Rock Spring Master Plan Transportation Appendix



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Introduction

This appendix summarizes the methodology and analysis behind recommendations included in the Rock Spring Master Plan. The plan's recommendations are intended to promote a safe and efficient multimodal transportation system through the build out of smaller local streets with "Complete Streets" principles that encourage low-stress bicycle and pedestrian networks, safer and improved pedestrian and bicycle connections, and the dispersion of vehicle traffic. The improved bicycle, pedestrian, transit and vehicular networks will improve access and overall connectivity and mobility through the horizon year (2040) of this transportation analysis.

Rock Spring is centrally located in Montgomery County, Maryland. It is well connected to freeways, major highways, and local roadways. A transit network, including buses and a shuttle, serve Rock Spring. Some existing bikeways serve the area today while others are planned. The area is primarily comprised of office buildings, limited residential uses, and the Walter Johnson High School (WJHS), which is located at 6400 Rock Spring Drive. WJHS serves portions of Bethesda, North Bethesda, and Rockville, as well as the towns of Garrett Park and Kensington. The area is bordered by I-270 to the north, the I-270 spur to the west, Democracy Boulevard to the south, and Old Georgetown Road to the east. Local roads through the office park include Rock Spring Drive, Rockledge Drive, and Fernwood Road. Montgomery Mall is to the west across I-270, and is served by Westlake Terrace and Westlake Drive.



Figure 1. Rock Spring Master Plan Area Boundary

Rock Spring contains a mix of zoning types and land uses. Rock Spring's street network is currently dominated by automobiles. Large, structured parking garages and surface parking spaces provide parking for a wide variety of land uses, including residential, commercial, office, medical, and corporate office developments.

The Rock Spring Master Plan recommends the implementation of a new, pedestrian and bicycle friendly, transit-oriented street network with publicly-accessible and well-connected open spaces and amenities. The plan supports planned bus-rapid transit (The North Bethesda Transitway), local bus, shuttle services, new and improved streets, and new bicycle infrastructure that will modify and improve the current auto-dominated environment to meet the needs of future residents, employees and visitors. The plan recommends better connectivity and accessibility through an improved block design that will support the transportation goals of the plan while improving area circulation. Road diets are recommended on some streets to provide the base design for the purposes of the road reconstruction needed to achieve the transportation goals of the plan. The plan's improved streets should not affect the 40-foot-wide transit easement along the North Bethesda Transitway corridor.

Transportation Analysis

Overview

The traffic analysis performed in support of this Master Plan evaluated local intersection system performance for the year 2040 using the Department's regional travel demand model, referred to as Travel/4. The travel demand model is a Montgomery County-focused adaptation of MWCOG's regional travel demand modeling tool, NCHRP 765 post-processing assessments, and Highway Capacity Manual (HCM) techniques as generally used to implement the County's Subdivision Staging Policy (SSP) and as described in the Planning Board's 2017 *Local Area Transportation Review Guidelines*.

Rock Spring is in the North Bethesda and Potomac Subdivision Staging Policy (SSP) areas. The methodology used to evaluate transportation system network adequacy is established by the County's SSP. Based on the newly adopted 2016-2020 SSP, the congestion standard for signalized intersections in these policy areas are a volume/capacity ratio of 0.97 (North Bethesda) and 0.91 (Potomac), using the Highway Capacity Manual (HCM) method, which translates to a measure of average vehicle delay of 71 and 55 seconds per vehicle, respectively. For reference, the HCM Average Delay Standard for policy areas located in the general vicinity of Rock Spring area are noted below in seconds per vehicle.

- Potomac 55 seconds
- North Bethesda 71 seconds
- Rockville City 63 seconds
- White Flint Metro Station Policy Area 120 seconds
- Twinbrook Metro Station Policy Area 120 seconds

Master Plan and Study Area Boundaries

The spatial area of the transportation analysis for the Rock Spring Master Plan includes a larger study area east of the I-270 spur, and a smaller study area west of the I-270 spur defined by the Plan boundary in Figure 2. The study area is comprised of the traffic analysis zones (TAZs) which are within and contiguous to the Plan boundary. The area defined as the Plan area boundary 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). Figure 2 also depicts the spatial relationship of the Master Plan area with the North Bethesda and Potomac policy areas.



Figure 2. Master Plan Transportation Study Area and Plan Boundary

Existing Conditions Evaluation (Traffic Count Collection)

Historical intersection turning movements in the study area were gathered using the Department's intersection traffic count database (<u>http://www.mcatlas.org/Intersections/</u>). In addition, observed approach volumes at study area intersections were collected and current level of service at these locations was evaluated. Counts of vehicles, pedestrians, and bicycles per 15-minute interval were collected, which is the minimum time interval unit used in the traffic analysis.

Figure 3 depicts the location of the intersections identified for intersection performance evaluation.





Study area intersections evaluated in support of this analysis have two congestion standards based on policy area location (See Figure 2). The portion of the Plan area located east of the I-270 Spur is in the North Bethesda Policy Area and has an average intersection delay standard of 71 seconds/vehicle. The portion of the study area located west of the I-270 Spur is in the Potomac Policy Area and has an average intersection delay standard of 55 seconds/vehicle. Intersections estimated to operate at or above these two standards are considered "failing" and not within the acceptable congestion standard for the relevant policy area.

Table 1 summarizes the average intersection delay results derived from the HCM analysis for the year 2015 (existing scenario) for all selected signalized intersections located within the study area.

Two of the evaluated intersections within the study area, Westlake Terrace at Westlake Drive (Intersection 1) and Democracy Boulevard at Westlake Drive (Intersection2), are located within the Potomac policy area that is west of the I-270 Spur. These two intersections are evaluated with the HCM average vehicle delay standard of 55 seconds/vehicle.

The remaining intersections that were evaluated are within the North Bethesda policy area and are evaluated with the HCM average vehicle delay standard of 71 seconds/vehicle.

Three intersections in the plan area failed either the AM or PM, or both the AM and PM peak hour(s) or travel:

- Rockledge Drive at Rock Spring Drive (Intersection 8) exceeded the North Bethesda policy area congestion standard during the AM peak hour of travel.
- Democracy Boulevard at Old Georgetown Road (Intersection 10) exceeded the North Bethesda policy area congestion standard during the PM peak hour of travel.
- Old Georgetown Road at Tuckerman Lane (Intersection 14), located within the Study area but beyond the Plan area, exceeded the North Bethesda policy area standard during the AM and PM peak hours of travel.

	Delay			2015 Existin	ig (seconds)
ID	Standard (seconds)	E-W Road	N-S Road	AM	PM
1	55	Westlake Ter.	Westlake Dr.	19.1	27.5
2	55	Democracy Blvd.	Westlake Dr.	47.4	45.6
3	71	Westlake Ter.	I-270 Ramps	17.3	6.2
4	71	Westlake Ter.	Rockledge Dr.	23.7	38.5
5	71	Westlake Ter.	Rock Spring Dr.	36.6	57.5
6	71	Democracy Blvd.	Fernwood Rd.	38.3	40.5
7	71	Rock Forest Dr.	Rockledge Dr.	20.5	43.6
8	71	Rock Spring Dr.	Rockledge Dr.	88.4	36.0
9	71	Democracy Blvd.	Rockledge Dr.	8.7	8.2
10	71	Democracy Blvd.	Old Georgetown Rd.	65.7	129.4
11	71	Rock Spring Dr.	Old Georgetown Rd.	24.4	38.7
12	71	I-270 South-EB	Old Georgetown Rd.	29.2	22.8
13	71	I-270 North-WB	Old Georgetown Rd.	13.1	15.5
14	71	Tuckerman Ln.	Old Georgetown Rd.	106.7	85.1
15	71	I-270 South-EB	Rockledge Dr.	14.6	25.0

Table 1. Existing Conditions Scenario - Intersection Delay Analysis

Note: Intersections within the Study area that exceed the applicable policy area congestion standard are highlighted in red.

Figure 4 visually depicts the information reported in the table above in the format of a colorcoded intersection level of service (LOS) "dot map". The left-hand side of the dot shows LOS during the AM peak period. The right-hand side of the dot shows LOS during the PM peak period. The colors reflected on the Figure 4 dot map are determined by the range delay values described below.

- Green: less than 20 seconds
- Yellow: between 20 and 55 seconds
- Orange: between 55 and 80 seconds
- Red: greater than 80 seconds

Figure 4 shows the intersections within the study that approach or exceed capacity, as reflected by the orange and red colors during the AM and/or PM peak period.



Figure 4. 2015 Existing Conditions HCM Analysis

Travel Demand Forecasting Process and Assumptions

An enhanced version of the Department's regional travel demand forecasting model, TRAVEL/4, was used to develop traffic forecast results for weekday travel and AM/PM peak periods. Travel/4 is a Montgomery County-focused adaptation of the regional travel demand model developed by the Metropolitan Washington Council of Governments (MWCOG). The application of Travel/4 included the validation of the tool to reflect 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 described below.

- **Trip generation:** the number of person trips that are generated by given types and densities of land uses within each traffic analysis zone (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, reflecting the same algorithms used in support of the application of the Metropolitan Washington Council of Governments' (MWCOG) 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 the Department's regional travel demand model which is used to reflect county-wide and regional traffic effects. This tool is a revised version of MWCOG's Version 2.3.52 regional travel demand forecasting model reflecting a more detailed transportation system network structure relative to the standard MWCOG model. In addition, relative to the standard MWCOG regional modeling tool, 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 3709 TAZs reflected in the MWCOG regional travel demand model to 3799 TAZs in Travel/4.

Additional model run scripting enhancements were made to the model code. In response to adjustments to the regional model network and zone structure, other inputs, such as aggregate socio-demographic data, lookup tables, and model parameters were revised accordingly for incorporation into Travel/4. When network and TAZ structures in Montgomery County area were expanded, the regional total of socio-demographic data (e.g., population, households and employment) in the Travel/4 model remain the same as MWCOG's Round 8.3 Cooperative Forecast land use data.

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

Travel/4MP Model for Local Area Traffic Analysis

As a first step in support of the traffic analysis, a more detailed roadway network and finer grained traffic analysis zone system was incorporated into Travel/4 in both the Rock Spring and White Flint 2 Master Plan areas. This effort reflected a subarea modeling approach designed to analyze these two areas concurrently. This enhanced tool, called "Travel/4MP" (i.e., "Travel/4 for master plan analysis") provides system-level traffic volume forecast results that were used as inputs to support the analytic tools described below.

The second step of the traffic analysis consisted of using post-processing techniques applied to the traffic volume forecasts derived from the application of the TRAVEL/4MP model, as described in NCHRP Report 255. These techniques included refining the morning and evening peak hour forecasts to reflect the finer grained land use and roadway network assumptions described above. Utilizing the information derived from the two steps described above, the third step of the traffic analysis was an evaluation of local intersection congestion, using the Highway Capacity Manual (HCM) methodologies described in the Department's *2017 Local Area Transportation Review Guidelines*.

Travel/4MP Model Updates Relative to Travel/4

The TAZ structure in the Rock Spring and White Flint 2 Master Plan areas was expanded utilizing block level land use data. Accordingly, the local roadway network and centroid connectors were revised based on the expanded TAZ structure. The Travel/4MP model represents the Rock Spring Master Plan study area as nine (9) transportation analysis zones (TAZs) based on block groupings spatially defined by major roads within the Plan area boundary (Figure 6). Similarly, the Travel/4MP model represents the White Flint 2 Master Plan area as fourteen (14) TAZs. The TAZ revisions for the two Master Plan areas are briefly described below.

- Eight TAZs in Travel/4MP were expanded into 14 TAZs based on 14 blocks in the White Flint 2 Master Plan
- Six TAZs in Travel/4MP were expanded into 9 TAZs based on 9 blocks in the Rock Spring Master Plan. Figure 6 shows the revised TAZ structure of the Rock Spring study area reflected in Travel/4MP.
- Land use data for the 23 TAZs were prepared for different development scenarios, and the original land use data from Travel/4MP were replaced by the new land use data for both Master Plans.

As appropriate, the TAZ level land use data of areas adjacent to the two Master Plan areas was also revised accordingly:

- Land use data of three TAZs that were split by the boundary of the White Flint 2 Master Plan area were adjusted accordingly.
- Land use data of two TAZs that were split by the boundary of the Rock Spring Master Plan area were adjusted accordingly.

Figure 6. TAZ Structure of Study Area



The standard Travel/4 model network does not reflect minor classification of local streets and/or lacks sufficient level of the detailed network coding necessary to adequately represent traffic movements within the Rock Spring and White Flint 2 Master Plan areas. The networks of the Rock Spring Master Plan study area and nearby White Flint 2 Master Plan area were also revised to better represent traffic circulation in these areas.

- Network revisions for the White Flint 2 Master Plan area:
 - Added a new local road between MD355 and East Jefferson Street.
 - Revised and simplified intersection coding between Randolph Road at Parklawn Drive to represent all directional movements at this location.
- Network revisions for the Rock Spring Master Plan area:
 - Revised and simplified network coding between Rockledge Drive and I-270 to represent all movements at this location. It should be noted that there are no frontage roads along I-270 in either direction in Travel/4.
 - Added a new 2-lane north-south public street between Democracy Boulevard and Rock Spring Drive, along the western edge of Georgetown Square and the eastern edge of Walter Johnson High School.

Land Use Scenarios for Rock Spring Master Plan

Intersection performance was evaluated within the Plan study area to assess the traffic implications of four (4) land use scenarios. Each of these scenarios is briefly described below.

Scenario 1. 2015 Existing Conditions.

Scenario 2 (Alternative 1). 1992 North Bethesda/Garrett Park Master Plan Approved Land Use.

• Includes existing development, pipeline including WMAL, and some additional development based on existing zoning.

Scenario 3 (Alternative 2). 2040 Proposed Land Use (low level development).

• Includes existing development, the pipeline including WMAL, and some additional development based on existing zoning and assumes a low level of development within the Plan area based on the land uses associated with the Plan vision.

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

• Includes existing development, pipeline including WMAL, and some additional development based on existing zoning and assumes a high level of development within the Plan area based on the land use associated with the Plan vision.

		Popul	ation			ł	Employmen	t	
TAZ	Household	Household Population	Group Quarters	Total	Industrial	Retail	Office	Other	Total
702	0	0	0	0	0	0	7,163	0	7,163
3791	0	0	0	0	0	0	5,170	447	5,617
3792	0	0	0	0	0	304	55	745	1,104
3793	1,250	3,019	0	3,019	0	750	2,200	400	3,350
3825	340	540	4	543	0	693	398	137	1,228
3826	0	0	2	2	0	3,181	0	0	3,181
3827	168	406	0	406	0	0	6,415	0	6,415
3828	0	0	0	0	0	0	4,183	0	4,183
3829	58	185	24	209	0	207	166	0	373

Table 2. Land Use Inputs for Approved 1992 North Bethesda/Garrett Park Master Plan (Alternative 1)

Table 3. Land Use Inputs for 2040, Proposed Low Level Development (Alternative 2)

		Popul	ation			E	Employment	t	
TAZ	Household	Household Population	Group Quarters	Total	Industrial	Retail	Office	Other	Total
702	0	0	0	0	0	0	7,163	0	7,163
3791	352	850	0	850	0	109	5,605	578	6,291
3792	1,250	3,019	0	3,019	0	750	2,200	400	3,350
3793	80	193	0	193	0	474	100	813	1,386
3825	340	540	4	543	0	693	398	137	1,228
3826	250	397	2	398	0	3,236	88	352	3,676
3827	638	1,541	0	1,541	0	37	6,625	15	6,677
3828	51	123	0	123	0	1	4,197	1	4,199
3829	58	185	24	209	0	207	166	0	373

Table 4. Land Use Inputs for 2040, Proposed High Level Development (Alternative 3)

		Popul	ation			l	Employment	t	
TAZ	Household	Household Population	Group Quarters	Total	Industrial	Retail	Office	Other	Total
702	0	0	0	0	0	0	7,163	0	7,163
3791	879	2,123	0	2,123	0	145	5 <i>,</i> 635	680	6,460
3792	1,250	3,019	0	3,019	0	750	2,200	400	3,350
3793	223	539	0	539	0	373	73	772	1,219
3825	631	1,001	4	1,005	0	816	420	137	1,374
3826	250	397	2	398	0	3,181	88	396	3,665
3827	769	1,857	0	1,857	0	0	6,415	0	6,415
3828	143	345	0	345	0	0	4,183	0	4,183
3829	58	185	24	209	0	207	166	0	373

Local Area Transportation Review (LATR) Analysis Modeling Assumptions

Daily traffic forecasts were estimated utilizing procedures from the *NCHRP 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design.* NCHRP Report 255 techniques were used to convert the Travel4MP system level forecasts to intersection-level forecasts. In the context of the regional travel demand modeling analysis using Travel/4MP, the following key assumptions were reflected in the traffic evaluation:

- 2015 base year and 2040 horizon year.
- No Bus Rapid Transit (BRT).
- No Non-Auto Driver Mode Share (NADMS) goal/target was applied.
- Rock Spring and White Flint 2 land use/transportation network scenarios evaluated concurrently.

In support of traffic analysis for the Rock Spring Master Plan, the following background parameters were assumed beyond the Plan area:

- White Flint I area
 - Year 2030 land use forecast (developed by the White Flint Partnership) used in support of the White Flint traffic impact studies performed by MCDOT and the White Flint Partnership after the adoption of the Sector Plan in 2010.
 - White Flint I Transportation CIP 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)
 - Montrose Parkway East.

• White Flint 2 area

• Planning Board Draft Plan recommended land use.

• Rock Spring area

- 320 residential units proposed at the WMAL site located south of the Plan area. (Added in TAZ 3748.)
- New I-270 Spur HOV ramps on the south side of the Westlake Terrace Bridge.
- **Remainder of the Metropolitan Washington Region** Year 2040 MWCOG Round 8.3 Cooperative land use Forecast for the areas beyond those referenced above.
 - For the Washington DC region, the Round 8.3 forecast assumes an increase from 3.9 million employees and 2.5 million households in 2010 to 5.6 million employees and 3.4 million households in 2040.
 - For Montgomery County (including the cities of Rockville and Gaithersburg), the Round 8.3 forecast assumes an increase from 666,100 employees and 408,200 households in 2010 to 895,300 employees and 527,900 households in 2040.

 Transportation improvements in the Metropolitan Washington region's Constrained Long Range Plan (CLRP), a fiscally constrained transportation network, for both highway and transit.

HCM Intersection Analysis

Table 5 summarizes the HCM average intersection delay analysis results for the following three (3) scenarios:

- 2015 Existing Conditions
 - Existing land use and transportation network.
- 2040 Plan Vision
 - Land use scenario "Alternative 3" as described in Table 4 reflecting the land use recommendations of the Public Hearing Draft Plan in combination with the CLRP transportation network.
 - The Planning Board Draft Plan recommends higher densities than the Public Hearing Draft Plan (Alternative 2) for select properties and reflects the Alternative 3 scenario's level of potential development.
- 2040 Road Diet
 - 2040 Plan Vision land use and transportation network described above in combination with a "road diet" network of internal roadways within the Rock Spring Office Park portion of the Plan area.

* Note: All mitigation options applied to the "Plan Vision" scenario										
	D	38.7	D	51.0	2040	2040 Road Diet			BIVO	
	C	24.7	D	45.8	2040	2040 Plan Vision	71	North Bethesda	1270 at Rockledge	15
	С	25.0	в	14.6	2015	Existing				
	D	46.7	D	53.5	2040	2040 Mitigation			5	
& Traffic Operations/Management)		252.1	- 1	202.3	2040	2040 Road Diet	71	North Bethesda	Rd at Tuckerman	14
Dissional of Tusse (Mode Chift Tothis Dodictions)	n -n	85.1 זבט 1		106.7	2015	Existing			Old Georgetown	
	в	14.7	в	13.4	2040	2040 Road Diet			G	
	в	14.7	в	13.4	2040	2040 Plan Vision	71	North Bethesda	Georgetown Rd	13
	в	15.5	в	13.1	2015	Existing			I-270 West at Old	
	C	27.0	т	57.3	2040	2040 Road Diet			0000 8000000000000000000000000000000000	
	C	27.0	ш	57.3	2040	2040 Plan Vision	71	North Bethesda	Georgetown Dr	12
	C	22.8	C	29.2	2015	Existing			I=970 Fact at Old	
	m	63.3	т	69.7	2040	2040 Road Diet			Sunde	
	D	39.4	C	34.3	2040	2040 Plan Vision	71	North Bethesda	Soring	11
	D	38.7	C	24.4	2015	Existing			MD 187 at Bock	
	r	00	a	0.0	1010	Operations/Management)				
MD 187 at Rock Spring and MD 187 at Cheshire Dr)	m	67.3	n	30.8	2040	2040 Mitigation (Traffic			Rd	
(Redistributed volumes assumed 50/50 split between	F	190.9	٦	124.2	2040	2040 Road Diet	71	North Bethesda	Old Georgetown	10
Center Evit right turns only Eliminates signal phase	F	190.9	ч	124.2	2040	2040 Plan Vision			Democracy Blvd at	
Traffic Operations/Management - Make Shopping	п	129.4	т	65.7	2015	Existing				
	в	13.1	в	14.5	2040	2040 Road Diet				
	В	10.1	в	12.1	2040	2040 No Build	71	North Bethesda	Democracy bive at	9
	A	8.2	A	8.7	2015	Existing			Domocracy Blud at	
יו מווור טעפונוטווז (הממי עוסיביניבע ועפר עוומסיב (עווודענ))	т	67.0	E	60.8	2040	2040 Mitigation (Traffic Operations)				
Traffic Opertions (Add protected NBI phase (pm+nt))	г	67.0	г	69.1	2040	2040 Mitigation (Traffic Redistribution)				
Identified in Rock Spring Master Plan	n	C7 0	n	ED 1	0000	2040 Mitigation (Traffic Bodistribution)			Rock spring Dr	
Traffic Redistribution (75 NBL) to potential local streets	т	67.0	m	70.5	2040	2040 Mitigation (Mode Shift)	71	North Bethesda	Rockledge Dr at	8
or	'n	124.1	Ŧ	233.0	2040	2040 Road Diet				
10% mode shift	ш	67.0	٦	91.7	2040	2040 Plan Vision				
	D	36.0	F	88.4	2015	Existing				
	D	39.6	o	27.5	2040	2040 Road Diet				
	D	38.6	C	20.9	2040	2040 Plan Vision	71	North Bethesda	Rock Forest Dr	7
	D	43.6	с	20.5	2015	Existing			Dockladge Dr at	
	п	57.0	D	52.6	2040	2040 Road Diet			מווע רפו ושטטע אמ	
	E	56.6	D	51.8	2040	2040 Plan Vision	71	North Bethesda	Delilociacy bivo	6
	D	40.5	D	38.3	2015	Existing				
	D	43.5	C	28.6	2040	2040 Road Diet			Rockspring Ur	
	D	43.3	0	26.6	2040	2040 Plan Vision	71	North Bethesda	Fernwood Rd at	л
	н	57.5	D	36.6	2015	Existing				
	С	32.7	D	50.0	2040	2040 Road Diet			Westlake Ter	
	С	34.1	C	32.1	2040	2040 Plan Vision	71	North Bethesda	Rockledge Dr	4
	D	38.5	C	23.7	2015	Existing			Fernwood Rd at	
	A	7.7	в	17.9	2040	2040 Road Diet			at I-270 ramps	
	Þ	7.2	Β	16.8	2040	2040 Plan Vision	71	North Bethesda	Westlake Terrace	ω
	Þ	6.2	Β	17.3	2015	Existing				
	D	51.4	D	53.0	2040	2040 Road Diet			Westlake Dr	
	D	51.4	D	53.0	2040	2040 Plan Vision	55	Potomac	Democracy Blvd at	2
	D	45.6	D	47.4	2015	Existing			2	
	C	27.7	C	20.6	2040	2040 Road Diet			westlake ler	
	0	27.7	0	20.6	2040	2040 Plan Vision	55	Potomac	Westlake Dr at	1
	0	27.5	в	19.1	2015	Existing				
	LOS	Delay	LOS	Delay			(seconds/vehicle)	. oney		i
Mitigation*	CM .	Ξ.	Ň	Ŧ		Scenario	delav equivalent	Policy Area	Intersection	5
	Ň		N	A I			Average vehicle			

Table 5. Summary of HCM Analysis Results (See Figure 7 and Figure 9)

As noted earlier, the HCM analysis results shown in Table 5 for the Existing Conditions scenario are also summarized utilizing the color-coded intersection "dot" map depicted in Figure 4 above. Similar, HCM analysis results for the 2040 Plan Vision scenario described above are depicted in Figure 7.



Figure 7. 2040 Plan Vision HCM Analysis Scenario

While the pattern of projected future congestion is generally similar to existing conditions in the Rock Spring area, the analysis forecasts failing conditions at three (3) locations:

- Rockledge Drive at Rock Spring Drive
- Democracy at Old Georgetown Road
- Old Georgetown Road at Tuckerman Lane

In response to this observation, selected mitigation strategies were applied at these to demonstrate potential options to be considered to address projected failing conditions at these locations. The analysis showed that future intersection adequacy could be achieved at these locations with the implementation of the following mitigation strategies:

- Rockledge Drive at Rock Spring Drive
 - Ten percent (10%) mode shift or
 - $\circ~$ Traffic redistribution (75 NBL traffic (vehicles)) assigned to proposed local streets identified in the Plan or
 - Traffic operations improvement (add protected NBL phase (pm+pt (permitted & protected))
- Democracy Boulevard at Old Georgetown Road
 - Traffic Operations/Management Make Shopping Center Exit right turns only. Eliminates signal phase. (Redistribute volumes assumed 50/50 split between MD 187 at Rock Spring Drive and MD 187 at Cheshire Drive)
- Old Georgetown Road at Tuckerman Lane
 - Eliminate direct left turns from all four approaches and replace these movements with U-turn phases at existing or new traffic signals beyond the intersection as shown in Figure 8.



Figure 8. Old Georgetown Road Displaced Left Turn Traffic Operations Concept

The results of the application of the mitigation strategies described above are depicted in the color-coded intersection "dot" map shown in Figure 9. This concept was offered as a potential mitigation solution for consideration at the PHED Committee discussion on July 10, 2017. The PHED Committee did not recommend this solution because of the distance of this intersection from the plan area boundary. The PHED Committee did not want to tie any potential improvements at this intersection (which fails under existing conditions and may continue to do so in the future) to the Rock Spring Master Plan.

Figure 9. 2040 Plan Vision Scenario HCM Analysis with Mitigation



An additional HCM traffic analysis based on the evaluation of a "road diet" scenario was conducted as a second phase of traffic impact study to investigate if non-vehicular modes can utilize this space while vehicular traffic has the same level or without too much reduction of LOS. The road diet scenario reduced the number of lanes alongside Rock Spring Dr., Fernwood Dr., Rockledge Dr., and Westlake Ter. from four through travel lanes to two through travel lanes.

The road diet scenario was evaluated in the context of the 2040 Plan Vision land use scenario described above reflecting the roadway lane reductions described below.

- Reduce the following roadway segments from 4 through travel lanes to 2 through travel lanes in the Master Plan of Highways and Transitways:
 - Rock Spring Drive (west of Georgetown Square and planned road).
 - Fernwood Road (north of Democracy Boulevard).
 - Rockledge Drive (north-south segment).
 - Rockledge Drive and Westlake Terrace (east of Motor City Drive / Montgomery Mall Transit Center Driveway).
- Re-classification of arterial streets to business streets of the appropriate roadway segments described above.
- Re-classification of residential primary to minor arterial of Westlake Drive (north of Westlake Terrace).

The results of the traffic analysis for the Road Diet scenario are summarized in the color-coded intersection "dot" map depicted in Figure 10.

Figure 10. 2040 Vision Plan with Road Diet HCM Analysis



Transit

Rock Spring contains a relatively robust transit network. WMATA Metrobus, Montgomery County Ride On bus, and the Rock Spring Park Express all serve the master plan area. Local and regional bus routes are supplemented with the Rock Spring Express.

The free Rock Spring Park Express connects the Grosvenor-Strathmore Metrorail station to Rock Spring during a.m. and p.m. rush hours. It is part of an effort to improve accessibility and connectivity. The Rock Spring Park Express runs on 10-minute intervals from 6-9 a.m. and from 4-7 p.m. with no stops between the two locations. This new express transit option supplements already existing regular Ride On bus service (Ride On Route 96). Approximately 200 riders per day used the Rock Spring Park Express. There are 5 stops within Rock Spring Park. The service is timed to complement Ride On Route 96 between the Grosvenor Metrorail Station and Rock Spring Park. The average wait for a rider is about 5 minutes for either transit option during peak hours.



Figure 12. Ride On Bus Route 96







Figure 14. Rock Spring Ride On Bus Routes





Figure 16. Metrobus System & Ride On Bus (Source WMATA 2017)



Montgomery Mall Transit Center Park and Ride

The Westfield Montgomery Mall Transit Center and Park and Ride lot is within the plan area adjacent to Westfield Montgomery Mall. The center includes covered bus bays, and buses can park and make turns at this location. The transit center serves the I-270 Corridor and vicinity in Montgomery County, and it includes automobile parking spaces and bicycle racks. The transit center serves Ride On bus routes 6, 26, 42, 47 and 96 and Metrobus routes J2 and J3.

Future Bus Rapid Transit Network

A bus rapid transit service (the North Bethesda Transitway) is planned for the area. It is currently planned to connect to the Grosvenor Metrorail Station, or to the White Flint Metrorail Station (Resolution 17-952). The planned transitway will link the Grosvenor or White Flint areas with the Westfield Montgomery Mall via Old Georgetown Road and Rock Spring Drive. Much of the right-of-way for the transitway is along Rock Spring Drive, Fernwood Road, and Tuckerman Lane, and it has been secured through easement dedications in most locations. The transitway was recommended in the 2013 Countywide Transit Corridors Functional Master Plan.



Figure 17. North Bethesda Transitway

Bicycle and Pedestrian Facility Determination

Bicycle Level of Stress

The Rock Spring Master Plan recommends a bicycle network that is safe, has a low level of traffic stress, and is accessible to users of all abilities. The proposed network will connect to existing bikeways and trails by providing interim and long-term bicycle improvements.

The Montgomery County Bicycle Planning Guidance, developed in July 2014, provides planning tools for determining the suitability of specific bicycle facilities and identifying alternate bicycle routes to avoid streets with higher vehicular speed and volumes. For the Rock Spring area, the basic level of traffic stress methodology was utilized to evaluate existing road conditions that affect bicyclists. Each road evaluation is based on a stress level from "1" (lowest stress) to "4" (highest stress) for bicyclists. This approach is utilized to access the level of traffic stress on each road segment based on the bicycle facility provided on or along the roadway and the vehicular speed and volume of adjacent traffic on that roadway.

A cursory review of the existing bicycle level of stress shows that some streets in the Rock Spring area have various bicycle levels of stress, ranging from "very low" to "very high" stress.



Figure 18. Bicycle Level of Traffic Stress (existing)

Bike Share

Capital Bikeshare connects a network of bike stations across the Washington Metropolitan area. MCDOT plans and operates the system in Montgomery County. The Rock Spring Plan recommends that the Capital Bikeshare program be expanded into the plan area. Currently, there are no Capital Bikeshare stations in Rock Spring. More Bikeshare stations are coming to areas of Montgomery County, including White Flint and Twinbrook, which would be easily accessible from Rock Spring via bicycle. There are currently 10 Capital Bikeshare stations within the Bethesda Downtown Sector Plan area. These stations are located near conventional transit (e.g.: bus stops, Metrorail, etc.).

The Montgomery County Department of Transportation (MCDOT) works with area developers to locate bikeshare locations as new development and redevelopment occur in the county. Along with an improved bikeway network, Capital Bikeshare would connect the plan area to many other areas of the county and help to achieve the plan's overall transportation goals and strategies.



Figure 19. Capital Bikeshare (Source: Capital Bikeshare)

Bicycle Pedestrian Priority Area

The Rock Spring Plan area is entirely within a Bicycle-Pedestrian Priority Area (BiPPA), as designated by Montgomery County in the *Approved and Adopted 2013 Countywide Transit Corridor Functional Master Plan* (see Map 13 in the 2013 Plan). One reason that this designation was made was because Rock Spring is recommended to contain bus rapid transit stations where sufficient planned density could generate significant pedestrian and bicyclist activity.

The State of Maryland's Bicycle-Pedestrian Priority Area (BPPA) designation is authorized through Section 2-604 of the Annotated Code of Maryland. Prior to formal recognition as a BPPA by the State of Maryland, however, the Maryland State Highway Administration (SHA) must concur with the County's BiPPA designation. Once formal concurrence has been issued,

Rock Spring would become eligible for State funding intended to enhance and prioritize bicycle and non-motorized travel within the transportation network.

Montgomery County is able to enhance bicycle and pedestrian accommodation in the BiPPA areas through its Capital Improvement Program (CIP), which provides funding for the planning, design, and construction of improvements, including but not limited to bikeways, sidewalks, intersections, street lighting, relocation of utilities, and curb ramp reconstruction to meet ADA best practices.

Pedestrian Sidewalks

Most of the roads within the plan area contain sidewalks. Bus stops are also located along most of these roads. Many intersections pose challenges to pedestrians and bicyclists, and it is recommended that intersections be improved for pedestrian safety, connectivity and ADA access, where feasible.



Figure 20. Existing Sidewalks

Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is an important consideration for the Rock Spring Master Plan's transportation goals and strategies. TDM in Rock Spring will facilitate more efficient use of infrastructure and provide more sustainable, economical land use patterns. Additionally, TDM strategies can reduce the overall cost of providing parking and transit, improve workforce access and health, and help businesses to retain employees by helping them find more efficient and cost-saving ways to reach their job site. Sometimes this job site is a worker's home if they telecommute. Overall, TDM can reduce the cost of commuting-related & other travel delays, and reduce the overall cost and stress of commuting, parking, gas, and car ownership.

Transportation Management Districts (TMDs)

Rock Spring is part of the larger North Bethesda Transportation Management District (TMD). The North Bethesda TMD is operated by the Transportation Action Partnership (TAP) under the name "North Bethesda Transportation Center" (NBTC). The NBTC provides free services to employers, employees, residents and visitors in Grosvenor, White Flint, Twinbrook, Executive Boulevard, and Rock Spring Park.



Figure 22. Montgomery County Transportation Management Districts (TMDs)

Montgomery County TMD law aims to reduce gridlock. TMD laws affect employers with 25 or more full or part-time employees. The purpose of TMD in Montgomery County is to reduce traffic congestion and encourage use of alternative commuting options for more than 100,000 employees in several business districts. The law requires that these employers implement a Traffic Mitigation Plan (TMP), participate in the County's Annual Commuter Survey, and submit an Annual Report of Activities related to TDM.

Employers with 25 or more employees within the County TMDs will receive a letter of notification from the Director of Montgomery County's Department of Transportation (MCDOT). Once notification is received, employers have 90 days to submit a TMP.

The County's TMD Staff is available to assist employers in preparing their TMP, which will be reviewed by the TMD staff and a TMD Advisory Committee. Recommendations will be made by the TMD Advisory Committee for additional strategies to be included in the employer's TMP. The Director of MCDOT has final approval authority.

Share A Ride (COMCOR 42A.00.02 Amendment of North Bethesda Share-A-Ride District)

Under the authority of Chapter 42A, titled "Ridesharing and Transportation Management," of the Montgomery County Code 1984, as amended, the county executive establishes a regulation for the expansion of a previously created share-a-ride district (Executive Regulation 8-91 titled "Creation of a North Bethesda Share-A-Ride District," effective July 18, 1991). The regulation facilitates parking reductions under Chapter 59, Article E of the Montgomery County Code for those owners of office or residential developments who meet the qualifications established in Chapter 42A and enter into a written agreement with the County.

Section 42A-2, titled "Share-Ride Districts," allows share-a-ride districts to be established by the county executive at locations where large concentrations of employment provide opportunities for many new ridesharing arrangements. Each Share a Ride District is to be an employment center that has a minimum of two million gross square feet of existing office space within a one-half mile area. All land in the general vicinity of the above area that is zoned or recommended in the appropriate master plan for commercial or industrial use is to be included in the district. The expanded North Bethesda TMD area meets the requirements for a share-a-ride district and is hereby established as such by the county executive.