 (existing likely scenario) relative to existing conditions, eight intersections reflect the same colors on the dot map even though the CLV V/C ratio at these locations showed a modest increase. The same comparison shows there are 12 intersections changed colors on dot map in AM and/or PM peak hours. In this regard, the LOS of 8 intersections deteriorated during the AM peak hour, while the LOS of 11 intersections deteriorated during the PM peak hour. The eight intersections showing deteriorated LOS conditions as reflected by changes in dot map colors from green to yellow or from yellow to orange based on LOS thresholds in both AM and PM peak hours are listed below.

- Twinbrook Parkway at Chapman Avenue
- Bou Avenue at MD 355

- Executive Boulevard at Old Georgetown Road
- Nicholson Lane at Old Georgetown Road
- Montrose Parkway at MD 355
- Marinelli Road at MD 355
- Nicholson Lane at MD 355
- Nicholson Lane at Nebel Street

Two major intersections within the Plan study area, Bou Avenue at MD 355 and Randolph Road at Parklawn Drive, exceed the 1,550 CLV standard during PM peak hours – reflecting impact of significant increased traffic during the PM peak hour.

The results of the 2040 Alternative 2 (low level land use development scenario) are generally comparable to those described above for the 2040 Alternative 1 (existing likely scenario) as shown in Figure 8.

As shown in Figure 9, depicting the results of the 2040 Alternative 3 (high level land use development scenario), the colors of CLV dot map generally remained the same as Alternatives 1 and 2 with the exception of Montrose Parkway at MD355 during AM peak hour. The color of the dot map at this location changed from yellow to orange because CLV result modestly exceeded 0.8 V/C threshold despite the fact that the magnitude of the increase in CLV was relatively insignificant.

In general, transportation system performance analysis results of three scenarios showed that 2040 traffic conditions of roadways within the Plan study area are forecasted to be adequate as reflected by the predominance of green and yellow colors on the dot map. However, seven intersections show a CLV V/C ratio greater than 0.8 indicating traffic conditions approaching or exceeding the relevant congestion standard.

**Table 6. Traffic Congestion Scenario (CLV Results of 2040 Vision Plans)**

ID	CLV Standard	E-W Road	N-S Road	2040 Alternative 1		2040 Alternative 2		2040 Alternative 3	
				AM	PM	AM	PM	AM	PM
1	1,550	Montrose Road	East Jefferson Street	732	1,118	773	1,170	784	1,185
2	1,550	Montrose Parkway	East Jefferson Street	1,068	1,149	1,096	1,178	1,098	1,189
3	1,800	Rollins Avenue	MD 355	1,171	1,297	1,175	1,302	1,175	1,305
4	1,800	Twinbrook Parkway	Chapman Avenue	1,159	1,322	1,136	1,323	1,142	1,328
5	1,550	Bou Avenue	MD 355	1,289	1,573	1,301	1,588	1,303	1,587
6	1,800	Bou Avenue	Chapman Avenue	826	921	814	973	804	924
7	1,800	Montrose Road	Hoya Street	911	941	960	963	968	984
8	1,800	Montrose Parkway	Hoya Street	976	1,161	999	1,167	1,008	1,170
9	1,800	Executive Boulevard	Old Georgetown Road	1,629	1,632	1,637	1,633	1,632	1,634
11	1,800	Nicholson Lane	Old Georgetown Road	1,621	1,660	1,624	1,678	1,624	1,666
13	1,800	Montrose Parkway	MD 355	1,424	1,206	1,437	1,207	1,446	1,214
14	1,800	Old Georgetown Road	MD 355	1,395	1,412	1,395	1,411	1,400	1,415
15	1,800	Marinelli Road	MD 355	1,151	1,329	1,163	1,330	1,201	1,307
16	1,800	Nicholson Lane	MD 355	1,221	1,581	1,226	1,583	1,231	1,608
18	1,800	Randolph Road	Nebel Street	998	1,251	984	1,262	997	1,278
19	1,550	Randolph Road	Parklawn Drive	1,195	1,586	1,209	1,616	1,217	1,670
21	1,550	Randolph Road	Gaynor Road	1,080	1,202	1,085	1,207	1,090	1,212
22	1,800	Nicholson Lane	Nebel Street	1,133	1,356	1,151	1,355	1,199	1,427
23	1,550	Boiling Brook Parkway	Parklawn Drive	1,155	1,454	1,164	1,470	1,188	1,507
24	1,550	Boiling Brook Parkway	Rocking Horse Road	1,135	990	1,154	1,000	1,150	996

Note: Intersection CLVs within the Study area that exceed the applicable policy area congestion standard is highlighted in red.

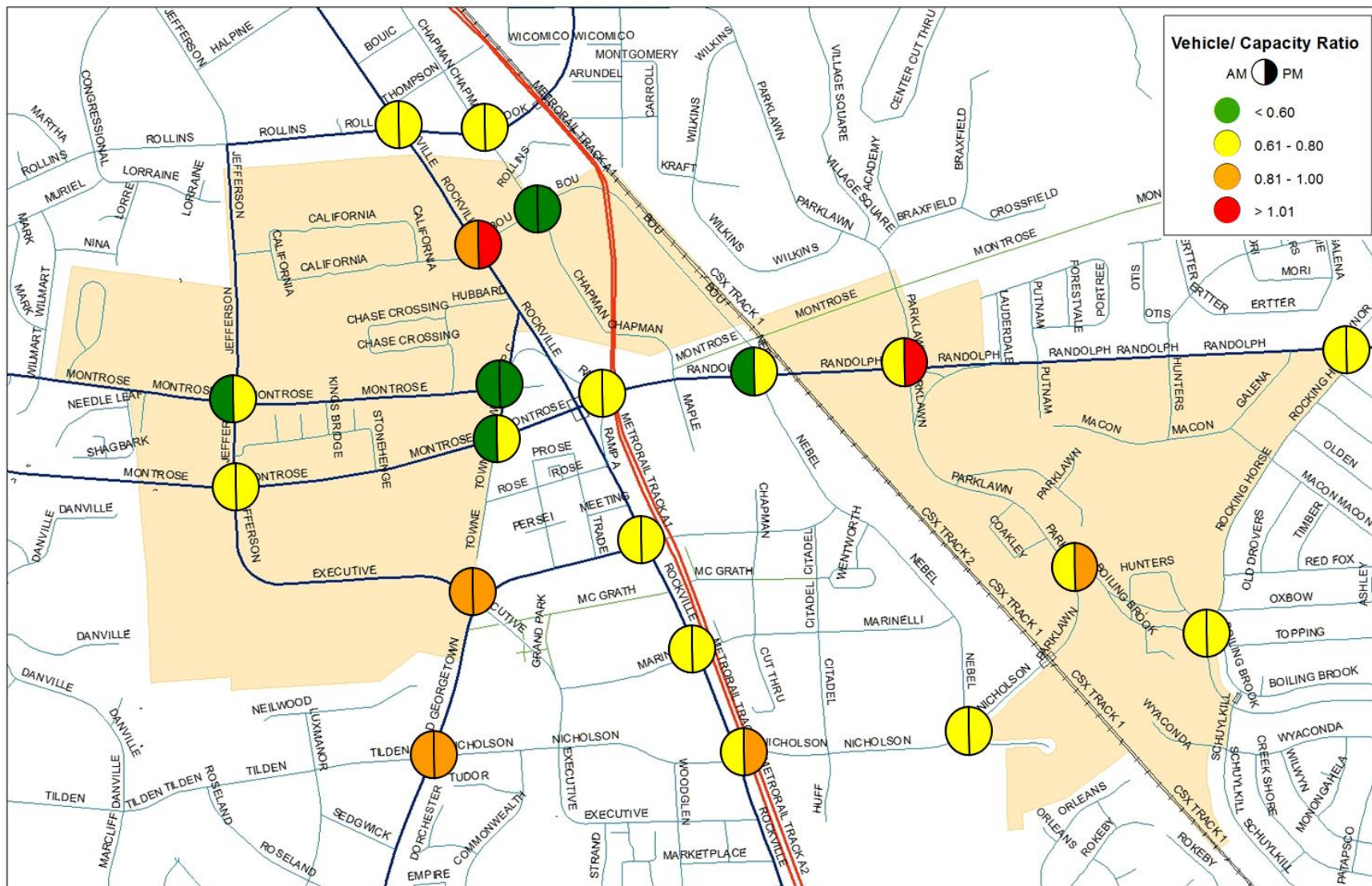


Figure 7. Traffic Condition Scenario - 2040 Land Use Visions (Alternative 1)



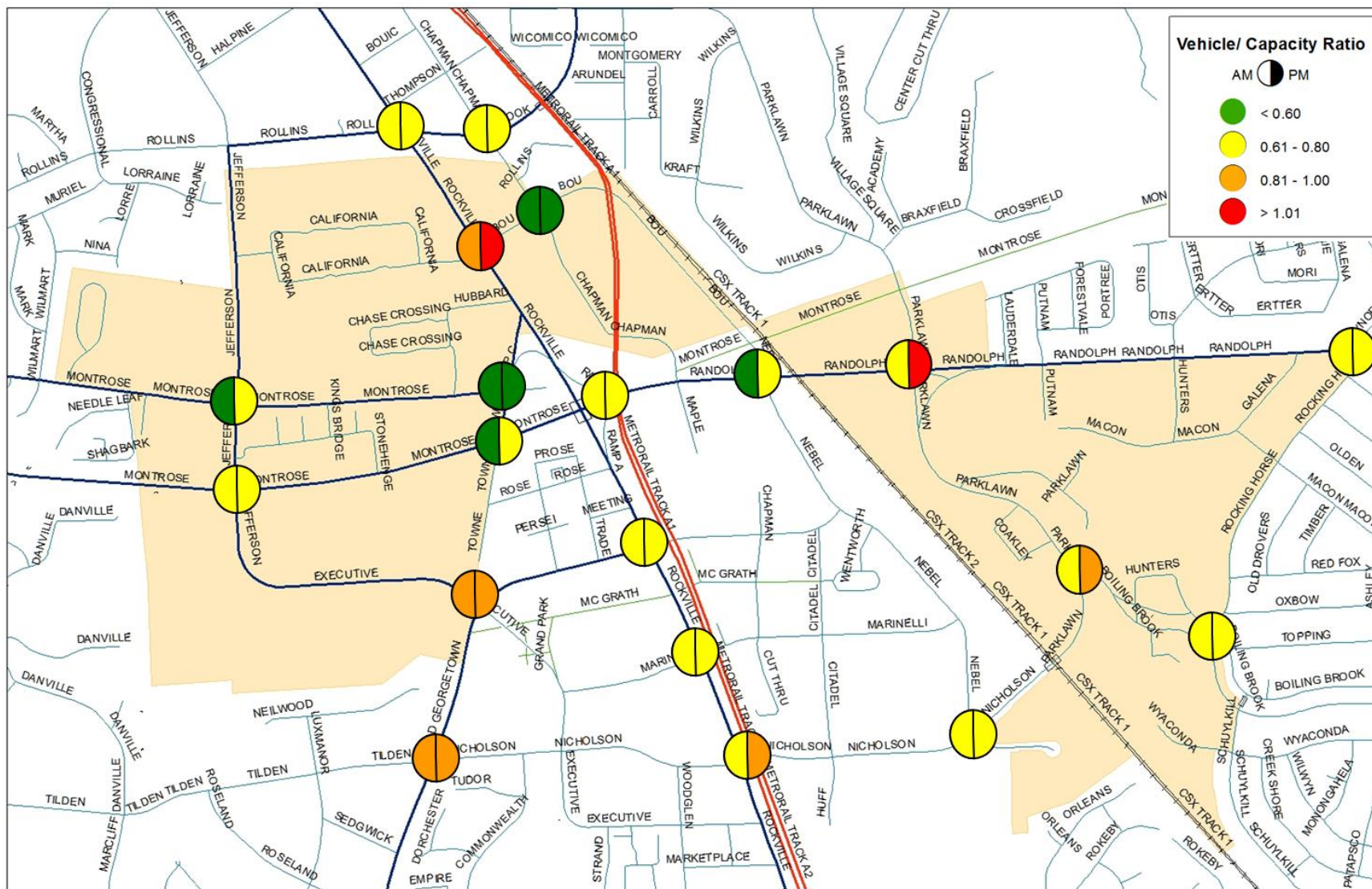
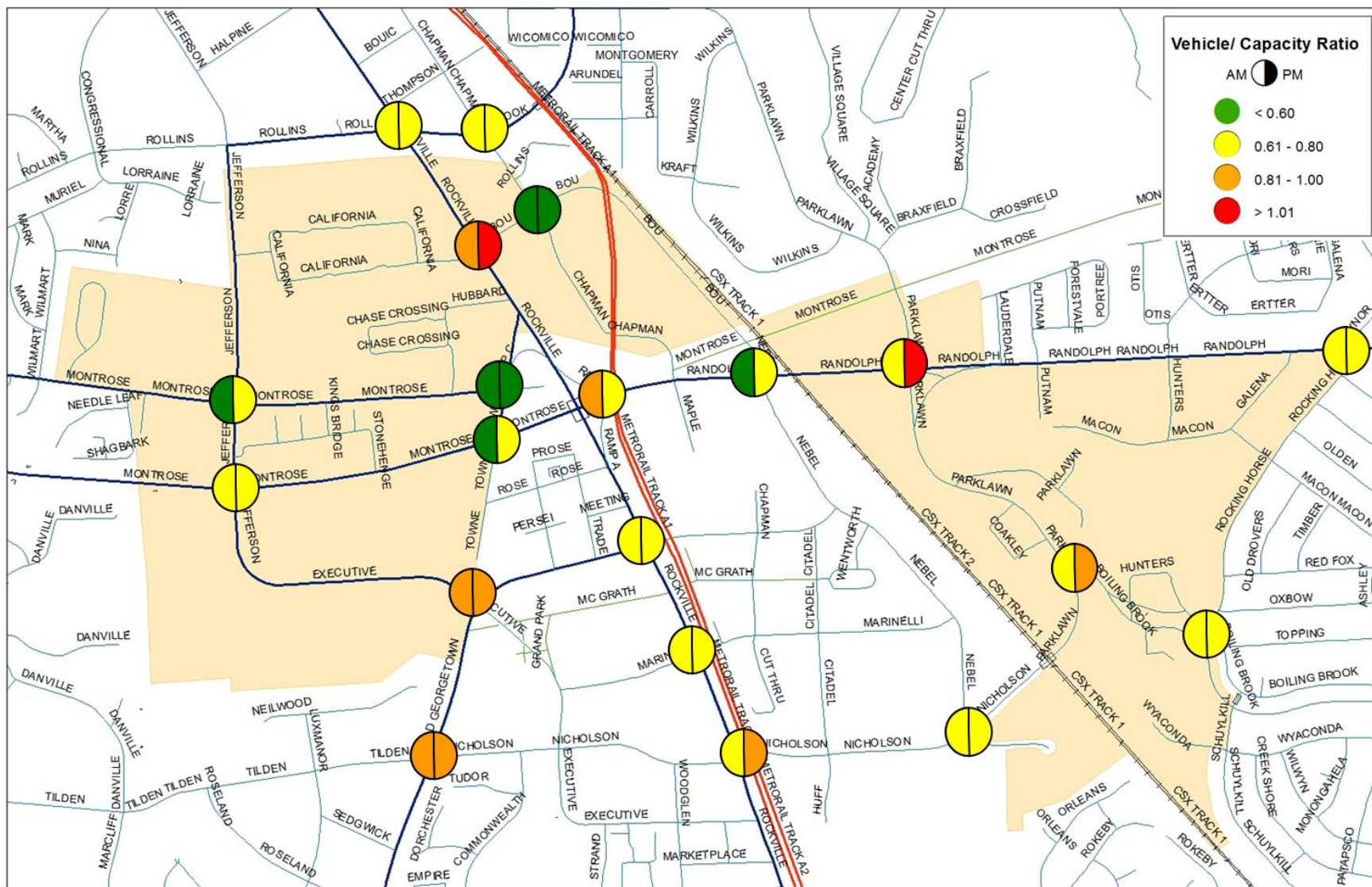


Figure 8. Traffic Condition Scenario - 2040 Land Use Visions (Alternative 2)





## Alternative 2 Road Diet Analysis

Pivoting from the 2040 Vision Plan (Alternative 2), an evaluation of the traffic impact implications of a “road diet” scenario, reflecting the reduction of the number of lanes along East Jefferson Street between Executive Boulevard and the City of Rockville from four to two through travel lanes, was conducted. In the context of this scenario, the CLV standard in the North Bethesda policy area was assumed to increase from 1,550 to 1,600.

Table 7 summarizes the CLV analysis results for three scenarios: (1) 2015 existing conditions; (2) 2040 Vision Plan (Alternative 2) and; (3) 2040 Vision Plan (Alternative 2) with road diet. Relative to the 2015 existing conditions scenario, the results of the 2040 road diet scenario shows a modest but generally insignificant increase in CLV at most intersections.

Figure 10 depicts the intersection LOS “dot map” reflecting the 2040 Vision Plan (Alternative 2) with road diet based on V/C ratio (i.e., CLV relative to CLV standard during AM and PM peak period). Similar to the 2040 Vision Plan (Alternative 2) scenario without the road diet, eight intersections exhibit the same colors on the dot map relative to the 2015 existing conditions scenario even though the CLV V/C ratio at these locations increased. Relative to existing conditions, twelve intersections exhibit changed colors on the dot map in AM and/or PM peak hours (as reflected by the colors at these locations changing from green to yellow or from yellow to orange based the LOS thresholds in both AM and PM peak hours).

After the application of the road diet, East Jefferson Street from Rollins Avenue to Montrose Road exhibited significantly decreased traffic volumes. The main reason for this traffic decrease along this road diet segment is a reflection of the reduction of roadway capacity (from 4 to 2 through traffic lanes) that forces vehicular traffic traveling through the area to find alternative travel routes in order to complete trips. As a result, the most of the negative traffic impact was found along the road diet segments. Generally, CLV results of all intersections with the road diet decreased when compared to 2040 CLV condition without the road diet. However, the colors depicted on the dot map remained constant. The one exception to this observation is the intersection of Bou Avenue at MD 355 during the PM peak hour.

Two major intersections within the Plan study area, Bou Avenue at MD 355 and Randolph Road at Parklawn Drive, exceed the proposed 1,600 CLV standard during PM peak hour. These two intersections received significantly increased traffic during this time period.

**Table 7. Traffic Congestion Scenario (CLV Results of 2040 Vision Plans with Road Diet)**

ID	E-W Road	N-S Road	2015 Existing		2040 Alternative2		2040 Alternative2 with Road Diet	
			AM	PM	AM	PM	AM	PM
1 *	Montrose Road	East Jefferson Street	710	962	773	1,170	669	1,035
2 *	Montrose Parkway	East Jefferson Street	1,058	1,221	1,096	1,178	1,069	1,146
3	Rollins Avenue	MD 355	972	1,138	1,175	1,302	1,171	1,300
4	Twinbrook Parkway	Chapman Avenue	840	1,035	1,136	1,323	1,142	1,324
5 *	Bou Avenue	MD 355	971	1,170	1,301	1,588	1,318	1,602
6	Bou Avenue	Chapman Avenue	575	766	814	973	823	942
7	Montrose Road	Hoya Street	561	578	960	963	880	918
8	Montrose Parkway	Hoya Street	548	685	999	1,167	988	1,174
9	Executive Boulevard	Old Georgetown Road	1,224	1,019	1,637	1,633	1,633	1,656
11	Nicholson Lane	Old Georgetown Road	1,067	1,121	1,624	1,678	1,625	1,661
13	Montrose Parkway	MD 355	672	640	1,437	1,207	1,439	1,222
14	Old Georgetown Road	MD 355	1,206	1,347	1,395	1,411	1,391	1,411
15	Marinelli Road	MD 355	887	933	1,163	1,330	1,159	1,329
16	Nicholson Lane	MD 355	1,072	1,310	1,226	1,583	1,223	1,586
18	Randolph Road	Nebel Street	854	1,145	984	1,262	992	1,259
19 *	Randolph Road	Parklawn Drive	1,144	1,174	1,209	1,616	1,217	1,612
21 *	Randolph Road	Gaynor Road	1,120	1,192	1,085	1,207	1,087	1,209
22	Nicholson Lane	Nebel Street	830	906	1,151	1,355	1,156	1,360
23 *	Boiling Brook Parkway	Parklawn Drive	1,124	858	1,164	1,470	1,167	1,468
24 *	Boiling Brook Parkway	Rocking Horse Road	1,021	882	1,154	1,000	1,155	1,001

Note: Intersection CLVs within the Study area that exceed the applicable policy area congestion standard is highlighted in red.

\* CLV standard was increased from 1,550 to 1,600



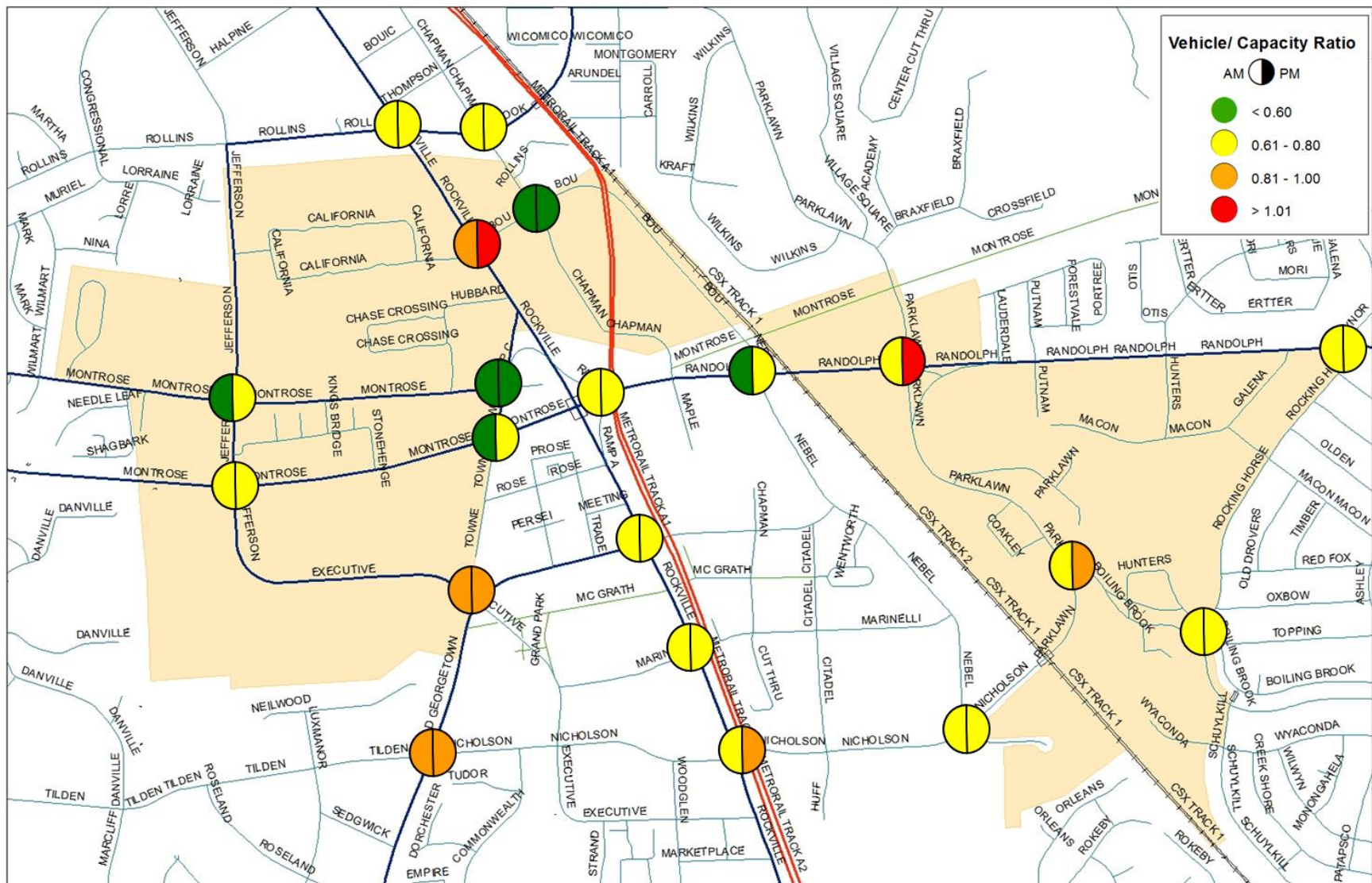


Figure 10 Traffic Condition Scenario - 2040 Land Use Vision (Pipeline + Low Development w/Road Diet)