

# Spring Valley Traffic Study

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**Prepared for**



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## Executive Summary

The purpose of this study is to evaluate various access alternatives for the Spring Valley Community to mitigate the effects of BRAC related traffic.

The State Highway Administration (SHA) has proposed improvements along Connecticut Avenue (MD 185) between Jones Bridge Road and the Capital Beltway (I-495) to provide additional access opportunities for the increased traffic demand expected from BRAC expansion at the National Naval Medical Center (NNMC). The NNMC will make access improvements to their gates on Jones Bridge Road. Because the intersection of MD 185 at Jones Bridge Road currently is congested, the SHA project proposes several improvements that will improve traffic flow at the intersection as well as expedite vehicles exiting I-495 to access Jones Bridge Road. Specifically, the project includes widening MD 185 to provide an additional lane in each direction as well as additional turn lanes on Jones Bridge Road. A continuous auxiliary/dedicated right-turn lane will be provided from I-495 Ramp 6 (eastbound to southbound) to Jones Bridge Road in the southbound direction immediately adjacent to the Spring Valley Community.

The Spring Valley Community has three access points on MD 185: Woodlawn Road, Montrose Driveway and Parsons Road. There is one access point on Jones Bridge Road at Spring Valley Road. All of the existing access points are unsignalized. Because of the proposed roadway widening and increased traffic anticipated from BRAC, this study was prepared to examine the transportation impacts of a variety of access improvement alternatives for the Spring Valley Community. The key roads in the study area include MD 185 (Connecticut Avenue), Jones Bridge Road, Spring Valley Road, Woodlawn Road, Montrose Driveway and Parsons Road. Peak hour observations and traffic counts were compiled to assess existing and potential future conditions.

Four alternatives, identified by Montgomery County to be analyzed as part of this study are as follows:

- **Alternative 1:** Construct Traffic Signal at MD 185 and Montrose Driveway
- **Alternative 2:** Construct Traffic Signal at Jones Bridge Road and Spring Valley Road
- **Alternative 3:** Construct Fourth Leg at Platt Ridge Drive Intersection
- **Alternative 4:** Extend Woodlawn Road or Montrose Driveway to the Park Access Road

Capacity analyses using Synchro software, which employs the methodology as outlined in the *Highway Capacity Manual (HCM)*, was used to evaluate intersections within the study network. Traffic signal warrant analyses were performed using the criteria listed in the 2006 *Maryland Manual On Uniform Traffic Control Devices (Md-MUTCD)*. In the analysis of each alternative, it was assumed the additional BRAC traffic and proposed BRAC related roadway improvements had been implemented. In addition, the feasibility for geometric improvements was examined in the field.

Based on the analysis of Existing, BRAC Opening Day and several access improvement alternative traffic conditions, we recommend that Montgomery County pursue Alternative 3 (Construct fourth leg at Platt Ridge Drive) as the ultimate solution, but also provide an interim solution in the form of Alternative 2 (Construct traffic signal at Jones Bridge Road and Spring Valley Road).





## Section 1 Introduction

### 1.1 Project Description

Montgomery County requested that STV evaluate access improvements for the Spring Valley community. As shown in Figure 1, the community is located along the west side of MD 185 (Connecticut Avenue) north of Jones Bridge Road in North Chevy Chase, MD. This study examines the transportation impacts for a variety of access improvement alternatives. It is anticipated that BRAC-related activities associated with the National Naval Medical Center (NNMC) will also have impacts to traffic in the vicinity of the community.

The study area includes all signalized and unsignalized intersections within the following limits: Woodlawn Road to the north, Jones Bridge Road to the south, MD 185 to the east as well as the North Chevy Chase Park Access Road to the west.

### 1.2 Scope of Study

The scope of the study included a data collection and analysis effort with the following tasks:

- Conducted peak hour turning movement count at the intersection of Jones Bridge Road at Spring Valley Road.
- Obtained other recent counts from the Maryland State Highway Administration's (SHA) website as well as Montgomery County's turning movement count database.
- Conducted AM and PM peak hour observations and spot turning movement counts along MD 185 and Jones Bridge Road to verify the existing count data for the community access points.
- Obtained recent Synchro networks from Montgomery County for MD 185 and Jones Bridge Road.
- Coordinated with Montgomery County's Traffic Management Center to obtain existing traffic signal timings.
- Obtained information on proposed BRAC-related expansion at the National Naval Medical Center, including population forecasts and potential future traffic analyses contained in the *National Naval Medical Center (NNMC) Master Plan Update 2008* as well as the corresponding *Transportation Management Plan* from SHA and the NNMC BRAC website.
- Obtained information on BRAC-related roadway projects (funded by SHA or Montgomery County), including available traffic data, scope of the project and time frame for implementation.
- Combined and calibrated available Synchro files into one study network for the roadways mentioned above. Balanced the traffic volumes within the existing Synchro networks using the counts collected above to reflect current traffic conditions. Conducted an existing conditions traffic analysis using the *Highway Capacity Manual (HCM)* outputs from Synchro.
- Estimated the traffic diversion for each peak hour that would result from anticipated NNMC gate changes.
- Estimated the traffic diversion for each peak hour that would result from the access improvement alternatives. Re-assigned this traffic to the surrounding roadway network, re-coded the Synchro model, and conducted a traffic analysis to quantify the impact for each alternative.





## Spring Valley Traffic Analysis

Figure 1

Location Map





- Evaluated the need for traffic signalization at several intersections using the Traffic Signal Warrant criteria listed in the 2006 *Maryland Manual On Uniform Traffic Control Devices (Md-MUTCD)*. Obtained relevant crash data from Montgomery County to supplement the signal warrant analyses.
- Conducted a concept-level feasibility analysis of geometric alternatives requested by Montgomery County.





## Section 2 Existing Conditions

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### 2.1 Description of Road Network

The key roads in the study area include MD 185 (Connecticut Avenue), Jones Bridge Road, Spring Valley Road, Woodlawn Road, Montrose Driveway, Parsons Road and Kensington Parkway.

### 2.2 Existing Community Access

The Spring Valley Community has three access points on MD 185: Woodlawn Road, Montrose Driveway and Parsons Road. There is a full median break at Woodlawn Road to access points north on MD 185. The other access points on MD 185 are right-in, right-out. All of these points are signed DO NOT ENTER during the hours of 7-11 AM. There is one access point on Jones Bridge Road at Spring Valley Road. There is a median break to access points east on Jones Bridge Road. There are DO NOT BLOCK INTERSECTION signs posted along eastbound Jones Bridge Road at Spring Valley Road. All of the existing access points are unsignalized.

### 2.3 Existing Lane Configurations

The Existing Lane Use and Traffic Control are shown on Figure 2.

### 2.4 Existing Vehicular Traffic Counts

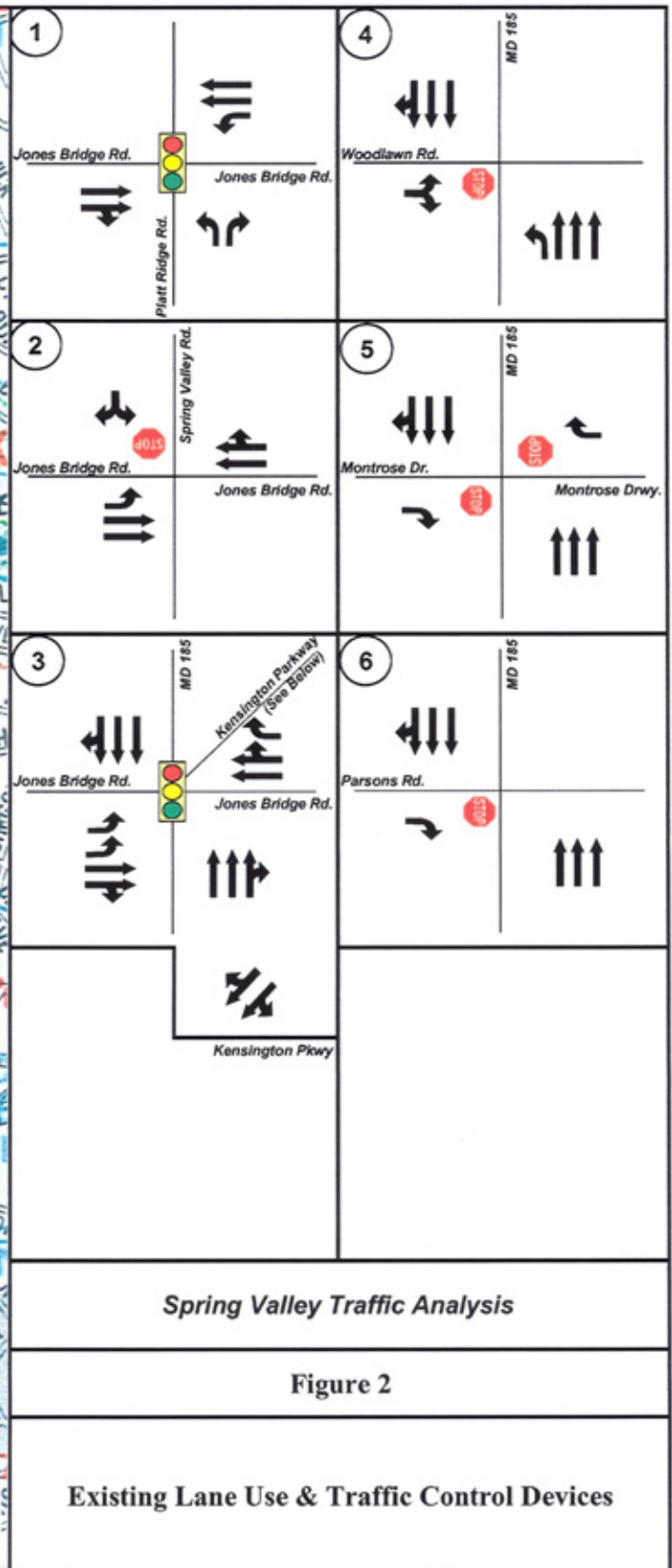
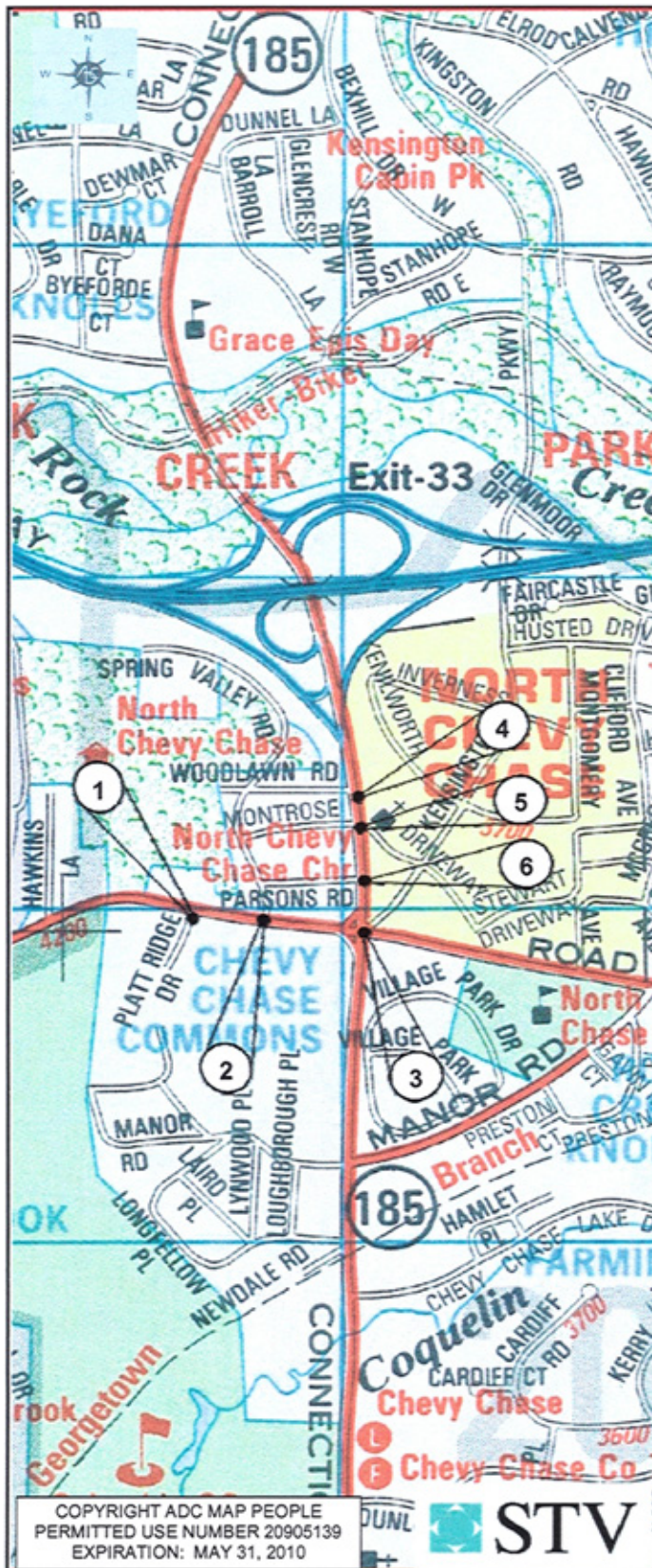
The Existing Peak Hour Traffic Volumes are shown on Figure 3. It should be noted that when compared to older counts available from the Maryland State Highway Administration website for the same intersections, the new turning movement counts were somewhat lower. This can likely be attributed to changes in individual travel choices within the last year or two. To be conservative, at intersections where old counts had higher volumes than new counts, the higher volumes were used. Appendix A contains the traffic count information.

### 2.5 Existing Peak Hour Observations

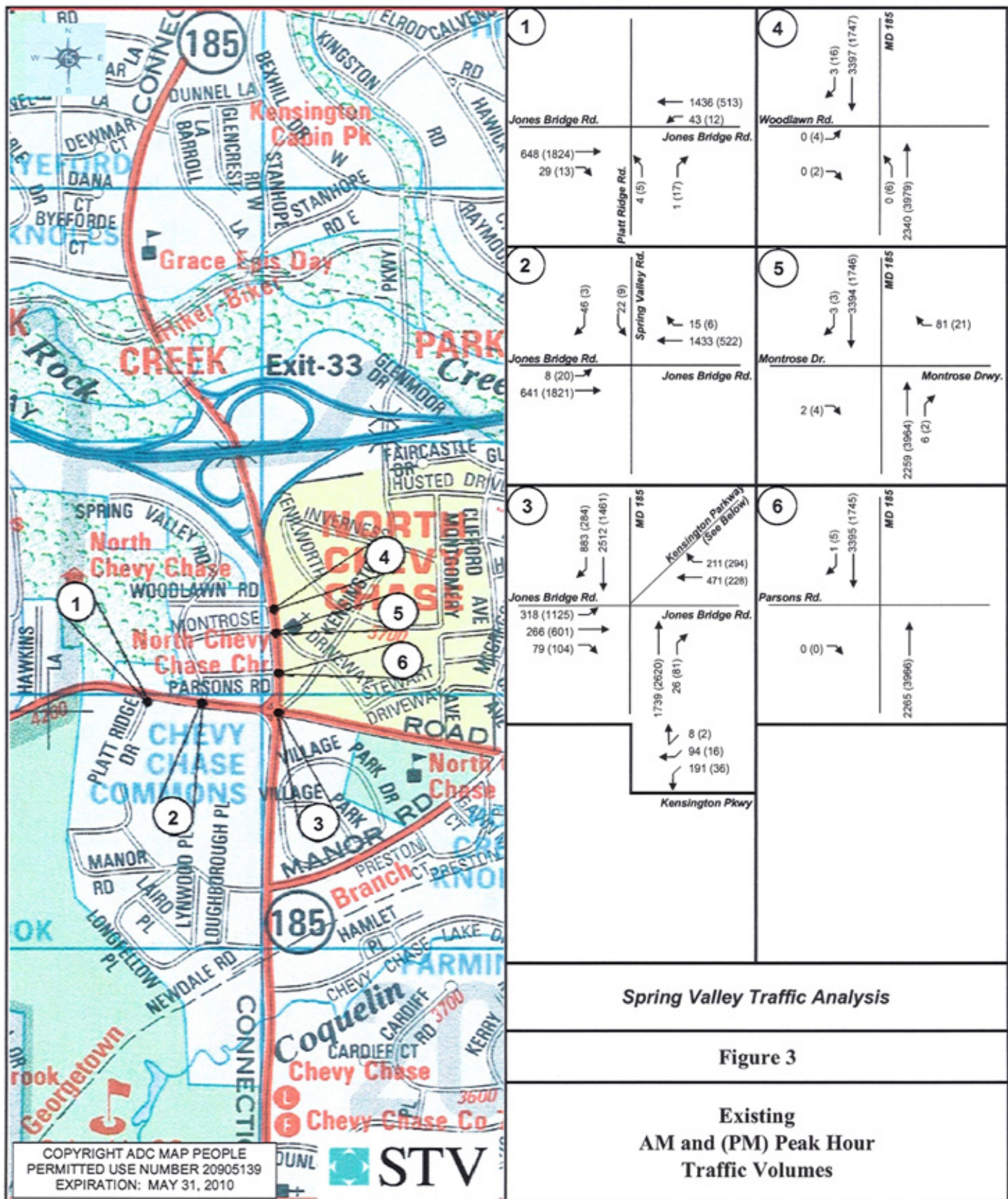
Peak hour observations were conducted on Tuesday, March 9, 2010. The following was observed:

#### AM Peak Hour

- A few vehicles were observed violating the 7-11 AM access restriction from MD 185.
- No vehicles were observed exiting from Woodlawn Drive.
- Queuing on southbound MD 185 blocks side street community access points throughout the peak period. Exiting vehicles must wait for motorists on southbound MD 185 to allow them to enter. This generally occurs throughout the AM peak period.
- Queuing on eastbound Jones Bridge Road occasionally blocks Spring Valley Road. Exiting vehicles occasionally perform a two stage left-turn maneuver using the limited space in the median opening.









PM Peak Hour

- Left-turning vehicles from Woodlawn Road occasionally perform a two stage left-turn maneuver using the limited space in the median opening along MD 185.
- A few U-Turns (northbound to southbound) were observed at the median opening along MD 185 at Woodlawn Road.
- Queuing on eastbound Jones Bridge Road consistently blocks the Spring Valley Road intersection. The “DO NOT BLOCK INTERSECTION” signs are often ignored. Exiting vehicles consistently perform a two stage left-turn maneuver using the limited space in the median opening along Jones Bridge Road. This generally occurs throughout the entire peak period.

Appendix B contains photographs that depict the existing traffic operations.

## 2.6 Existing Level of Service Analysis

Level of Service (LOS) calculations were conducted using Synchro. Synchro models operations at signalized and unsignalized intersections using the methodology from the 2000 *Highway Capacity Manual* and calculates a variety of measures of effectiveness (MOEs). The two most commonly utilized MOEs are the average delay per vehicle at the intersection and the level of service (LOS) at the intersection. The LOS is a measure of the level of congestion at an intersection ranging from A to F. LOS A indicates an intersection operating with little to no congestion, while LOS E and F represent an intersection with unacceptable heavy congestion. Table 1 below summarizes the delay and level of service results of the existing capacity analyses.

**Table 1: Existing Condition Intersection Capacity Analysis**

	LOCATION	AM		PM	
		Delay (sec)	LOS	Delay (sec)	LOS
1	Jones Bridge Road at Platt Ridge Drive	2.3	A	6.1	A
2	Jones Bridge Road at Spring Valley Road <sup>1</sup>	<b>38.8</b>	<b>E</b>	26.2	D
3	Jones Bridge Road at MD 185	<b>107.0</b>	<b>F</b>	<b>142.4</b>	<b>F</b>
4	MD 185 at Woodlawn Road <sup>1,3</sup>	0.0	A	53.6	F
5	MD 185 at Montrose Driveway <sup>2</sup>	10.0	B	10.1	B
6	MD 185 at Parsons Road <sup>2,3</sup>	0.0	A	0.0	A

1-Unsignalized intersection with median opening (Delay and LOS reported for the side street)

2-Unsignalized intersection with right-in/right-out access only (Delay and LOS reported for the side street)

3-Intersection did not have either AM or PM peak hour traffic, therefore no delay is reported

The results of the existing level of service analyses indicate the intersection of Jones Bridge Road at Spring Valley Road operates at an unacceptable LOS during the AM peak hour. The intersection of Jones Bridge Road at MD 185 operates at an unacceptable LOS during both peak hours. Even though Synchro reports acceptable LOS throughout the study area, for practical purposes most of the intersections along MD 185 are likely to have operational issues related to queuing from the Jones Bridge Road at MD 185 intersection. For example, in the AM peak period, the southbound queue along MD 185 regularly extends to at least the I-495 ramps. This queue is the primary reason that access from the Spring Valley Community is so difficult during peak periods. Appendix C contains the existing traffic signal timing information and Appendix D contains the Synchro analysis worksheets.



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**Section 3 BRAC Conditions**

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**3.1 Proposed BRAC Expansion Description**

An Environmental Impact Statement (EIS) was prepared to examine the environmental impacts caused by the BRAC-mandated relocation of certain medical functions from the Walter Reed Army Medical Center (WRAMC) in Washington, DC to the National Naval Medical Center (NNMC) in Bethesda, Maryland. This BRAC Action would result in the integration of the two institutions to establish the Walter Reed National Military Medical Center (WRNMMC) at Bethesda. The BRAC Action alternatives currently call for approximately 2,200 employees to be accommodated at the NNMC campus by 2011. However, the EIS assumed approximately 2,500 additional employees as a conservative estimate to ensure any additional staff determined necessary have been evaluated in the EIS as well as to account for possible increases in staff at NNMC under other ongoing or future projects on Base. Relevant information from the study is included in Appendix E.

**3.2 BRAC Trip Generation, Site Trip Distribution & Trip Assignment**

The trip generation, distribution and assignment of new trips anticipated to be generated by the proposed expansion at NNMC was obtained from the *National Naval Medical Center Transportation Study in Support of Environmental Impact Statement*. In an effort to increase gate efficiency, the NNMC is currently implementing improvements to several of the entry points along Jones Bridge Road. For the purposes of this study, it is assumed that 15 percent of the projected NNMC traffic currently assigned to the Main NNMC Gate (Rockville Pike at Medical Center Metro Station) will utilize the University Road Gate via MD 185 and Jones Bridge Road.

**3.3 BRAC Related Roadway Improvements**

The intersection of MD 185 at Jones Bridge Road/Kensington Parkway has been selected by the SHA as one of several locations that will require roadway improvements to accommodate additional traffic demand due to BRAC. The project includes widening MD 185 to provide an additional lane in each direction as well as additional turn lanes on Jones Bridge Road. A continuous auxiliary/dedicated right-turn lane will be provided from I-495 Ramp 6 (eastbound to southbound) to Jones Bridge Road in the southbound direction immediately adjacent to the Spring Valley Community. The southbound right-turn channelization island will be removed and median channelization improvements are proposed at Jones Bridge Road at Spring Valley Road to help separate in- and outbound left-turning traffic. Appendix E contains a figure that illustrates all of the proposed improvements.





### 3.4. BRAC Opening Day Traffic Volumes

The BRAC Opening Day Peak Hour Traffic Volumes are determined by summing the Existing Conditions and the BRAC Trip Assignment. The resultant BRAC Opening Day Peak Hour Volumes are shown on Figure 4.

### 3.5. BRAC Opening Day Level of Service Analysis

The BRAC Opening Day traffic volumes and roadway improvements were evaluated using the methodology discussed previously. Table 2 below summarizes the results of the capacity analyses.

**Table 2: BRAC Opening Day Condition Intersection Capacity Analysis**

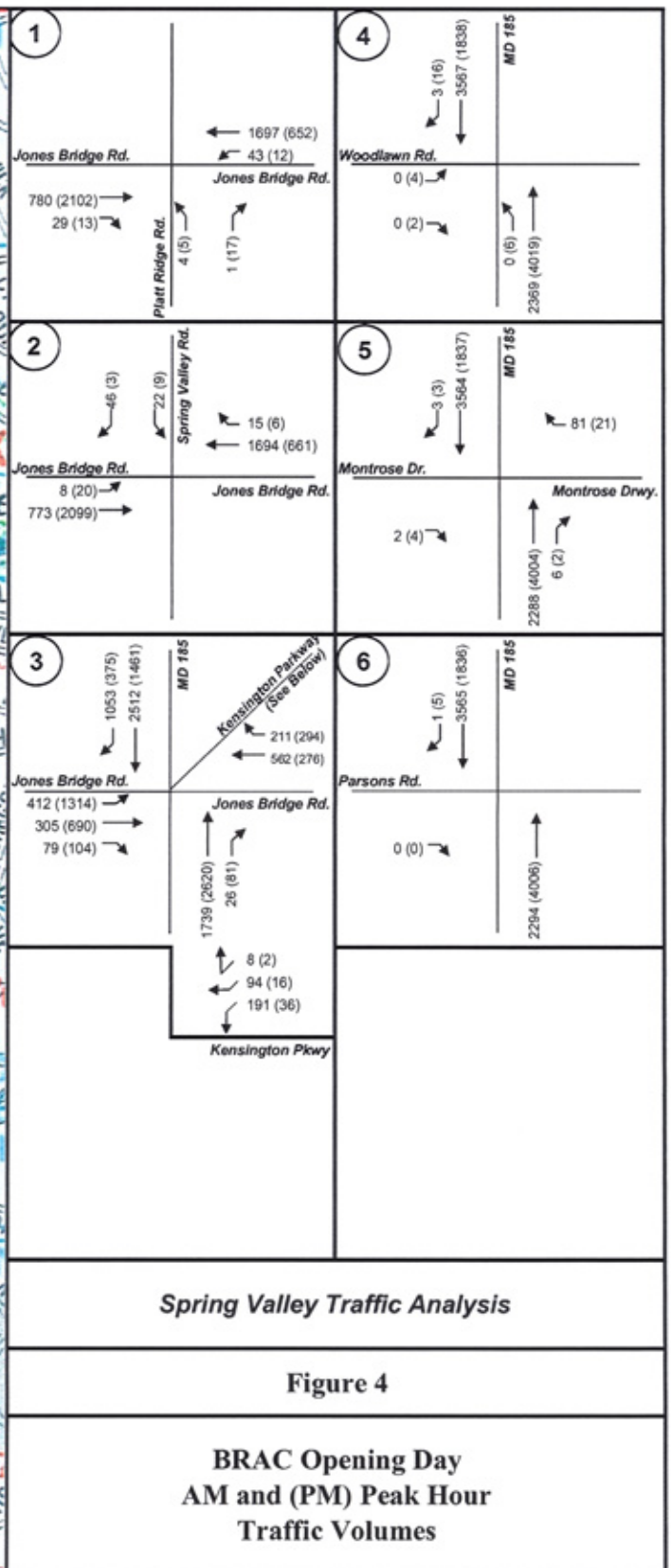
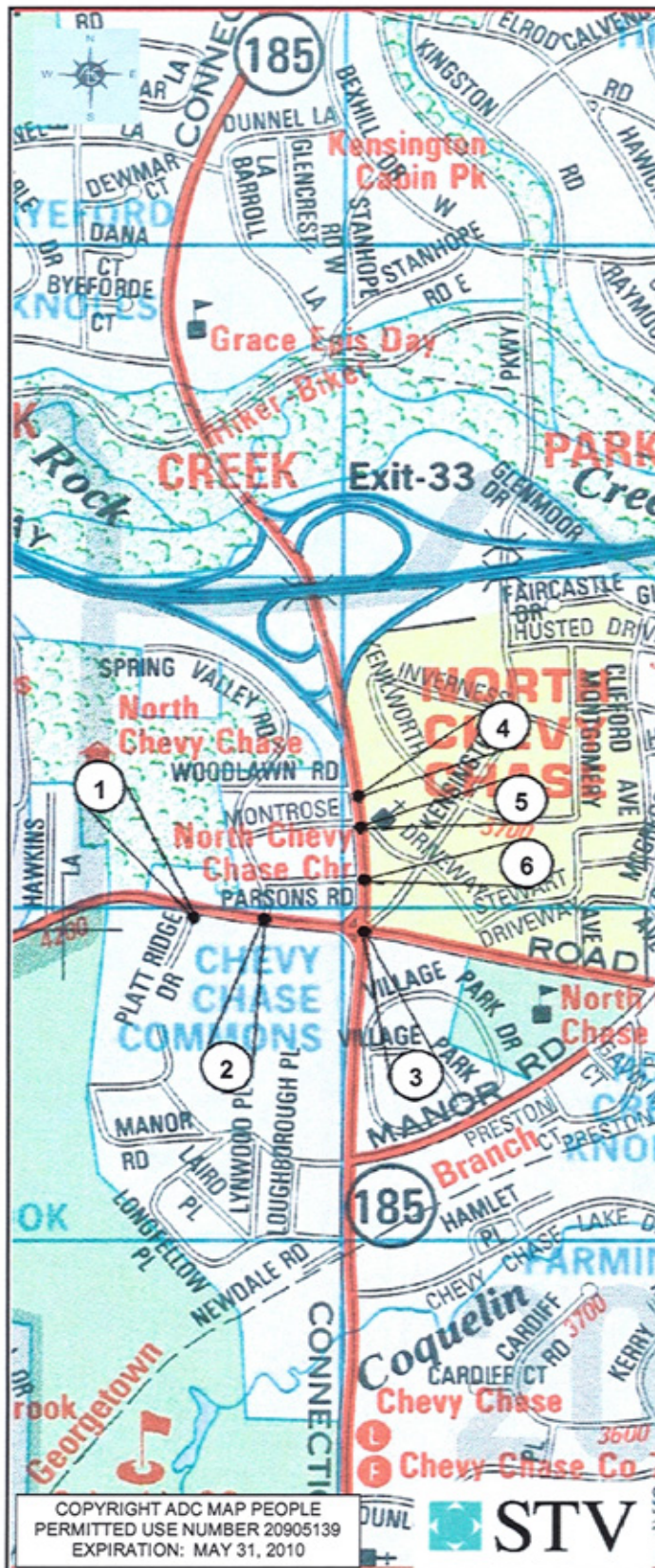
	LOCATION	AM		PM	
		Delay (sec)	LOS	Delay (sec)	LOS
1	Jones Bridge Road at Platt Ridge Drive	2.5	A	7.3	A
2	Jones Bridge Road at Spring Valley Road <sup>1</sup>	93.3	F	10.9	B
3	Jones Bridge Road at MD 185	75.0	E	69.7	E
4	MD 185 at Woodlawn Road <sup>1,3</sup>	0.0	A	13.0	B
5	MD 185 at Montrose Driveway <sup>2</sup>	9.8	A	9.5	A
6	MD 185 at Parsons Road <sup>2,3</sup>	0.0	A	0.0	A

1-Unsignalized intersection with median opening (Delay and LOS reported for the side street)

2-Unsignalized intersection with right-in/right-out access only (Delay and LOS reported for the side street)

3-Intersection did not have either AM or PM peak hour traffic, therefore no delay is reported

The results of the BRAC opening day level of service analyses indicate the unsignalized intersection of Jones Bridge Road at Spring Valley Road deteriorates to LOS F in the AM peak hour; however it improves to a LOS B in the PM peak hour. The intersection of Jones Bridge Road at MD 185 improves to LOS E during both peak hours even with the influx of additional traffic. Again, even though Synchro reports acceptable LOS throughout the study area, for practical purposes most of the intersections along MD 185 are likely to have operational issues related to queuing from the Jones Bridge Road at MD 185 intersection. Appendix F contains the Synchro analysis worksheets.







## Section 4 Community Access Improvement Alternatives

### 4.1 Community Access Improvement Alternatives

Several alternatives were identified by Montgomery County to be evaluated as part of this study to improve access in and out of the Spring Valley Community. A brief description of each alternative is given in the following sections. Each alternative assumes the additional BRAC traffic and that the proposed SHA BRAC related roadway improvements have been implemented. The Alternatives are as follows:

- **Alternative 1:** Construct Traffic Signal at MD 185 and Montrose Driveway
- **Alternative 2:** Construct Traffic Signal at Jones Bridge Road and Spring Valley Road
- **Alternative 3:** Construct Fourth Leg at Platt Ridge Drive Intersection
- **Alternative 4:** Extend Woodlawn Road or Montrose Driveway to the Park Access Road

For each alternative an 'A' case and a 'B' case was considered. The A case assumed that, unless otherwise specified as a part of the alternative, access to the community from MD 185 remains unchanged. The B case assumed that all three access points to and from the community along MD 185 are closed and all traffic must enter and exit the community along Jones Bridge Road. Because the traffic volumes, and therefore the analysis, for the A case and B case of each alternative were nearly identical, the A case volumes and results are shown and discussed below, while the B case volumes are included in the appendix for each alternative.

### 4.2 Alternative 1: Construct Traffic Signal at MD 185 and Montrose Driveway

#### Description

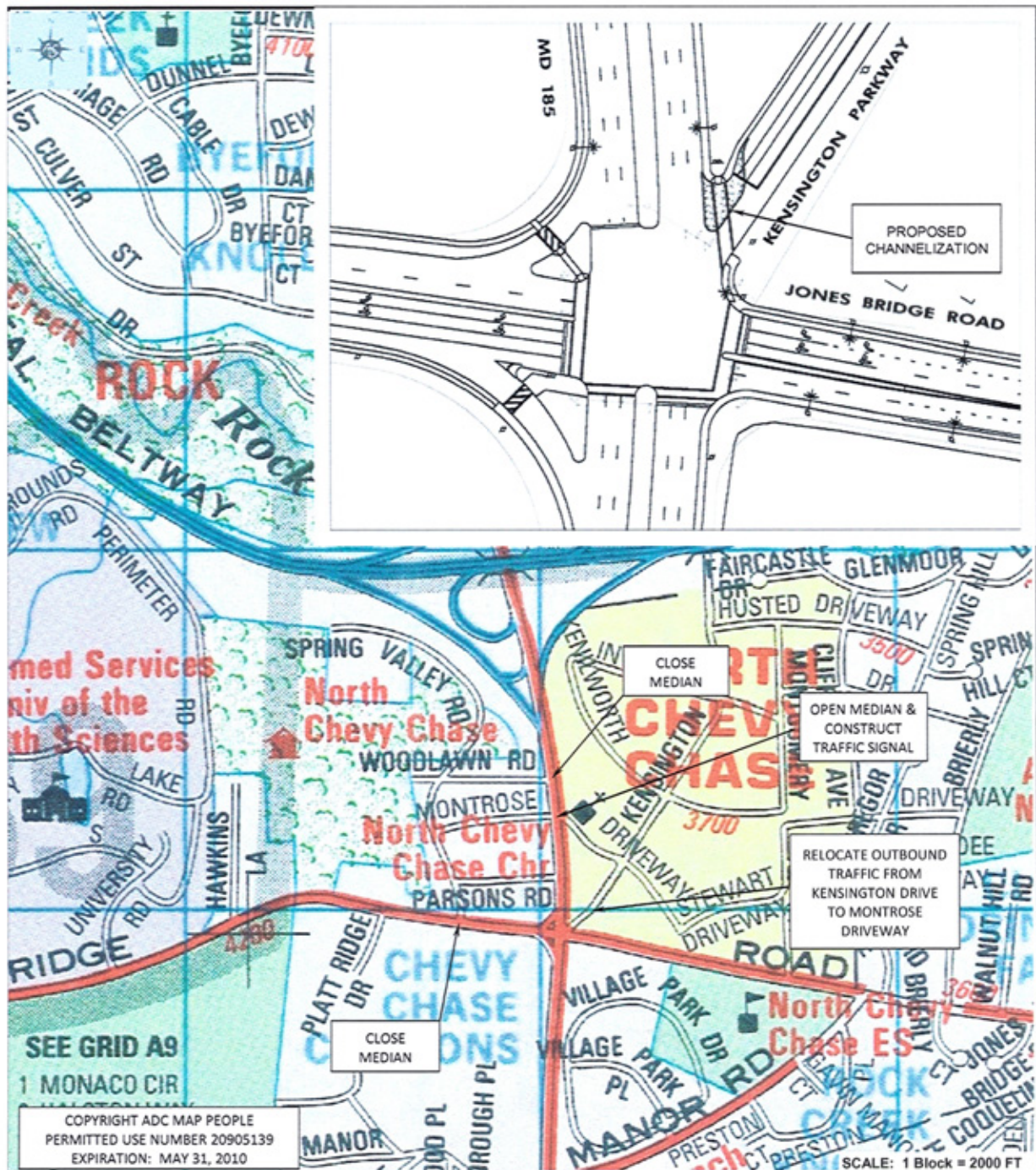
This alternative is illustrated on Figure 5 and includes the following characteristics:

- Close the median openings along Jones Bridge Road at Spring Valley Road and along MD 185 at Woodlawn Road.
- Make Kensington Parkway south of Montrose Driveway one-way northbound by diverting the southbound Kensington Parkway movement onto Montrose Driveway.
- Widen Montrose Driveway to accommodate the diverted traffic and associated queuing on the east leg. (Montrose Driveway is currently an unmarked residential street and is not conducive in its current configuration to accepting the rerouted traffic.)
- Open the median along MD 185 and signalize the intersection of MD 185 and Montrose Driveway.
- Alternative 1B considers all of the items listed above and also includes closing all access at Woodlawn Road and Parsons Road.

#### Diverted Peak Hour Volumes

Figure 6 illustrates the resultant Alternative 1A AM and PM peak hour traffic volumes when traffic is diverted under this alternative. The resultant peak hour volumes under Alternative 1B are included in Appendix G.





**NOTE:**

Alternative 1B considers closing all access at Woodlawn and Parsons Road. This traffic would divert to Montrose Driveway or Spring Valley Road

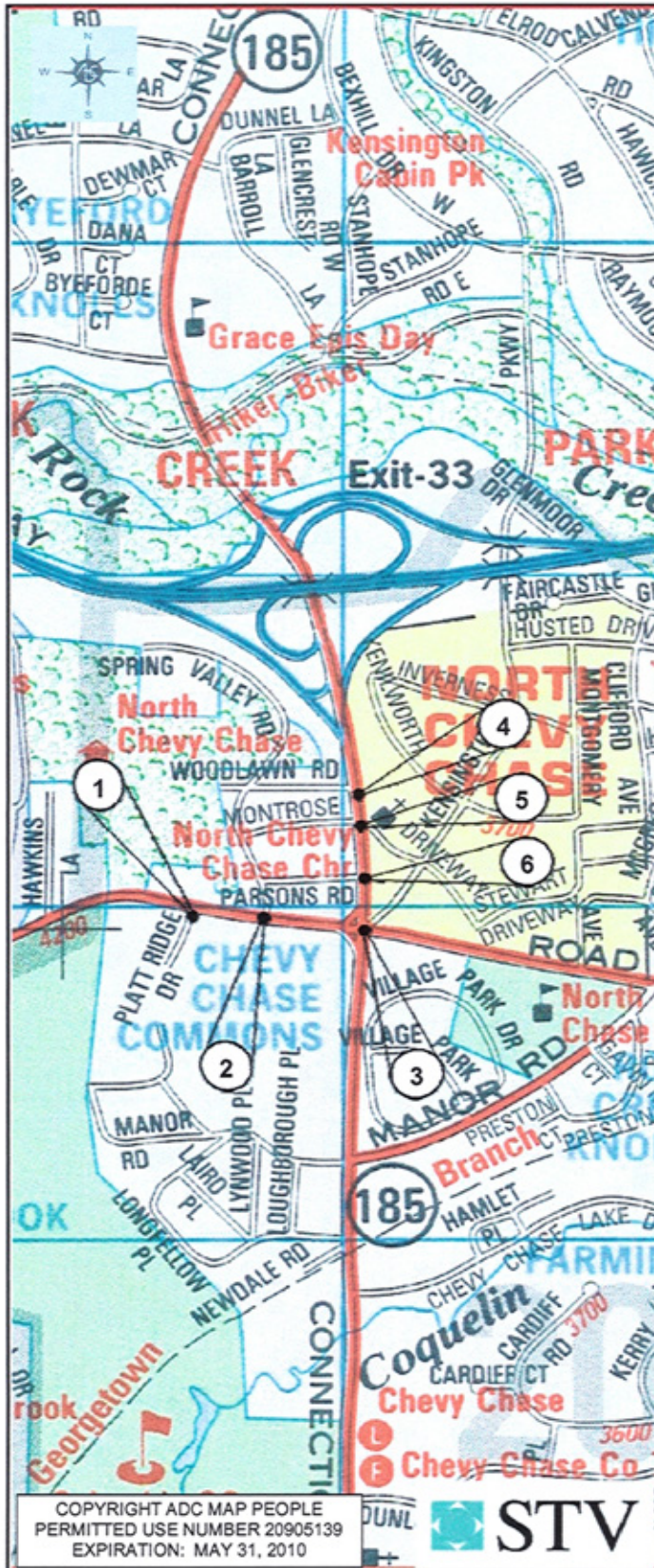
**Spring Valley Traffic Analysis**

**Figure 5**

**Alternative 1**







<p>1</p> <p>Jones Bridge Rd.</p> <p>780 (2102) → 29 (13) →</p> <p>Platt Ridge Rd.</p> <p>4 (5) → 1 (17) →</p>	<p>4</p> <p>Woodlawn Rd.</p> <p>1697 (652) ← 43 (12) ←</p> <p>0 (0) → 0 (2) →</p> <p>MD 185</p> <p>3 (16) → 3567 (1838) →</p> <p>2369 (4023) → 0 (0) →</p>
<p>2</p> <p>Jones Bridge Rd.</p> <p>781 (2119) →</p> <p>Spring Valley Rd.</p> <p>15 (6) → 1694 (661) →</p>	<p>5</p> <p>Montrose Dr.</p> <p>11 (10) → 0 (0) → 13 (7) →</p> <p>MD 185</p> <p>3 (3) → 3564 (1837) →</p> <p>89 (23) → 8 (26) → 285 (52) →</p> <p>Montrose Drwy.</p> <p>2269 (3990) → 6 (2) →</p>
<p>3</p> <p>Jones Bridge Rd.</p> <p>409 (1328) → 294 (687) → 79 (104) →</p> <p>MD 185</p> <p>1147 (391) → 2714 (1500) →</p>	<p>6</p> <p>Parsons Rd.</p> <p>0 (0) →</p> <p>MD 185</p> <p>1 (5) → 3861 (1891) →</p> <p>2275 (3952) →</p>
<p>MD 185</p> <p>Kensington Parkway (See Below)</p> <p>211 (294) → 562 (276) →</p> <p>Jones Bridge Rd.</p> <p>1739 (2614) → 26 (87) →</p> <p>0 (0) → 0 (0) → 0 (0) →</p> <p>Kensington Pkwy</p>	
Spring Valley Traffic Analysis	
Figure 6	
Alternative 1A AM and (PM) Peak Hour Traffic Volumes	





### Alternative 1 Intersection Capacity Analysis

A capacity analysis of this condition was performed based on the methodologies presented earlier. The results of the analysis are presented in Table 3 below.

**Table 3: Alternative 1 Intersection Capacity Analysis**

MD 185 at Montrose Driveway	AM		PM	
	Delay (sec)	LOS	Delay (sec)	LOS
Existing Conditions	10.0	B	10.1	B
BRAC Opening Day Conditions	9.8	A	9.5	A
Alternative 1A	20.2	C	4.6	A
Alternative 1B	20.4	C	4.6	A

The resultant LOS when signalizing the intersection of MD 185 at Montrose Driveway is acceptable. The Synchro capacity worksheets are included in Appendix G.

### Traffic Signal Warrant Analysis

A traffic signal warrant analysis was performed based on standards provided in the 2006 *Md-MUTCD*. Per the methodology, the warrant analysis is based on the combined volume of both approaches of the mainline and the highest approach of either side street. The posted speed limit at the location is less than 40 mph; therefore the 70 percent reduction does not apply. The analysis first evaluated Warrants 1 and 2 considering only the AM and PM peak hours. Since both of these hours exceeded the minimum volume criteria of those Warrants, 13-hour volumes were derived to estimate whether any other hours also exceeded the minimum volume criteria. The 13-hour volumes were derived based on a 24-hour count on MD 185 near Montrose Driveway. (It should be noted that the distribution of hourly volumes along MD 185, a major highway, is not the best basis for projecting hourly traffic volumes along a residential street, it was used for lack of any other available data source. As such, the projected non-peak volumes on the Montrose Driveway approaches are likely overstated.)

The results of the analysis indicate that the projected traffic volumes meet the minimum warrant criteria of Warrant 2. Appendix G contains the detailed traffic signal warrant analysis.

### Advantages and Disadvantages

#### **Advantages**

- Projected traffic volumes appear to meet the minimum warrant criteria for signalization
- Provides enhanced access to the Spring Valley Community.
- Relatively low construction costs (as compared to other alternatives)



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**Disadvantages**

- Geometric improvements would be required to both Montrose Driveway and the intersection with MD 185.
- Selling this option to SHA will be challenging. A new traffic signal at MD 185 and Montrose Driveway, and any changes to the signal at MD 185 & Jones Bridge Road will require SHA approval. SHA's general practice is to not allow signals along state roads within ¼ mile of adjacent signals due to queuing and operational issues.
- This alternative does not appear to be a short term solution as it will require project development, design, and competing for funds in the County's capital budget.
- This alternative would divert approximately 300 additional peak hour vehicles (projected as 3,000 vehicles per day), onto a residential street that is not currently designed for this volume of traffic. Thus, even with widening of Montrose Driveway, obtaining community support from the residents on the east side of MD 185 would be difficult, particularly those residents who live on Montrose Driveway.
- Despite signalization, queues along southbound MD 185 will regularly extend past the Montrose Driveway intersection, especially during AM peak periods. These queues are likely to block the intersection and prevent vehicles from Montrose Driveway gaining access to MD 185 during the side street green interval.
- Possible right of way acquisition (associated with widening and realignment of Montrose Driveway) from private property owner(s).



### 4.3 Alternative 2: Construct Traffic Signal at Jones Bridge Road and Spring Valley Road

#### Description

This alternative is illustrated on Figure 7 and includes the following characteristics:

- Close the median opening along MD 185 at Woodlawn Road.
- Signalize Jones Bridge Road at Spring Valley Road.
- Alternative 2B considers all of the items listed above and also includes closing all access at Woodlawn Road, Montrose Driveway and Parsons Road.

#### Diverted Peak Hour Volumes

Figure 8 illustrates the resultant Alternative 2A AM and PM peak hour traffic volumes when traffic is diverted under this alternative. The resultant peak hour volumes under Alternative 2B are included in Appendix H.

#### Alternative 2 Intersection Capacity Analysis

A capacity analysis of this condition was performed based on the methodologies presented earlier. The results of the analysis are presented in Table 4 below.

**Table 4: Alternative 2 Intersection Capacity Analysis**

Jones Bridge Road at Spring Valley Road	AM		PM	
	Delay (sec)	LOS	Delay (sec)	LOS
Existing Conditions	38.8	E	26.2	D
BRAC Opening Day Conditions	93.3	F	10.9	B
Alternative 2A	6.9	A	17.5	B
Alternative 2B	7.0	A	17.6	B

The resultant LOS when signalizing the intersection of Jones Bridge Road at Spring Valley Drive is acceptable. A review of the SimTraffic animations indicates similar, but slightly longer queuing because of the close proximity of this traffic signal to Jones Bridge Road. The Synchro capacity worksheets are included in Appendix H.

#### Traffic Signal Warrant Analysis

A traffic signal warrant analysis was performed based on standards provided in the 2006 *Md-MUTCD*. Per the methodology, the warrant analysis is based on the combined volume of both approaches of the mainline and the highest approach of either side street. The posted speed limit at the location is less than 40 mph; therefore the 70 percent reduction does not apply. The analysis first evaluated Warrants 1 and 2 considering only the AM and PM peak hours. The results indicated that the neither the AM or PM peak hours met the minimum volume criteria for Warrants 1 and 2. Since it is unlikely that the volumes will be higher during other hours in the day it is assumed that the warrant criteria will not be satisfied. Appendix H contains the detailed signal warrant analysis.





Although the warrant criteria are not met, Montgomery County DOT should consider signalization based on engineering judgment for the sole purpose of facilitating egress from the Spring Valley community.

### Advantages and Disadvantages

#### **Advantages**

- Easy to implement as only major tasks are traffic signal design and construction. As such, this alternative can be easily accomplished to coincide with the SHA's improvements at MD 185 and Jones Bridge Road.
- Decision to implement does not require any other agency approvals, and can be funded from existing funds appropriated in the County's capital budget (i.e., can be built from currently approved Traffic Signal CIP.)
- Relatively low construction costs as compared to other alternatives.
- Does not impact any properties, i.e., no right-of-way acquisition required.

#### **Disadvantages**

- The queuing from existing signals along Jones Bridge Road may at times block the intersection, thereby not allowing vehicles to utilize the green indication for Spring Valley Road. This is a similar challenge to that with a potential signal on MD 185 at Montrose Driveway.



**NOTE:**

Alternative 2B considers closing all access at Woodlawn Road, Montrose Driveway and Parsons Road. This traffic would divert to Spring Valley Road.

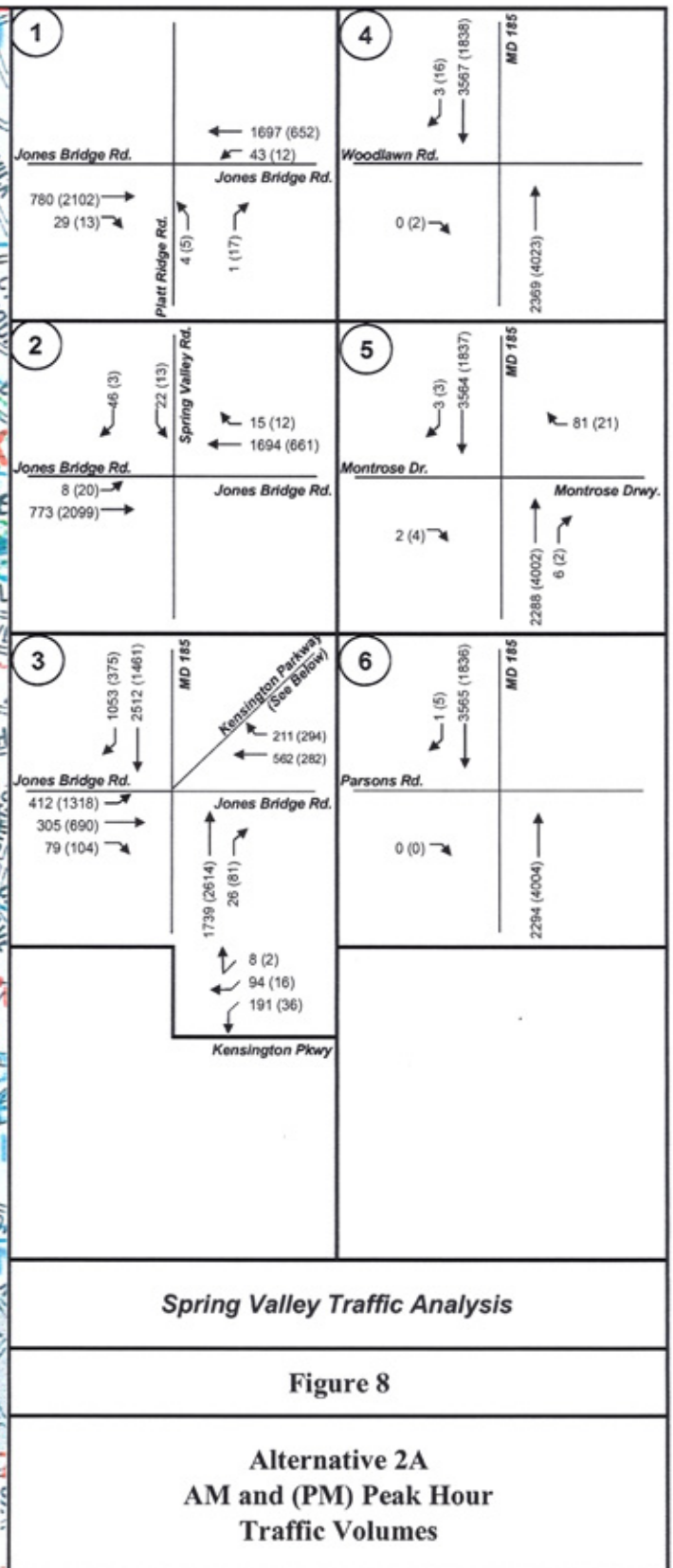
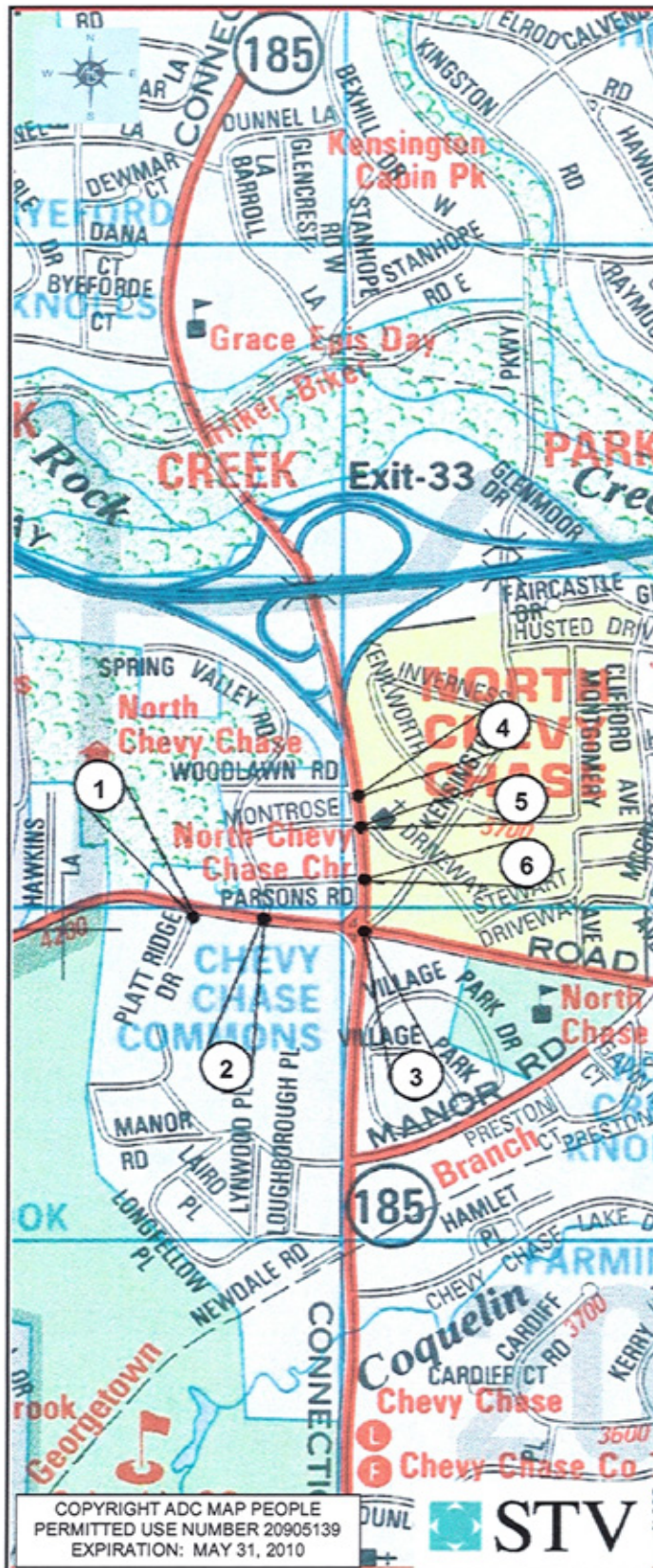
**Spring Valley Traffic Analysis**

**Figure 7**

**Alternative 2**









#### 4.4 Alternatives 3 and 4 – Construction Feasibility

A cursory constructability review of Alternatives 3 and 4 was performed based on a number of factors including impacts to existing features, geometric considerations and construction cost. A field visit was made to determine existing characteristics that may affect extending Woodlawn Road or Montrose Driveway to Jones Bridge Road. The following characteristics were found that may complicate the roadway extensions.

- Substantial grade differences exist between the Spring Valley Community and Jones Bridge Road. The grade differences are more pronounced between Jones Bridge Road and Montrose Driveway.
- The area is forested parkland with mature trees.
- There is a ravine conveying drainage from Jones Bridge Road to a drainage structure at the terminus of Montrose Driveway. Some of the channel is eroded and the outfall has been compromised. It is likely that any alignment options from Montrose Driveway would impact this existing drainage pattern.
- There are two private residences on one parcel in the northwest quadrant of the intersection of Jones Bridge Road at Platt Ridge Drive. There will be significant impacts to these residences under the Alternative 3 scenario.

None of the above appears to be insurmountable. However, these alternatives would involve longer timelines to implement due to the usual project development, design and construction schedules associated with building new roadway segments. Additionally, these roadway extension projects will need to go through the County's capital budget process and compete for funding.

Appendix I contains photographs illustrating the existing characteristics of the terrain between Jones Bridge Road and Montrose Driveway.

Digital county mapping with five-foot contours was obtained from Montgomery County and used to create a digital terrain model. InRoads civil design software was used to layout conceptual horizontal and vertical alignments. The roadway cross-section assumed the same cross-sectional elements that exist on both Montrose Driveway and Woodlawn Road with a pavement design of two inch surface course, six inch base course and 12 inch sub-base. The horizontal and vertical alignments along with the cross-section elements conformed to applicable American Association of State Highway Transportation Officials (AASHTO), SHA and Montgomery County Design criteria.

The development of costs for each option follows the procedure outlined in SHA's *2009 Highway Construction Cost Estimating Manual*. For each alternative, Categories 2, 5, 6 and 8 were computed. Standard percentages were used for the other Categories and a contingency of 50 percent was applied to the overall estimate. Additionally, no right-of-way cost was included in any of the construction cost estimates.





#### 4.5 Alternative 3: Construct Fourth Leg at Platt Ridge Drive Intersection

##### Description

This alternative is illustrated on Figure 9 and includes the following characteristics:

- Close the median opening along MD 185 at Woodlawn Road.
- Close the median opening along Jones Bridge Road at Spring Valley Road.
- Extend either Woodlawn Road or Montrose Driveway to connect to Jones Bridge Road so that it becomes the fourth leg of the intersection with Platt Ridge Drive.
- The assumed geometric alignments will impact the existing residences in the northwest quadrant of the intersection of Jones Bridge Road and Platt Ridge Drive. It is likely that the parcel immediately adjacent to the proposed alignment will need to be acquired.
- Alternative 3B considers all of the items listed above and also includes closing all access along MD 185 at Woodlawn Road, Montrose Driveway and Parsons Road.

##### Diverted Peak Hour Volumes

Figure 9 illustrates the resultant Alternative 3A AM and PM peak hour traffic volumes when traffic is diverted under this alternative. The resultant peak hour volumes under Alternative 3B are included in Appendix J.

##### Alternative 3 Intersection Capacity Analysis

A capacity analysis of this condition was performed based on the methodologies presented earlier. The results of the analysis are presented in Table 5 below.

**Table 5: Alternative 3 Intersection Capacity Analysis**

Jones Bridge Road at Platt Ridge Drive	AM		PM	
	Delay (sec)	LOS	Delay (sec)	LOS
Existing Conditions	2.3	A	6.1	A
BRAC Opening Day Conditions	2.5	A	7.3	A
Alternative 3A	6.7	A	11.1	B
Alternative 3B	6.7	A	11.1	B

The resultant LOS when including the fourth leg at the intersection of Jones Bridge Road at Platt Ridge Drive remains acceptable. The Synchro capacity worksheets are included in Appendix J.

##### Construction Cost Estimate

Concept level construction cost estimates, based on assumptions described in Section 4.4, are listed below. Appendix J contains the construction cost estimates.

<b>Option 1: Extend Montrose Driveway</b>	<b>\$985,000</b>
<b>Option 2: Extend Woodlawn Road</b>	<b>\$1,690,000</b>



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Advantages and Disadvantages

**Advantages**

- Provides the desired enhanced access for the Spring Valley Community.
- The traffic operations along Jones Bridge Road will not appreciably change because the intersection is already signalized and spaced well with other intersections.
- Operationally, this appears to be best alternative as queues from the intersection of MD 185 and Jones Bridge Road do not regularly extend to this point, and therefore would not block the side street movement during its green phase as is expected to occur with Alternatives 1 and 2.

**Disadvantages**

- Would take longer to implement due to the usual project development schedule for new roadway segments.
- Higher construction costs as compared to Alternatives 1 and 2.
- Likely right of way acquisition from private property owner(s).
- Alignment will impact parkland.





**NOTE:**

Alternative 3B considers closing all access at Woodlawn Road, Montrose Driveway and Parsons Road. This traffic would divert to Platt Ridge Drive.

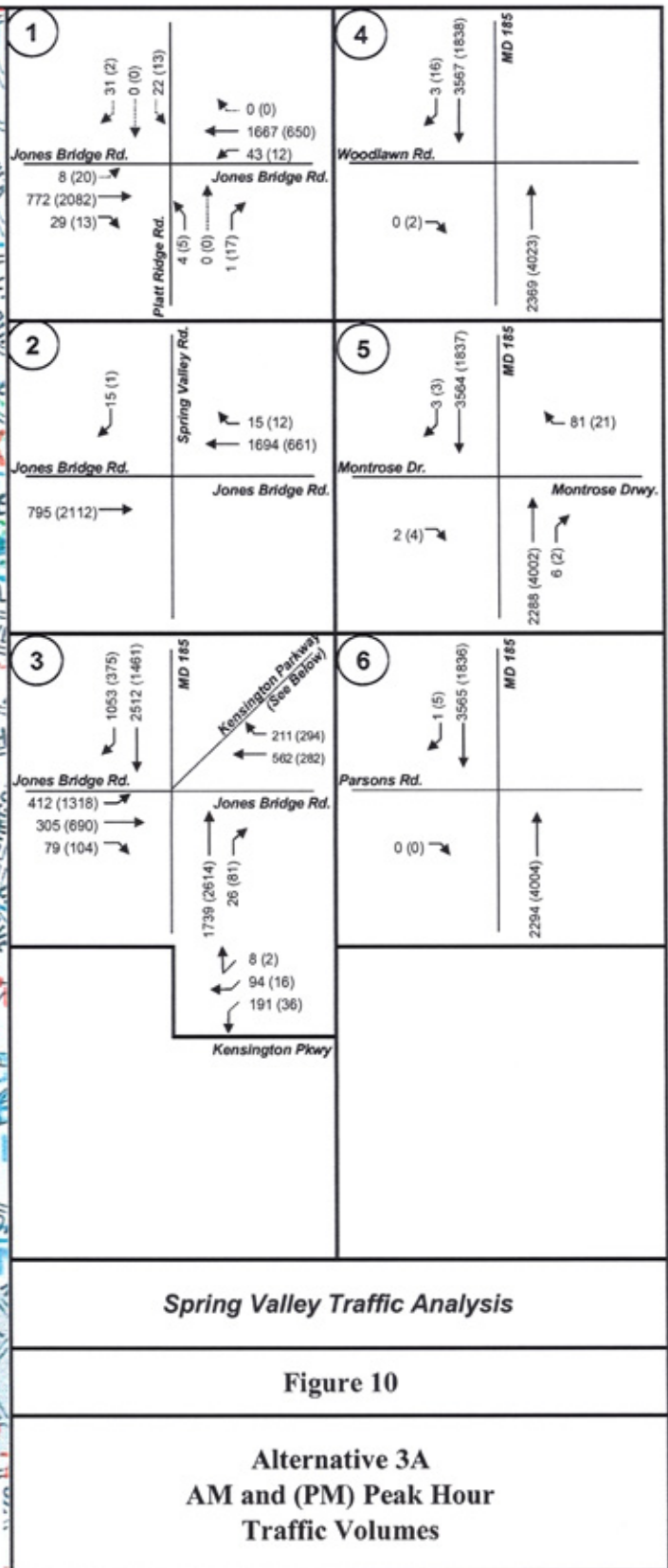
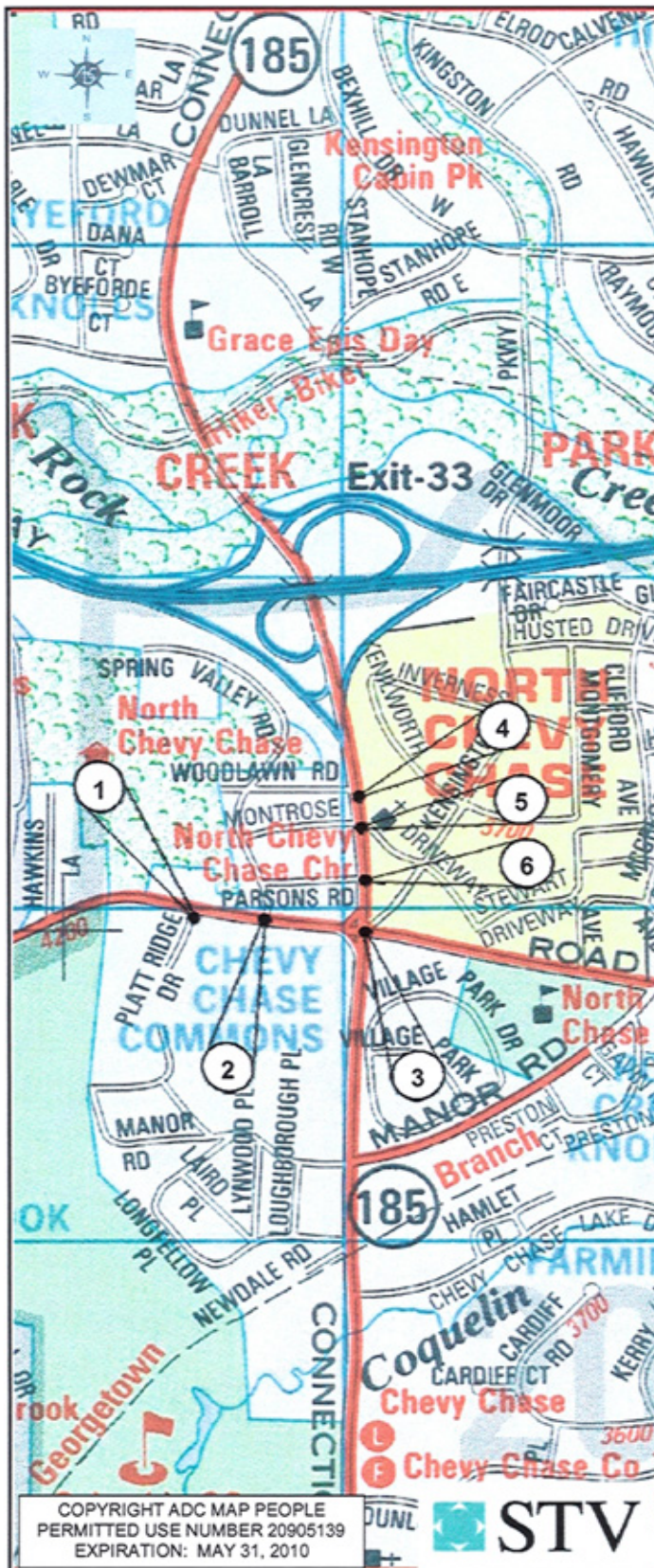


**Spring Valley Traffic Analysis**

**Figure 9**

**Alternative 3**







**4.6 Alternative 4: Extend Woodlawn Road or Montrose Driveway to the Park Access Road**Description

This alternative is illustrated on Figure 11 and includes the following characteristics:

- Close the median opening along MD 185 at Woodlawn Road.
- Close the median opening along Jones Bridge Road at Spring Valley Road.
- Extend either Woodlawn Road or Montrose Driveway to connect to the Park Access Road.
- Signalize Park Access Road at Jones Bridge Road
- Alternative 4B considers all of the items listed above and also includes closing all access along MD 185 at Woodlawn Road, Montrose Driveway and Parsons Road.

Diverted Peak Hour Volumes

Figure 12 illustrates the resultant AM and PM peak hour traffic volumes when traffic is diverted under this alternative. The resultant peak hour volumes under Alternative 4B are included in Appendix K.

Alternative 4 Intersection Capacity Analysis

A capacity analysis of this condition was performed based on the methodologies presented earlier. The resultants of the analysis are presented in Table 6 below.

**Table 6: Alternative 4 Intersection Capacity Analysis**

Jones Bridge Road at Platt Ridge Drive	AM		PM	
	Delay	LOS	Delay	LOS
	(sec)		(sec)	
Existing Conditions	0.0	A	0.0	A
BRAC Opening Day Conditions	0.0	A	0.0	A
Alternative 4A	5.4	A	7.5	A
Alternative 4B	5.4	A	7.7	A

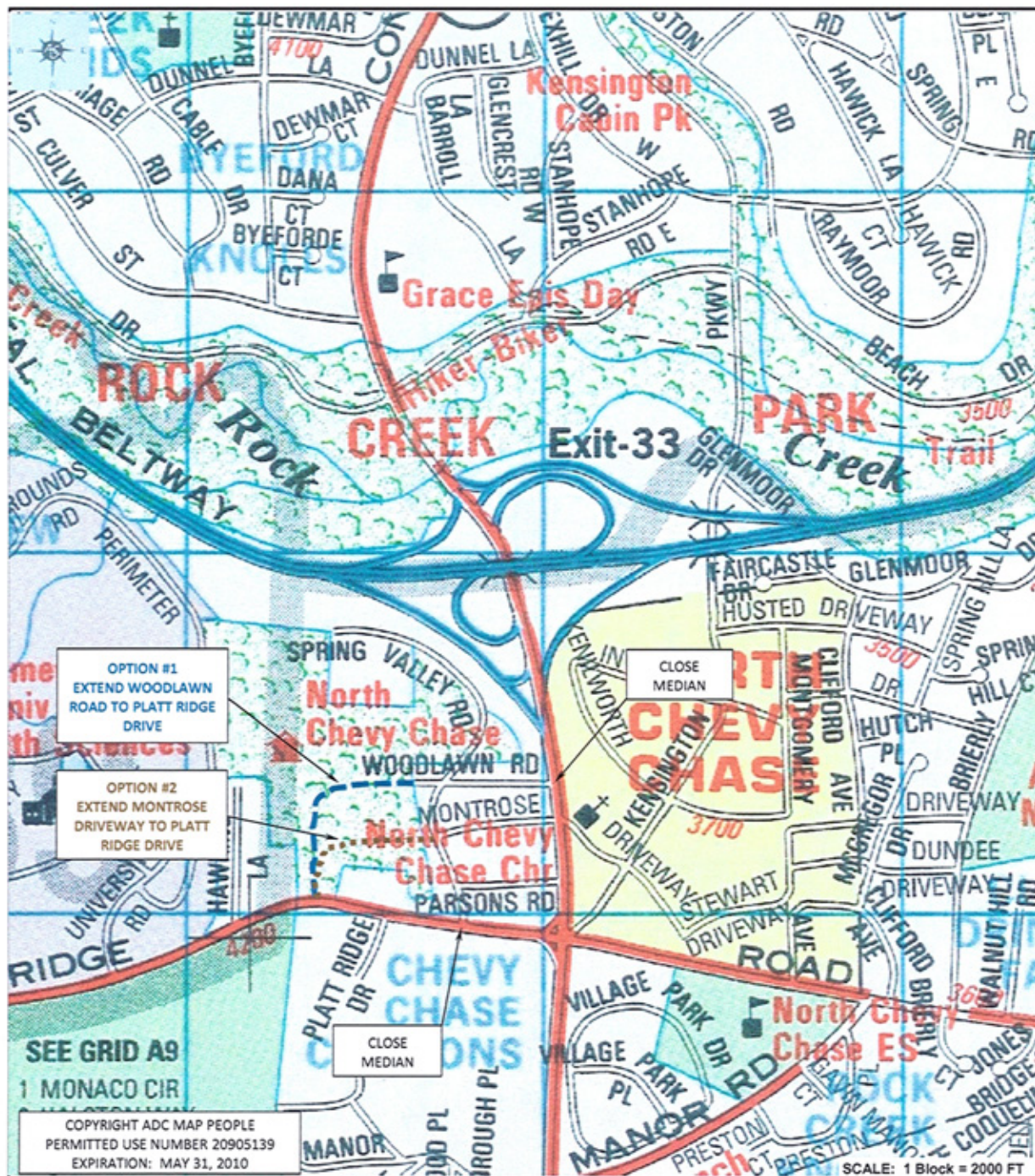
The resultant LOS when signalizing the intersection of Jones Bridge Road at the Park Access Road is acceptable. The Synchro capacity worksheets are included in Appendix K.

Construction Cost Estimate

Concept level construction cost estimates, based on assumptions described in Section 4.4, are listed below. Appendix K contains the construction cost estimates.

<b>Option 1: Extend Montrose Driveway</b>	<b>\$1,855,000</b>
<b>Option 2: Extend Woodlawn Road</b>	<b>\$1,665,000</b>





**NOTE:**

Alternative 4B considers closing all access at Woodlawn Road, Montrose Driveway and Parsons Road. This traffic would divert to the Park Access Road.

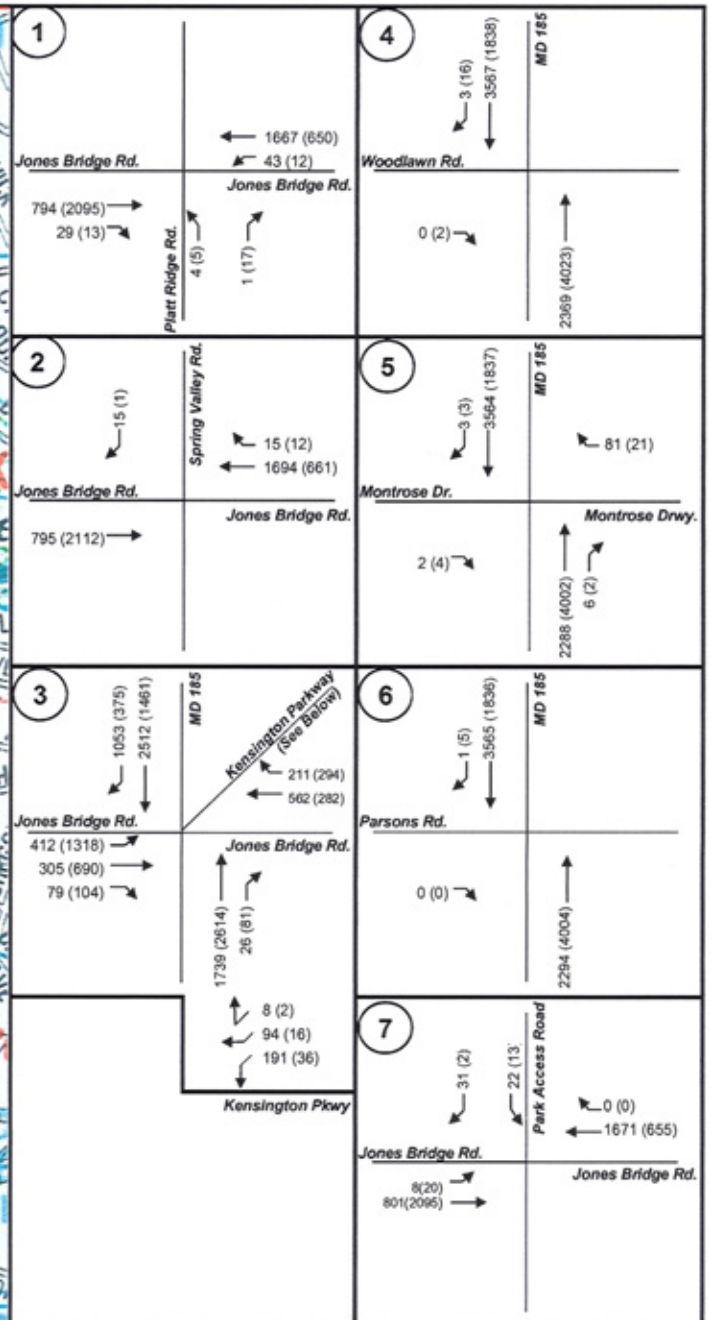
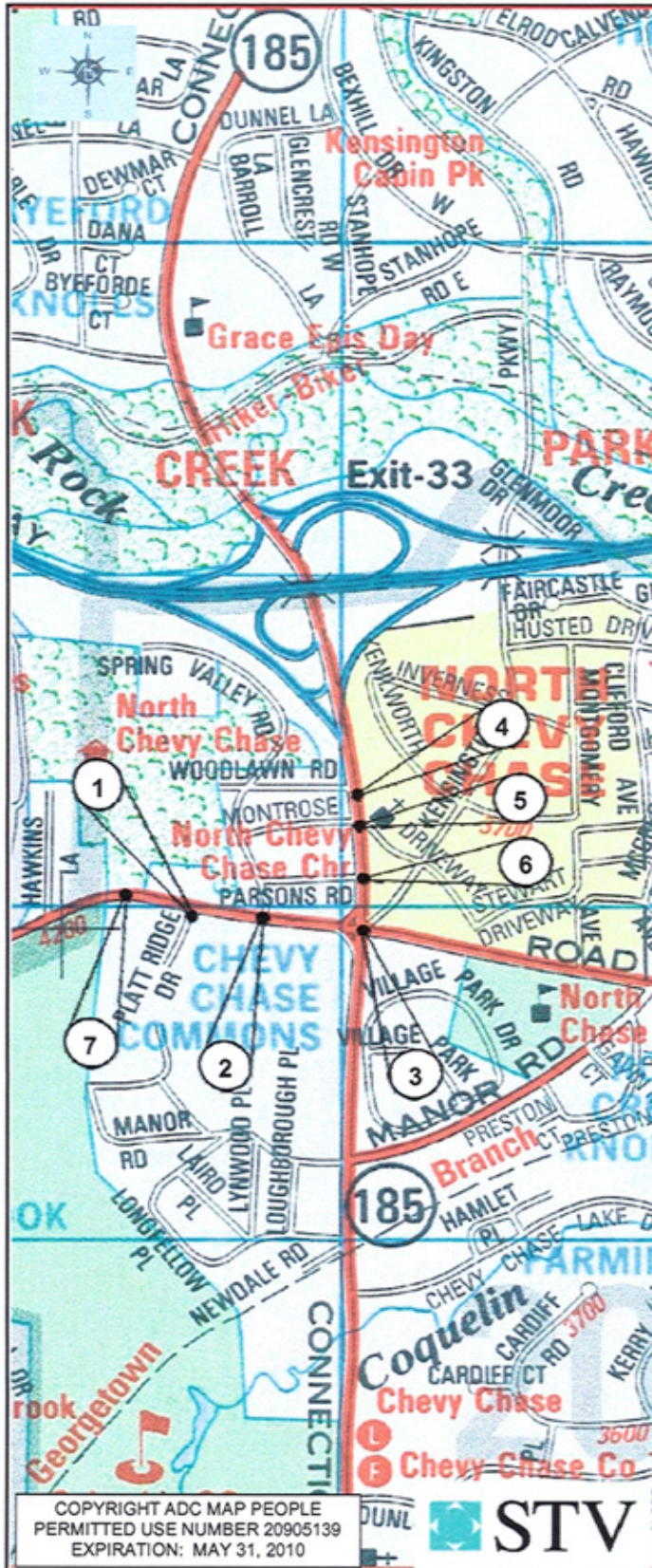
**Spring Valley Traffic Analysis**

**Figure 11**

**Alternative 4**







Spring Valley Traffic Analysis

Figure 12

Alternative 4A  
AM and (PM) Peak Hour  
Traffic Volumes



### Traffic Signal Warrant Analysis

A traffic signal warrant analysis was performed based on standards provided in the 2006 *Md-MUTCD*. Per the methodology, the warrant analysis is based on the combined volume of both approaches of the mainline and the highest approach of either side street. The posted speed limit at the location is less than 40 mph; therefore the 70 percent reduction does not apply for this location. The analysis first evaluated Warrants 1 and 2 considering only the AM and PM peak hours. The results indicated that the neither the AM or PM peak hours met the minimum volume criteria for Warrants 1 and 2. Since it is unlikely that the volumes will be higher during other hours in the day it is assumed that the warrant criteria will not be met. Appendix K contains the detailed signal warrant analysis.

Although the warrant criteria are not met, Montgomery County DOT should consider signalization based on engineering judgment for the sole purpose of facilitating egress from the Spring Valley community.

### Advantages and Disadvantages

#### **Advantages**

- Provides the desired enhanced access for the Spring Valley community.
- Moves the access point to and from the Spring Valley community the furthest away from the intersection of MD 185 and Jones Bridge Road, thus reducing the likelihood that access will be blocked by queues resulting from that intersection.

#### **Disadvantages**

- Would take longer to implement due to the usual project development schedule for new roadway segments.
- The proximity to the existing signal at Jones Bridge Road and Platt Ridge Drive will result in inefficient signal coordination along Jones Bridge Road.
- Higher construction costs as compared to Alternatives 1 and 2.
- Alignment will impact parkland.





## Section 5 Conclusion

### 5.1 Results of Analysis

This Traffic Study was prepared to evaluate potential access improvements for the Spring Valley Community bounded by MD 185, Jones Bridge Road and I-495. Based on the analysis of Existing, BRAC Opening Day and several access improvement alternative traffic conditions, the following findings and conclusions can be made:

- Access to and from the Spring Valley Community is difficult in the AM and PM peak hours due to queuing on MD 185 and Jones Bridge Road that extends beyond the community's various access points. All egress is made from unsignalized intersections. Exiting the community onto MD 185 during the AM peak is only possible if queued southbound motorists allow exiting motorists to turn. Likewise, exiting the community onto eastbound Jones Bridge Road during the PM peak is only possible if queued eastbound vehicles allow exiting motorists to complete a two-stage left-turn maneuver. Right turns onto westbound Jones Bridge Road generally can occur with minor delays throughout the day.
- BRAC activities at the National Naval Medical Center will increase the population by approximately 2,500 staff, as well as increase the number of daily visitors to the campus. MSHA will be implementing intersection improvements at the intersection of MD 185 at Jones Bridge Road to mitigate the effects of BRAC related traffic. MSHA has determined that the addition of a dedicated southbound right turn lane along MD 185 from Jones Bridge Road to the I-495 ramp will facilitate vehicle movements to NNMC and improve the opportunity for NNMC destined traffic to utilize the gates along Jones Bridge Road and relieve congestion at the gates along MD 355. However, this dedicated lane will further exacerbate the current access challenges that the Spring Valley community experiences.
- When considering the BRAC Opening Day traffic conditions and improvements, the intersection of MD 185 at Jones Bridge Road will improve as compared to existing conditions. However, operations at the other intersections within the study area continue to be affected by queuing from the intersection of MD 185 at Jones Bridge Road.
- There are several viable options to enhance access to the Spring Valley Community that can work in concert with the SHA's improvement to the intersection of MD 185 and Jones Bridge Road.

### 5.2 Recommendations

The advantages and disadvantages of each of the four enhanced access alternatives that were analyzed are discussed in Section 4. In weighing these issues, it is clear that each of the Alternatives have varying timelines to implement, but this should not be a driving factor in determining the best solution. Notwithstanding time to implement and cost considerations, Alternative 3 (Construct fourth leg at Platt Ridge Drive) is the recommended option as it provides the desired enhanced community access without degrading operations along the arterial network via the addition of new signalized intersections. Accordingly, we recommend that Montgomery County initiate project development to further pursue this Alternative.



We have discussed a potential timeline to implement Alternative 3 with Montgomery County DOT staff. As a result, it can be reasonably concluded that the SHA will have implemented their improvements to the intersection of MD 185 and Jones Bridge Road before the County can develop the project, gain necessary approvals, coordinate funding and complete design and construction of the roadway extensions. In order to provide access relief to the community that better coincides with the effects resulting from BRAC, it is recommended that Alternative 2 (Construct traffic signal at Jones Bridge Road and Spring Valley Road) be implemented as an interim measure. In consideration of all the factors, this option provides the quickest and most cost-effective access relief, and appears to be more easily achieved than Alternative 2 due to potential community acceptance and SHA concurrence.





Appendices Available Upon Request