

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor



John D. Porcari, Secretary
Neil J. Pedersen, Administrator

March 13, 2009

Mr. Phil Alperson
BRAC Coordinator
Montgomery County BRAC
101 Monroe Street, 2nd floor
Rockville MD 20850

Dear Mr. Alperson:

On behalf of the Maryland State Highway Administration (SHA) and the Maryland Department of Transportation (MDOT), I am pleased to forward you a copy of the *Traffic and Intersection Improvement Studies for Bethesda National Naval Medical Center, Base Realignment and Closure (BRAC) Report*. As part of the congressionally authorized BRAC process, the number of direct and indirect jobs coming to Maryland over the next six to ten years is estimated at 40,000 to 60,000, with the National Naval Medical Center at Bethesda (NNMC), Fort George Meade, Aberdeen Proving Ground (APG), and Andrews Air Force Base receiving most of these positions. To prepare for the impacts that this influx of jobs and people will have on our state roadways, the SHA is conducting studies of the highway transportation needs associated with BRAC at each of these installations. The enclosed report presents the results of the studies completed for NNMC.

The study included data collection at numerous locations around NNMC in Montgomery County, development of short-term intersection improvement concepts that could be implemented by 2011, and an analysis of a new access location on I-495 that could provide a direct connection to the NNMC campus.

The results of SHA's traffic studies indicate that the existing roadway network will be insufficient to accommodate the influx of new traffic due to the BRAC action at NNMC. The travel forecasts indicate that a total of seven intersections (out of 27 analyzed) are projected to operate at failing conditions for either the morning or evening peak period by 2011. Some of these intersections are failing under existing conditions and will continue to do so in 2011 even without the addition of BRAC traffic. BRAC traffic will obviously make conditions worse.

To prepare for this anticipated increase in traffic volumes, the SHA has developed improvement concepts at these seven locations. However, the level of available State and Federal funding is not sufficient to program all of the needed short-term improvements identified in this study.

My telephone number/toll-free number is 410-545-0412 or 1-888-204-4828
Maryland Relay Service for Impaired Hearing or Speech: 1.800.735.2258 Statewide Toll Free

Street Address: 707 North Calvert Street · Baltimore, Maryland 21202 · Phone: 410.545.0300 · www.marylandroads.com



Mr. Phil Alperson
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Therefore, SHA, in coordination with NNMC and the Montgomery County BRAC Committee, developed a list of priority intersections that are recommended for improvement, as funding becomes available. Four of these intersection improvements are currently funded for either preliminary engineering or construction in MDOT's Consolidated Transportation Program.

If you have any questions or comments about SHA's BRAC initiatives at NNMC, please contact Mr. Dennis Yoder, Assistant Division Chief, Regional and Intermodal Planning at 410-545-5575 or via email at dyoder@sha.state.md.us. You may also contact me at any time.

Sincerely,

A handwritten signature in black ink, appearing to read 'G. Slater', written over a horizontal line.

Gregory I. Slater, Director
Office of Planning and Preliminary Engineering

Enclosure

cc: Mr. Dennis Yoder, Assistant Division Chief, Regional and Intermodal Planning, SHA

Base Realignment and Closure



Traffic and Intersection Improvement Studies for Base Realignment and Closure

Bethesda National Naval Medical Center

Montgomery County, Maryland

Summary Report

February 2009



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Maryland Department of Transportation
State Highway Administration

Regional and Intermodal Planning Division

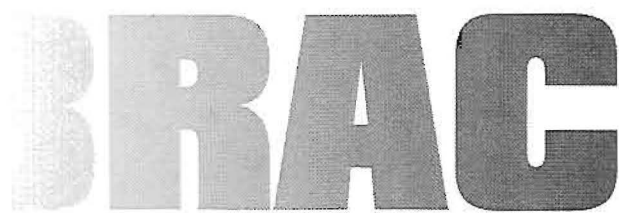


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BRAC

National Naval Medical Center

Executive Summary

Base Realignment and Closure or "BRAC" is the congressionally authorized process the U.S. Department of Defense has used to reorganize and consolidate its base structure to more efficiently and effectively support the military. In November 2005, Congress voted to approve the final recommendations of the BRAC Commission and Maryland benefited by gaining additional military and civilian positions. Direct and indirect jobs coming to Maryland over the next six to ten years are estimated at 40,000 to 60,000. Fort George Meade in Anne Arundel County, Aberdeen Proving Ground (APG, in Harford County) and the National Naval Medical Center at Bethesda (NNMC, in Montgomery County) are three of five locations that will be gaining most of these positions.

Walter Reed Army Medical Center and the National Naval Medical Center will merge by September 2011 into one military medical center located on the Bethesda campus. The combined facility will be called the Walter Reed National Military Medical Center, and will expand the current facility by adding approximately 2,200 to 2,500 jobs staffed by Air Force, Army and Navy military personnel. In preparation for this action, Maryland State Highway Administration (SHA) initiated a study of the short-term highway transportation needs associated with BRAC at this installation.

The focus of the study was on arterial and collector roadways. The results of SHA's traffic studies indicate that the highly-urbanized roadway network surrounding the NNMC is already experiencing regular congestion, which will increase as development continues in the region. Under existing conditions, four of the 27 intersections analyzed are already operating at LOS F during at least one peak hour of each weekday, and seven

The study process involved four components:

- Identifying the study area and conducting traffic studies
- Developing short-term (2011) intersection improvement concepts and determining the costs and impacts associated with each concept
- Selecting priority short-term intersection improvements for inclusion in the Maryland Department of Transportation's Consolidated Transportation Program (CTP)
- Reviewing the technical and environmental issues associated with the potential construction of a new access point from I-495 (the Capital Beltway) between MD 355 (Rockville Pike) and MD 185 (Connecticut Avenue) to the NNMC campus.

others are currently operating at LOS E. Under 2011 "With BRAC" conditions, seven intersections are expected to operate at LOS F during one or both peak hours each weekday, with three others operating at LOS E.

To prepare for this anticipated increase in traffic volumes, SHA is recommending improvements at these seven failing locations. However, the level of available State funding is not sufficient to program all of the needed short-term improvements identified in this study. Therefore SHA, in coordination with the Montgomery County BRAC Committee and

the NNMC, developed a list of priority intersections that were desired to be implemented, should funding become available. The seven failing intersections are shown below, with the priority intersections (which are currently in design) highlighted in bold:

- ➔ Intersection 3: MD 355 (Rockville Pike) @ Grosvenor Lane
- ➔ **Intersection 5: MD 355 (Rockville Pike) @ Cedar Lane**
- ➔ **Intersection 6: MD 187 (Old Georgetown Road) @ West Cedar Lane/Oakmont Avenue**
- ➔ Intersection 8: MD 355 (Rockville Pike) @ North Drive
- ➔ Intersection 9: MD 355 (Rockville Pike) @ North Wood Road
- ➔ **Intersection 12: MD 355 (Rockville Pike/Wisconsin Avenue) @ Center Drive/Jones Bridge Road**
- ➔ **Intersection 16: MD 185 (Connecticut Avenue) @ Jones Bridge Road/Kensington Parkway**

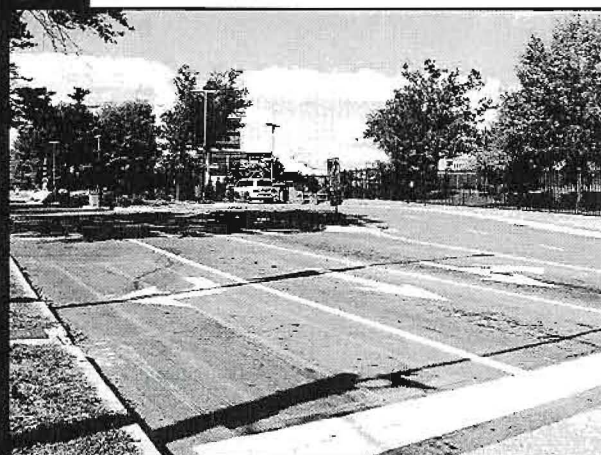
In addition to developing short-term intersection improvements, SHA investigated the feasibility of a new dedicated entrance/exit or "slip ramp" to the campus from the Capital Beltway to provide more direct access and to decrease the amount of traffic on arterial roadways surrounding the campus. The study showed that, due to spacing, the existing complexity of the Capital Beltway between MD 355 (Rockville Pike) and MD 185 (Connecticut Avenue), volume of traffic and geometrics, adding a new access point at this location would further complicate traffic flow and create additional safety concerns due to weaving conflicts. The traffic analyses conducted by the Navy, as part of its Environmental Impact Statement, and SHA show that the operational effectiveness of a direct access ramp on local traffic congestion would be limited, at best, and the environmental constraints associated with a new access point could be significant. Therefore, SHA does not consider an additional interstate access point from the Capital Beltway to the NNMC to be a viable option for further consideration.



Intersection 3 - MD 355 at Grosvenor Lane



Intersection 6 - MD 187 @ West Cedar Lane



Intersection 12 - MD 355 at Jones Bridge Road

BRAC

National Naval Medical Center

Introduction

Base Realignment and Closure or "BRAC" is the congressionally authorized process the U.S.

Department of Defense has used to reorganize and consolidate its base structure to more efficiently and effectively support the military. In November 2005, Congress voted to approve the final recommendations of the BRAC Commission and Maryland benefited by gaining additional military and civilian positions. Direct and indirect jobs coming to Maryland over the next six to ten years are estimated at 40,000 to 60,000. Fort George Meade in Anne Arundel County, Aberdeen Proving Ground (APG, in Harford County) and the National Naval Medical Center at Bethesda (NNMC, in Montgomery County) are three of five locations that will be gaining most of these positions.

Walter Reed Army Medical Center and the National Naval Medical Center will merge by September 2011 into one military medical center located on the Bethesda campus. The combined facility will be called the Walter Reed National Military Medical Center, and will expand the current facility by 2,200 to 2,500 jobs staffed by Air Force, Army and Navy military personnel. In preparation for this action, Maryland State Highway Administration (SHA) initiated a study of the short-term highway transportation needs associated with BRAC at this installation.

The State Highway Administration's (SHA) Regional and Intermodal Planning Division (RIPD) is coordinating the transportation needs assessments associated with the five major military installations affected by the BRAC initiative in Maryland. RIPD created an Action Plan that outlines the steps for developing improvement concepts for intersections or short roadway segments that are projected to have a failing Level of Service (LOS) in the most immediate years of the BRAC planning process and can be improved with relatively low cost and minimal

environmental impacts. As a first step, SHA determined which intersections were expected to be most affected by BRAC in 2011 (the year that Congress mandated the completion of BRAC in Maryland). Once the intersections were identified, the team worked with decision-makers and local government officials to develop a list of priority intersections that could be funded in the Maryland Department of Transportation's Consolidated Transportation Program (CTP), based on available funding. The purpose of this report is to present the results of the travel forecasting, traffic studies and short-term intersection needs at the NNMC. The studies included analysis of the impacts to traffic operations that are anticipated based upon the effects of BRAC on the roadway network that serves the NNMC, and recommendations for transportation system improvements that would allow operation at an acceptable LOS in 2011.

The study process involved four components:

- ➔ Identifying the study area and conducting traffic studies
- ➔ Developing short-term (2011) intersection improvement concepts and determining the costs and impacts associated with each concept
- ➔ Selecting priority short-term intersection improvements for inclusion in the Maryland Department of Transportation's Consolidated Transportation Program (CTP)
- ➔ Reviewing the technical and environmental issues associated with the potential construction of a new access point from I-495 (the Capital Beltway) between MD 355 (Rockville Pike) and MD 185 (Connecticut Avenue) to the NNMC campus.

BRAC

Identification of the Study Area

National Naval Medical Center

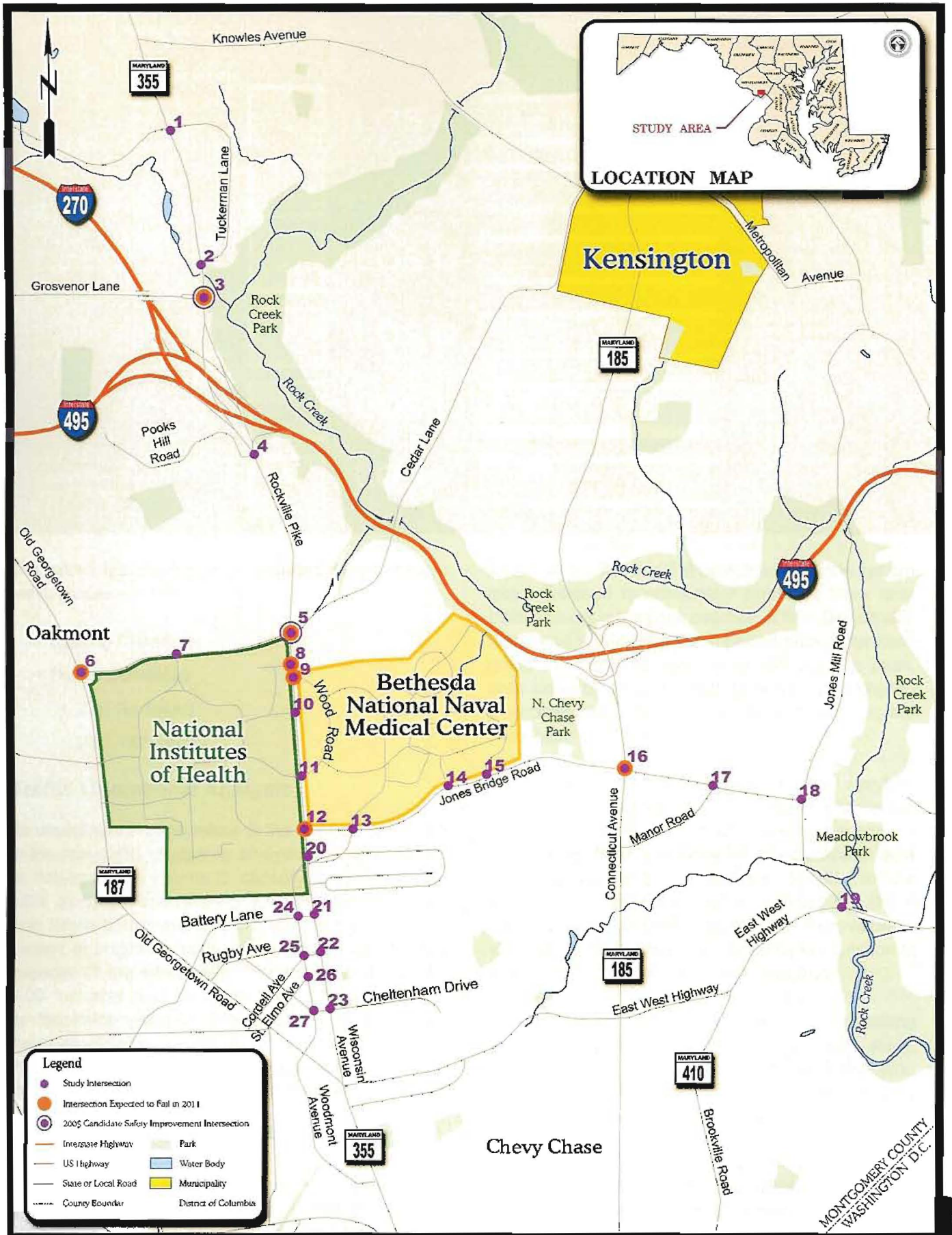
The NNMC is located just south of the Capital Beltway (I-495), in Bethesda, Montgomery County, Maryland. In preparation for the BRAC action, the Navy conducted a traffic study in the area surrounding the NNMC campus as a part of its March 2008 Final Environmental Impact Statement (NNMC FEIS, 2.2, p. 7-8). The intersections listed to the right and shown in **Figure 1** were included as a part of this study.

Seven of these intersections are expected to operate at a failing LOS by 2011, as shown in **Figure 1**. Two of these locations, Intersection 3: MD 355 (Rockville Pike) @ Grosvenor Lane and Intersection 5: MD 355 (Rockville Pike) @ Cedar Lane, were identified as Candidate Safety Improvement Intersections for 2005, which are locations where the crash rate exceeds the statewide average for similarly designed roadways.

Travel Forecasting

SHA conducted a traffic study based on the findings in the Navy's traffic study to evaluate several future short-term scenarios. The purpose of the traffic study was to analyze the impacts to traffic operations that are anticipated due to the effects of BRAC and expected background growth at the NNMC and to develop recommendations for transportation system improvements.

- ➔ Intersection 1: MD 355 (Rockville Pike) @ Tuckerman Lane North
- ➔ Intersection 2: MD 355 (Rockville Pike) @ Tuckerman Lane South
- ➔ Intersection 3: MD 355 (Rockville Pike) @ Grosvenor Lane
- ➔ Intersection 4: MD 355 (Rockville Pike) @ Pooks Hill Road
- ➔ Intersection 5: MD 355 (Rockville Pike) @ Cedar Lane
- ➔ Intersection 6: MD 187 (Old Georgetown Road) @ West Cedar Lane / Oakmont Avenue
- ➔ Intersection 7: West Cedar Lane @ West Drive
- ➔ Intersection 8: MD 355 (Rockville Pike) @ North Drive
- ➔ Intersection 9: MD 355 (Rockville Pike) @ North Wood Road
- ➔ Intersection 10: MD 355 (Rockville Pike) @ Wilson Drive
- ➔ Intersection 11: MD 355 (Rockville Pike) @ South Drive
- ➔ Intersection 12: MD 355 (Rockville Pike / Wisconsin Avenue) @ Center Drive / Jones Bridge Road
- ➔ Intersection 13: Jones Bridge Road @ Gunnell Road
- ➔ Intersection 14: Jones Bridge Road @ Grier Road
- ➔ Intersection 15: Jones Bridge Road @ University Road
- ➔ Intersection 16: MD 185 (Connecticut Avenue) @ Jones Bridge Road / Kensington Pkwy
- ➔ Intersection 17: Jones Bridge Road @ Manor Road
- ➔ Intersection 18: Jones Mill Road @ Jones Bridge Road
- ➔ Intersection 19: East - West Highway @ Jones Mill Road
- ➔ Intersection 20: MD 355 (Wisconsin Avenue) @ Woodmont Avenue
- ➔ Intersection 21: MD 355 (Wisconsin Avenue) @ Battery Lane
- ➔ Intersection 22: MD 355 (Wisconsin Avenue) @ Cordell Avenue
- ➔ Intersection 23: MD 355 (Wisconsin Avenue) @ Cheltenham Drive
- ➔ Intersection 24: Woodmont Avenue @ Battery Lane
- ➔ Intersection 25: Woodmont Avenue @ Cordell Avenue
- ➔ Intersection 26: Woodmont Avenue @ St. Elmo Avenue
- ➔ Intersection 27: Woodmont Avenue @ Cheltenham Drive



Traffic and Intersection Improvement Studies for BRAC
Bethesda National Naval Medical Center

Figure 1
Study Area Map

Summary Report
February 2009

Figure 2: Level of Service (LOS)

Intersection	Roadway
Highly stable, free-flow condition with little or no congestion Delay: <10 seconds/vehicle	LOS A
Stable, free-flow condition with little congestion Delay: 10 to 20 seconds/vehicle	LOS B
Free-flow condition with moderate congestion Delay: 20 to 35 seconds/vehicle	LOS C
Approaching unstable condition with increasing congestion Delay: 35 to 55 seconds/vehicle	LOS D
Unstable, congested condition Delay: 55 to 80 seconds/vehicle	LOS E
Stop and go Delay: >80 seconds/vehicle	LOS F

The following scenarios were evaluated as part of the traffic studies:

- Existing Conditions
- Future Conditions
 - 2011 No-BRAC
 - 2011 With BRAC

Traffic Operational Analysis

To understand the operations at the key intersections in the study area, a capacity analysis was conducted to determine the volume to capacity (v/c) ratio and LOS at these intersections for both the existing and future conditions. The v/c ratio is the ratio of current or projected traffic volume to the theoretical capacity of the intersection. For example, a v/c of 1.00 indicates that an intersection is operating at its theoretical capacity. The LOS is a quantitative measure of traffic operations. On most arterials with signalized intersections, LOS is also a measure of the intersection delays. Intersection operations are quantified by applying an LOS letter grade as noted in Figure 2.

Traffic distribution analysis is based on the morning peak period and the evening peak period of the day with the highest hourly traffic volumes, commonly

known as the AM and PM peak hours. Roadways are often designed to adequately serve the peak hour traffic volume in the peak direction of flow. Since traffic going one way during the morning peak is typically going the opposite way during the evening peak, both sides of a facility must generally be designed to accommodate the peak directional flow during the peak hour.

Critical Lane Volume (CLV) analysis is the standard SHA tool for the preliminary analysis of intersection improvements, and is used to determine the volume to v/c ratio of an intersection. CLV analyses were performed on the 27 intersections identified for the study. If an intersection had functioned at LOS F during a particular peak hour, then the improvements were designed to allow the intersection to function at a minimum of LOS E during that peak hour.

SHA verified the traffic volume and travel forecasting information presented in the Navy's traffic study, and used this data as a basis for developing improvements for intersections that are expected to fail in 2011. These volumes include existing traffic plus background growth based on planned developments and additional traffic due to the BRAC action, and were used to determine the improvements that would be required to accommodate the new trips.

BRAC

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Short-Term Intersection Development

In analyzing the 27 study area intersections, SHA focused on the short-term, immediate effects on traffic operations due to the BRAC initiative and background growth through 2011. The seven intersections listed below (and shown in Figure 1 on page 5) were forwarded for more detailed study because they were projected to operate at LOS F for either the AM or PM peak hour in 2011:

- Intersection 3: MD 355 (Rockville Pike) @ Grosvenor Lane
- Intersection 5: MD 355 (Rockville Pike) @ Cedar Lane
- Intersection 6: MD 187 (Old Georgetown Road) @ West Cedar Lane/Oakmont Avenue
- Intersection 8: MD 355 (Rockville Pike) @ North Drive
- Intersection 9: MD 355 (Rockville Pike) @ North Wood Road
- Intersection 12: MD 355 (Rockville Pike/ Wisconsin Avenue) @ Center Drive/Jones Bridge Road
- Intersection 16: MD 185 (Connecticut Avenue) @ Jones Bridge Road/ Kensington Parkway

Table 1 on page 8 shows the LOS and v/c for each intersection under Existing, 2011 No-Build (with BRAC) and 2011 Build (with BRAC) conditions.

Methodology

Once it was determined which intersections were recommended for improvement, field reviews were conducted to gather additional data. SHA took photos and documented information about the topography

and environmental features found at each location, and noted anything unusual that could influence the intersection design process. Photographs were also used to verify the features shown on aerial mapping of the study area. Traffic operations were also observed during the field reviews, to help confirm the CLV analyses.

Information collected during field reviews was used in conjunction with aerial photography to develop sketch-level intersection improvement design concepts. Improvement concepts were developed using AASHTO 2001 and SHA design standards, assuming that new lanes would be 10-12 feet wide.

Once the initial concepts were created using aerial photography as a base map, the limits of disturbance were determined for each location. Using aerial photography and GIS data, SHA calculated the area of impact within the limits of disturbance for wetlands, streams, floodplains, parks and forests, as well as right-of-way impacts and displacements to residential and commercial properties. No detailed planning or engineering was completed at this stage of the study.

SHA developed cost estimates for each intersection improvement concept using COST-EST, SHA's Excel-based spreadsheet. For cost estimating purposes, the pavement overlay was assumed to be a two-inch hot mix asphalt (HMA) surface, and full depth pavement was assumed to consist of two-inch HMA surface, six-inch HMA base, and eight-inch graded aggregate base. Sidewalks were included in the improvement concepts for intersections with existing sidewalks, and were assumed to be five inches thick and five to eight feet wide. For reconstruction and/or widening, it was assumed that existing traffic signals

Table 1: LOS and v/c for Intersections Expected to Fail in 2011

Intersection 3 MD 355 (Rockville Pike) @ Grosvenor Lane		AM V/C	AM LOS	PM V/C	PM LOS
	Existing	0.99	E	0.74	C
	2011 No-Build	1.04	F	0.80	C
	2011 Build	0.90	D	0.80	C
Intersection 5 MD 355 (Rockville Pike) @ Cedar Lane		AM V/C	AM LOS	PM V/C	PM LOS
	Existing	1.27	F	1.35	F
	2011 No-Build	1.35	F	1.43	F
	2011 Build	0.99	E	0.97	E
Intersection 6 MD 187 (Old Georgetown Road) @ W. Cedar Lane / Oakmont Avenue		AM V/C	AM LOS	PM V/C	PM LOS
	Existing	0.79	C	0.98	E
	2011 No-Build	0.87	D	1.15	F
	2011 Build	0.85	D	0.99	E
Intersection 8 MD 355 (Rockville Pike) @ North Drive		AM V/C	AM LOS	PM V/C	PM LOS
	Existing	1.00	F	0.87	D
	2011 No-Build	1.05	F	0.92	E
	2011 Build	0.95	E	0.92	E
Intersection 9 MD 355 (Rockville Pike) @ North Wood Road		AM V/C	AM LOS	PM V/C	PM LOS
	Existing	0.77	C	0.91	E
	2011 No-Build	0.81	C	1.04	F
	2011 Build	0.81	C	0.97	E
Intersection 12 MD 355 (Rockville Pike / Wisconsin Avenue) @ Center Drive / Jones Bridge Road		AM V/C	AM LOS	PM V/C	PM LOS
	Existing	0.94	E	1.10	F
	2011 No-Build	0.95	E	1.18	F
	2011 Build	0.93	E	0.97	E
Intersection 16 MD 185 (Connecticut Avenue) @ Jones Bridge Road / Kensington Parkway		AM V/C	AM LOS	PM V/C	PM LOS
	Existing	1.21	F	1.28	F
	2011 No-Build	1.29	F	1.37	F
	2011 Build	0.99	E	0.99	E

would be entirely replaced. Quantities were estimated using design concept drawings, information from field reviews and aerial photography. SHA's 2007 Highway Construction Cost Estimating Manual was used to obtain unit costs.

For intersection concepts that initially had an unusually high cost or a large number of right-of-way or environmental impacts, SHA sought less impactful ways to improve the intersection's LOS, while still achieving a LOS E or better. Below is a summary of the recommended improvements, cost estimates, and environmental impacts associated with each

intersection.

These intersection concepts represent the lane capacity needed to attain LOS E in 2011. SHA recognizes that funding constraints, schedule constraints, and other unforeseen impacts could make these improvements difficult or impossible to construct by 2011. The next stage of design will allow SHA to refine the intersection concepts using detailed survey and utility information, and to better understand the costs and impacts. Therefore, some modification to these concepts may be necessary as they move through the highway design process.

Description of Short-Term Intersection Concepts

Five intersection improvement concepts are described below, and are depicted on aerial mapping, which can be found in **Appendix A**. While seven intersections are expected to operate at LOS F in 2011, making the recommended intersection improvements for Intersection 5: MD 355 (Rockville Pike) @ Cedar Lane allow Intersection 8: MD 355 (Rockville Pike) @ North Drive and Intersection 9: MD 355 (Rockville Pike) @ North Wood Road to operate at an acceptable LOS. Intersection 8: MD 355 (Rockville Pike) @ North Drive is an entrance to the National Institutes of Health that was included the traffic analysis. Intersection 9: MD 355 (Rockville Pike) @ North Wood Road is an entrance to the NNMC. The Navy is currently studying ways to improve traffic operations at this intersection for vehicles entering the NNMC campus, and SHA will continue to coordinate with the Navy on any improvements they choose to implement. **Table 2** on page 13 summarizes the traffic data, cost estimates, and impacts for each intersection. It should be noted that these concepts are preliminary and subject to modification as they are refined during detailed design.

Intersection 3: MD 355 (Rockville Pike) @ Grosvenor Lane

This intersection was identified in 2005 as a Candidate Safety Improvement Intersection, and currently operates at LOS E during the AM peak with a v/c of 0.99, and LOS C during the PM peak with a v/c of 0.74. Without improvements, in 2011 with BRAC traffic this intersection is forecasted to operate at LOS F during the AM peak, with a v/c of 1.04, and at LOS C during the PM peak, with a v/c of 0.80. Making the recommended improvements will allow the intersection to function at LOS D during the AM peak hour, with a v/c of 0.90, and LOS C during the PM peak hour, with a v/c of 0.80. The proposed improvement



Intersection 3

is to add one lane to southbound MD 355 to create a free right turn condition from eastbound Grosvenor Lane onto SB MD 355.

These proposed improvements would impact three properties with no displacements, totaling 0.17 acres. No environmental features would be impacted. The total cost is estimated at approximately \$4.0 - \$8.0 million.

Intersection 5: MD 355 (Rockville Pike) @ Cedar Lane

This intersection was identified in 2005 as a Candidate Safety Improvement Intersection, and currently operates at LOS F during both peak hours, with a v/c during the AM of 1.27 and 1.35 during the PM. Without improvements, in 2011 with BRAC traffic this intersection is forecasted to operate at LOS F during both peak hours, with an AM peak v/c ratio of 1.35 and a PM peak v/c ratio of 1.43. Making the recommended improvements will allow the intersection to function at LOS E during the AM peak hour, with a v/c ratio of 0.99, and LOS E during the PM peak hour, with a v/c ratio of 0.97. The recommended improvements include:



Intersection 5

- ➔ Adding one through lane to MD 355 in the southbound direction
- ➔ Adding one left turn lane, one through lane and separate combined through and right turn movements on MD 355 in the northbound direction
- ➔ Converting shared through/left lane to a through-only lane and separate through and right turn movements on Cedar Lane in the eastbound direction
- ➔ Converting shared through/left lane to one through lane and a second left lane on Cedar Lane in the westbound direction.

These proposed improvements would impact 21 properties with no displacements, totaling 2.86 acres, as well as 305 linear feet of streams, 0.4 acres of parks, and 0.7 acres of forests. More detailed information about the construction and right-of-way costs of this intersection are currently being developed as part of the 30 percent design efforts. Based on the current level of design, the cost is estimated to range between \$68.0 and \$75.0 million. Making these improvements also improves the LOS at Intersection 8: MD 355 (Rockville Pike) @ North Drive and Intersection 9: MD 355 (Rockville Pike) @ North Wood Road to LOS E or better during both peak hours. If the improvement concept is revised so that the through lane is not added in the northbound direction, the cost could be reduced by approximately \$2.5 million and right-of-way impacts could be reduced to approximately 2.70 acres, but the intersection would be forecasted to operate at LOS E during the AM peak hour, with a v/c ratio of 0.99, and LOS F during the PM peak hour, with a v/c ratio of 1.15. If the concept is further revised so that through lanes are not added in either the northbound or southbound directions, the cost could be reduced by approximately \$15.0 million and right-of-way impacts could be reduced to approximately 1.21 acres, but under these conditions, the intersection is forecasted to operate at LOS F during both peak hours, with a v/c ratio of 1.20 during the AM peak hour, and 1.15 during the PM peak hour.

Intersection 6: MD 187 (Old Georgetown Road) @ West Cedar Lane/Oakmont Avenue

This intersection currently operates at LOS C during the AM peak hour with a v/c of 0.79, and LOS E during the PM peak hour with a v/c of 0.98. Without improvements, in 2011 with BRAC traffic this intersection is forecasted to operate at LOS D during the AM peak hour with a v/c ratio of 0.87 and LOS F during the PM peak hour with a v/c ratio of 1.15. Making the recommended improvements will allow the intersection to function at LOS D during the AM peak hour, with a v/c ratio of 0.85, and LOS E during the PM peak hour, with a v/c ratio of 0.99. The recommended improvements include:

- Converting the shared through/right lane to one through and one right turn lane on MD 187 in the northbound direction
- Converting the present shared left/through/right lane into one left turn lane and one shared



Intersection 6

through/right lane on Oakmont Avenue in the eastbound direction

- Converting the shared through/right lane to one through and one right turn lane on West Cedar Lane in the westbound direction.

These proposed improvements would impact 11 properties with no displacements, totaling 0.36 acres. No environmental features are expected to be impacted. The total cost is estimated at approximately \$5.0 - \$10.0 million.

Intersection 8: MD 355 (Rockville Pike) @ North Drive

This intersection functions as a gated entrance to the National Institutes of Health. It currently operates at LOS F during the AM peak hour, with a v/c of 1.00, and LOS D during the PM peak hour, with a v/c of 0.87. Without improvements, in 2011 with BRAC traffic this intersection is forecasted to operate at LOS F during the AM peak hour with a v/c ratio of 1.05 and LOS E during the PM peak hour with a v/c ratio of 0.92.

If this were the only intersection being improved in the immediate area, adding a turn lane from southbound MD 355 to westbound North Drive would allow the intersection to function at LOS E during both peak hours, with a v/c ratio of 0.95 during the AM peak hour and 0.92 during the PM peak hour. However, the recommended improvements for Intersection 5:



Intersection 8

MD 355 @ Cedar Lane include adding one through lane to MD 355 in the northbound direction and one through lane to MD 355 in the southbound direction. These Intersection 5 improvements carry through the North Drive intersection, and would allow MD 355 @ North Drive to operate at LOS C during the AM peak hour with a v/c ratio of 0.79, and LOS B during the PM peak hour with a v/c ratio of 0.70. Because these improvements would already be in place as a result of modifications to Intersection 5, no additional improvements are being recommended for Intersection 8, and any associated costs and environmental impacts for improvements at this location have been included in the estimate for Intersection 5.

Intersection 9: MD 355 (Rockville Pike) @ North Wood Road

This intersection currently operates at LOS C during the AM peak hour, with a v/c of 0.77, and LOS E during the PM peak hour, with a v/c of 0.91. Without improvements, in 2011 with BRAC traffic this intersection is forecasted to operate at LOS C during the AM peak hour with a v/c ratio of 0.81 and LOS F during the PM peak hour with a v/c ratio of 1.04. If this were the only intersection being improved in the immediate area, adding a turn lane from westbound North Wood Road to MD 355 would allow the intersection to function at LOS C during the AM peak hour with a v/c ratio of 0.81, and LOS E during the PM peak hour with a v/c ratio of 0.97. However, the recommended improvements for Intersection 5: MD 355 @ Cedar Lane include adding one through



Intersection 9

lane to MD 355 in the northbound direction and one through lane to MD 355 in the southbound direction. These Intersection 5 improvements carry through this intersection, and would cause MD 355 (Rockville Pike) @ North Wood Road to operate at LOS B during the AM peak hour with a v/c ratio of 0.72, and LOS D during the PM peak hour with a v/c

ratio of 0.84. Because these improvements would already be in place as a result of modifications to Intersection 5, no additional improvements are being recommended for Intersection 9, and any associated costs and environmental impacts for improvements at this location have been included in the estimate for Intersection 5. Because MD 355 (Rockville Pike) @ North Wood Road is one of the two main entrances to the NNMC campus, the Department of Defense has agreed to contribute \$1.0 million in improvements to this section of MD 355 ("Defense Department Will Pay for Turn Lanes as Naval Hospital Expands", Washington Post, 7/17/08). The Navy is studying additional improvements that could improve traffic operations for vehicles entering the NNMC campus, and SHA and NNMC will continue to work together to develop appropriate improvements at this location.

Intersection 12: MD 355 (Rockville Pike / Wisconsin Avenue) @ Center Drive / Jones Bridge Road

This intersection currently operates at LOS E during the AM peak hour, with a v/c of 0.94, and LOS F during the PM peak hour, with a v/c of 1.10. Without improvements, in 2011 with BRAC traffic this intersection is forecasted to operate at LOS E during the AM peak hour with a v/c ratio of 0.95 and LOS F during the PM peak hour with a v/c ratio of 1.18. Making the recommended improvements will allow the intersection to function at LOS E during the AM peak hour, with a v/c ratio of 0.93, and LOS E during the PM peak hour, with a v/c ratio of 0.97. The recommended improvements include:



Intersection 12

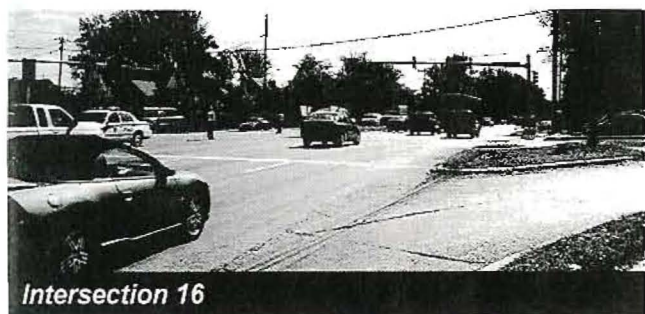
- Adding one left turn lane to MD 355 in the southbound direction
- Converting the shared through/left lane to one through and one left lane on Center Drive in the eastbound direction

- Converting the shared through/left lane to a left-only lane on Jones Bridge Road in the westbound direction.

These proposed improvements would impact two properties with no displacements, totaling 1.15 acres. No environmental features are expected to be impacted. More detailed information about the construction and right-of-way costs of this intersection are currently being developed as part of the 30 percent design efforts. Based on the current level of design, the cost is estimated to range between \$5.0 and \$10.0 million. If the improvement concept is revised so that there is only one through lane provided in the eastbound direction (instead of the two that would be created by the improvements listed above), the cost could be reduced by approximately \$2.5 million, and right-of-way impacts could be reduced to approximately 0.64 acres. However, this revision would cause the intersection to operate at LOS E during the AM peak hour, with a v/c ratio of 0.94, and LOS F during the PM peak hour, with a v/c ratio of 1.05.

Intersection 16: MD 185 (Connecticut Avenue) @ Jones Bridge Road/Kensington Parkway

This intersection currently operates at LOS F during both peak hours, with a v/c during the AM of 1.21, and a v/c of 1.28 during the PM. Without improvements, in 2011 with BRAC traffic this intersection is forecasted to operate at LOS F during the AM peak hour with a v/c ratio of 1.29 and LOS F during the PM peak hour with a v/c ratio of 1.37. Making the recommended improvements will allow the intersection to function at LOS E during both peak hours, with a v/c ratio of 0.99 during both the AM and PM peaks. The recommended improvements include:



- Creating separate through and right turn lanes on southbound MD 185
- Adding two lanes to northbound MD 185 resulting in four through lanes and one shared hard right/

gradual right lane

- Adding one left turn lane and separate the shared through/right lane into one through and one right turn lane on eastbound Jones Bridge Road
- Converting the shared through/right lane on westbound Jones Bridge Road to one separate through lane and one right turn lane

These proposed improvements would impact 22 properties with no displacements, totaling 1.76 acres. No environmental features are expected to be impacted. More detailed information about the construction and right-of-way costs of this intersection are currently being developed as part of the 30 percent design efforts. Based on the current level of design, the cost is estimated to range between \$39.0 and \$45.0 million.

A number of alternate improvement concepts were also considered for this intersection that may be further evaluated during the design phase. If one of the northbound through lanes along MD 185 was eliminated, the cost could be reduced by approximately \$2.5 million and right-of-way impacts could be reduced to approximately 1.64 acres, but the intersection would be expected to operate at LOS E during the AM peak hour with a v/c ratio of 0.99, and LOS F during the PM peak hour with a v/c ratio of 1.16.

If the existing conditions of having combined through/right lanes on eastbound Jones Bridge Road and northbound MD 185 are retained and one northbound through lane is eliminated from the proposed improvement, the cost could be reduced by approximately \$3.0 million and right-of-way impact could be reduced to approximately 1.38 acres. However, under these conditions, the intersection is expected to operate at LOS F during both peak hours, with a v/c during the AM peak hour of 1.01, and a v/c during the PM peak hour of 1.19.

Finally, if one left turn lane is eliminated from the proposed improvement to eastbound Jones Bridge Road, the cost could be reduced by approximately \$4.0 million and right-of-way impacts could be reduced to approximately 1.20 acres, but this would cause the intersection to operate at LOS F during both peak hours, with a v/c ratio of 1.02 during the AM peak hour and a v/c ratio of 1.10 during the PM peak hour.

Table 2: Summary of Short Term Intersection Improvement Concepts

Intersection		Traffic Data (2011)				Right-of-Way			Environmental Features					Total Cost (millions)
Number	Name	No-Build AM LOS (v/c)	No-Build PM LOS (v/c)	Build AM LOS (v/c)	Build PM LOS (v/c)	Displacements	Properties Impacted	Total Right-of-Way (acres)	Wetlands (acres)	Streams (linear feet)	Floodplains (acres)	Parks (acres)	Forests (acres)	
3	MD 355 (Rockville Pike) @ Grosvenor Lane	F (1.04)	C (0.80)	D (0.90)	C (0.80)	0	3	0.17	0	0	0	0	0	\$4 - \$8
5*	MD 355 (Rockville Pike) @ Cedar Lane	F (1.35)	F (1.43)	E (0.99)	E (0.97)	0	21	2.86	0	305	0	0.40	0.70	\$68 - \$75
6	MD 187 (Old Georgetown Road) @ West Cedar Lane/ Oakmont Avenue	D (0.87)	F (1.15)	D (0.85)	E (0.99)	0	11	0.36	0	0	0	0	0	\$5 - \$10
12	MD 355 (Rockville Pike/Wisconsin Avenue) @ Center Drive/Jones Bridge Road	E (0.95)	F (1.18)	E (0.93)	E (0.97)	0	2	1.15	0	0	0	0	0	\$5 - \$10
16	MD 185 (Connecticut Avenue) @ Jones Bridge Road/Kensington Parkway	F (1.29)	F (1.37)	E (0.99)	E (0.99)	0	22	1.76	0	0	0	0	0	\$39 - \$45

* Includes MD 355 @ North Road and MD 355 @ North Wood Road

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Synchro Analyses

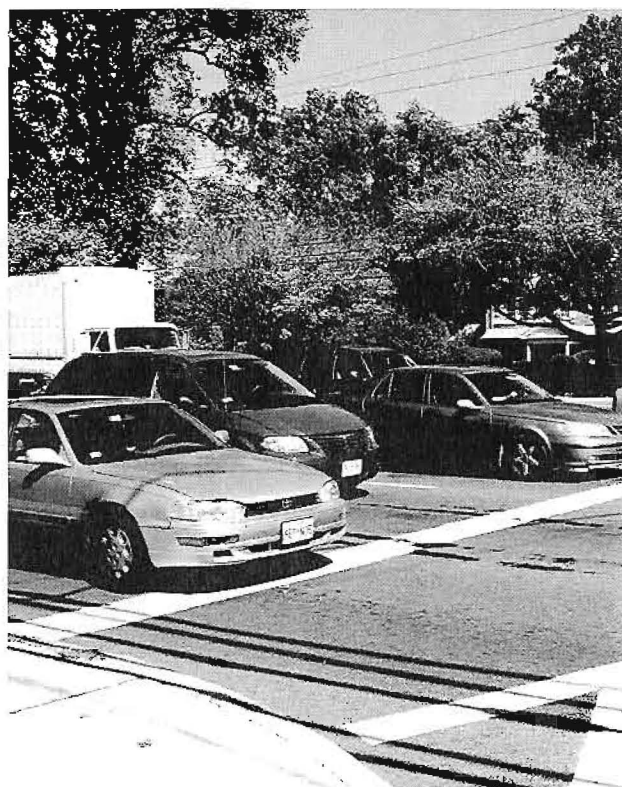
To understand the operational characteristics of this highly urbanized segment of MD 355 in the study area, Synchro analyses were also performed on the 2011 BRAC volumes to validate the findings of the CLV analysis. The CLV analysis used to evaluate the intersections, as discussed in the previous section, is the most common tool for planning-level preliminary assessments of traffic conditions. These analyses focus only on the volume for each movement during each peak hour and capacity of the intersection. Aspects of operation such as signal timing, travel speed, precise signal phasing, the effects of queuing with regard to turn lane lengths, and the potential effect of one intersection on the operation of an adjacent intersection cannot be assessed using CLV.

Synchro is a software program that, when used with its companion simulation software, SimTraffic, can produce results that better incorporate potential effects of geometric features, travel speeds, and signal operation, as well as, to some extent, anticipated driver behavior. Synchro and SimTraffic provide a means to assess corridor-level benefits of improvements and well as intersection-level benefits.

A Synchro model was developed for MD 355 between Pooks Hill Road and Woodmont Avenue and calibrated for existing conditions, for both the AM and PM peak hours, using existing traffic counts, signal timings, lane configurations and geometry, and speed data acquired from travel time runs. The 2011 forecasted volumes were then added to the model to evaluate the 2011 No Build condition. Following that evaluation, the improvements developed during the

CLV process were incorporated into the model. At each stage the simulations were observed to see if the traffic operation appeared to be reasonable.

With the improvements predicted by the CLV process, the simulations showed that the intersection operations performed as expected. Queues formed in the vicinity of intersections predicted to operate at close to LOS F. The Synchro simulations developed for this effort, as well as some additional intersections, will continue to be used as the intersection concepts move through the design phase.



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Implementation of Short-Term Improvements

Once SHA determined the full range of needs and intersection improvements described in the previous section, the next step in the process was to determine the priority of intersection improvements to be implemented. Based on the cost estimates developed for all five intersection improvement concepts, the total cost of the short term improvements near the NNMC would be approximately \$121 - \$148 million, including the design, construction, and ROW acquisition phases. The level of available funding is not sufficient to program all of the needed improvements. In 2007 MDOT added \$45.3 million to the Consolidated Transportation Program (CTP) for SHA's BRAC improvements at NNMC. However, MDOT recently deferred a portion of this funding as part of its efforts

to reduce its total statewide budget by \$1.1 billion in new project funding in the draft CTP for the FY 2009-2014 six-year program period. Therefore SHA, in coordination with the Montgomery County BRAC Committee and the NNMC, developed a list of priority intersections that were desired to be implemented, should funding become available. Table 3 on page 16 denotes the priority; the intersections indicated with a "P1" are the top priorities, and are currently programmed in the CTP.

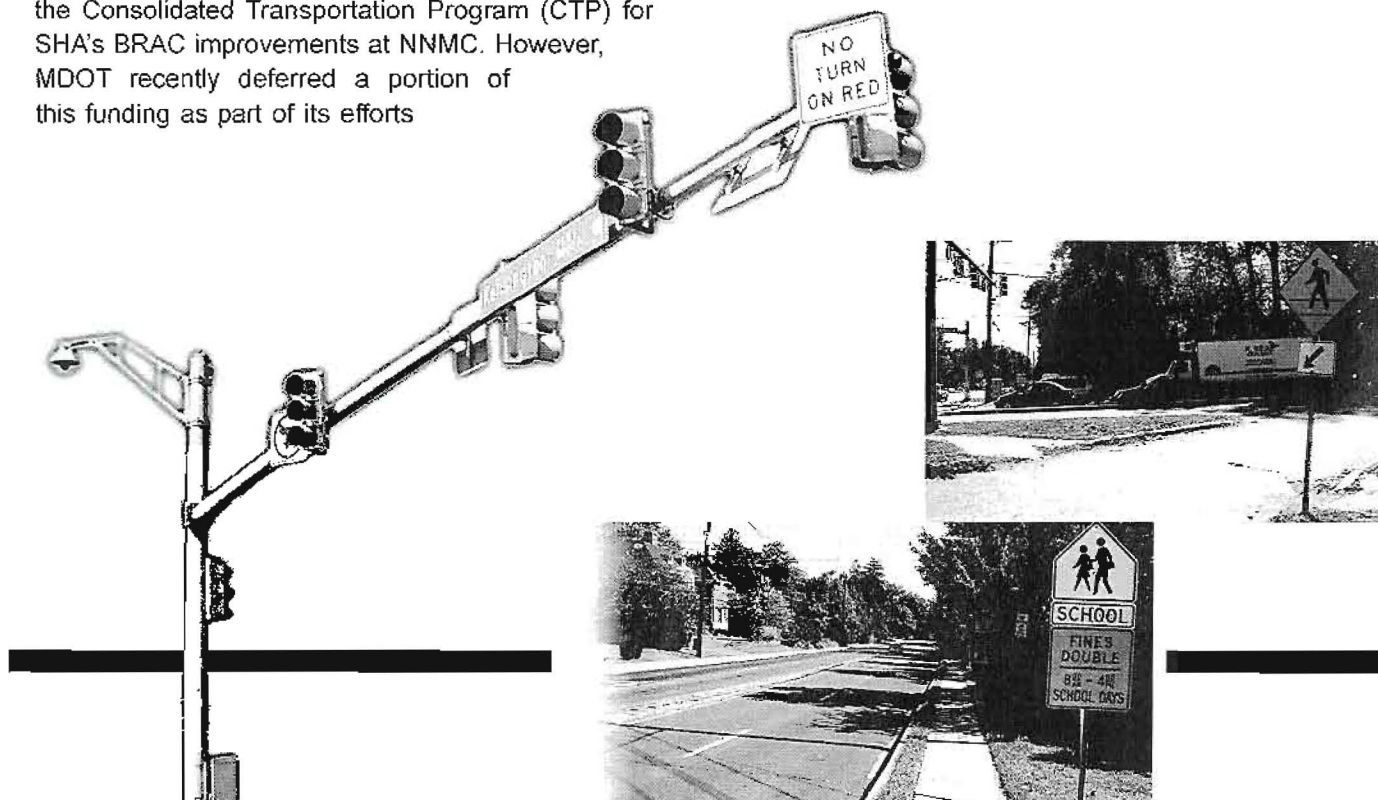
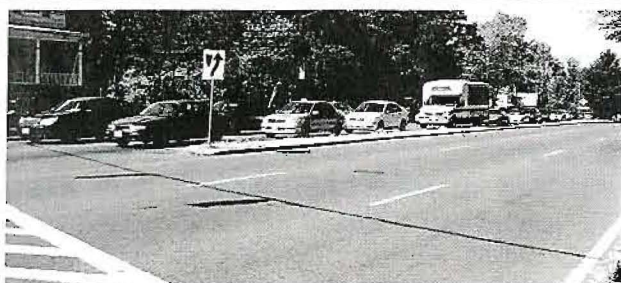


Table 3: Summary of Intersection Priorities

Priority	Location
P1	Intersection 5: MD 355 (Rockville Pike) @ Cedar Lane
P1	Intersection 6: MD 187 (Old Georgetown Road) @ West Cedar Lane/Oakmont Avenue
P1	Intersection 12: MD 355 (Rockville Pike/Wisconsin Avenue) @ Center Drive/Jones Bridge Road
P1	Intersection 16: MD 185 (Connecticut Avenue) @ Jones Bridge Road/Kensington Parkway
P2	Intersection 8: MD 355 (Rockville Pike) @ North Drive
P2	Intersection 9: MD 355 (Rockville Pike) @ North Wood Road
P2	Intersection 3: MD 355 (Rockville Pike) @ Grosvenor Lane

Under limited circumstances, the Department of Defense (DoD) can provide funding for road improvements outside its property if the projects meet the criteria for Defense Access Road (DAR) program certification. The DAR program provides a methodology to determine whether the military can legally pay their fair share of the cost of public highway improvements necessary to mitigate an unusual impact of a defense activity. The DAR program itself does not have funds for such improvements. As with other construction programs, the funding for such improvements (if found eligible) would come through the annual federal DoD appropriations process. Under the DAR program, an unusual impact could be a significant increase in personnel at a military installation (currently defined as one that doubles existing traffic at the year of implementation), or one that requires relocation of

an access gate, or the deployment of an oversized or overweight military vehicle or transporter unit. On June 10, 2008, the DOD's Transportation Engineering Agency determined that the proposed improvements to Intersection 9: MD 355 (Rockville Pike) @ North Wood Road do not appear to be eligible for the DAR program, and recommended that the intersection improvements be incorporated into the larger on-base improvements at the North Wood Road Gate. With this notice, the DoD approved the search for funds within the existing Navy budget, and the Navy is currently examining its budget. If and when the Navy identifies these funds, the Maryland Department of Transportation and the Navy will continue to coordinate on defining the project within the State's current intersection improvement efforts.



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Beltway Ramp Access

In addition to developing short-term improvements to address the most critical intersections near NNMC, at the request of local government and citizens' advisory groups SHA also investigated a new access point on I-495 (the Capital Beltway) between the existing MD 355 (Rockville Pike) and MD 185 (Connecticut Avenue) interchanges with I-495. SHA reviewed the technical and environmental issues associated with the potential construction of a new access point, and a discussion of the major issues associated with this concept are presented below.

The National Naval Medical Center (NNMC) Campus in Bethesda borders the Capital Beltway (I-495) between MD 355 (Rockville Pike) and MD 185 (Connecticut Avenue). Local officials, citizens, and stakeholder groups have expressed interest in a new dedicated entrance/exit or "slip ramp" to the campus from the eastbound (inner loop) Capital Beltway to provide more direct access and to decrease the amount of traffic on arterial roadways surrounding the campus. It should be noted that a new access point in this location is not currently included in any of the region's master plans.

In its December 14, 2007 Draft Environmental Impact Statement (DEIS), the Navy evaluated and presented results on the potential impact of a new access point with a slip ramp from the Capital Beltway. The Navy identified the potential construction of a new access point as a long-term regional issue rather than an improvement related to BRAC mitigation, and further did not recommend the installation of Beltway Slip ramps to or from the NNMC campus (NNMC DEIS,

4.7.4.2, p. 4-52) for security and traffic operations reasons (NNMC DEIS, App. C, 4.5.2, p. 68). In subsequent discussions with MDOT, the Navy has expressed concern about the security measures it would be required to implement to accommodate vehicles using a new access point directly from the Beltway. The logistics and capital and operating costs to implement a new security check point on its grounds would be significant challenges for the Navy.

Interstate Access Point Approval and Traffic Safety Issues

23 U.S.C. § 111 provides that States will not add any points of access to, or exit from, the interstate highway system without the prior approval of the United States Secretary of Transportation. The Secretary has delegated the authority to administer 23 U.S.C. § 111 to the Federal Highway Administrator. Therefore, provision of any new or revised access to an interstate highway (Interstate Access Point Approval, or IAPA) requires approval from the Federal Highway Administration (FHWA) and constitutes a federal action. FHWA approval is a two-step process that consists of concept approval and final approval. Concept approval is requested from FHWA with an Access Justification Report (AJR). Following concept approval and fulfillment of National Environmental Policy Act (NEPA) requirements, final approval is contemplated, assuming no significant changes have been made to the original access concept. Final approval is necessary regardless of whether the project(s) that will create the new or revised interstate access receive federal funding. The fundamental tenet underlying the IAPA process is the protection

of the integrity, operation, and safety of the interstate system by ensuring proper spacing and safe weaving distances.

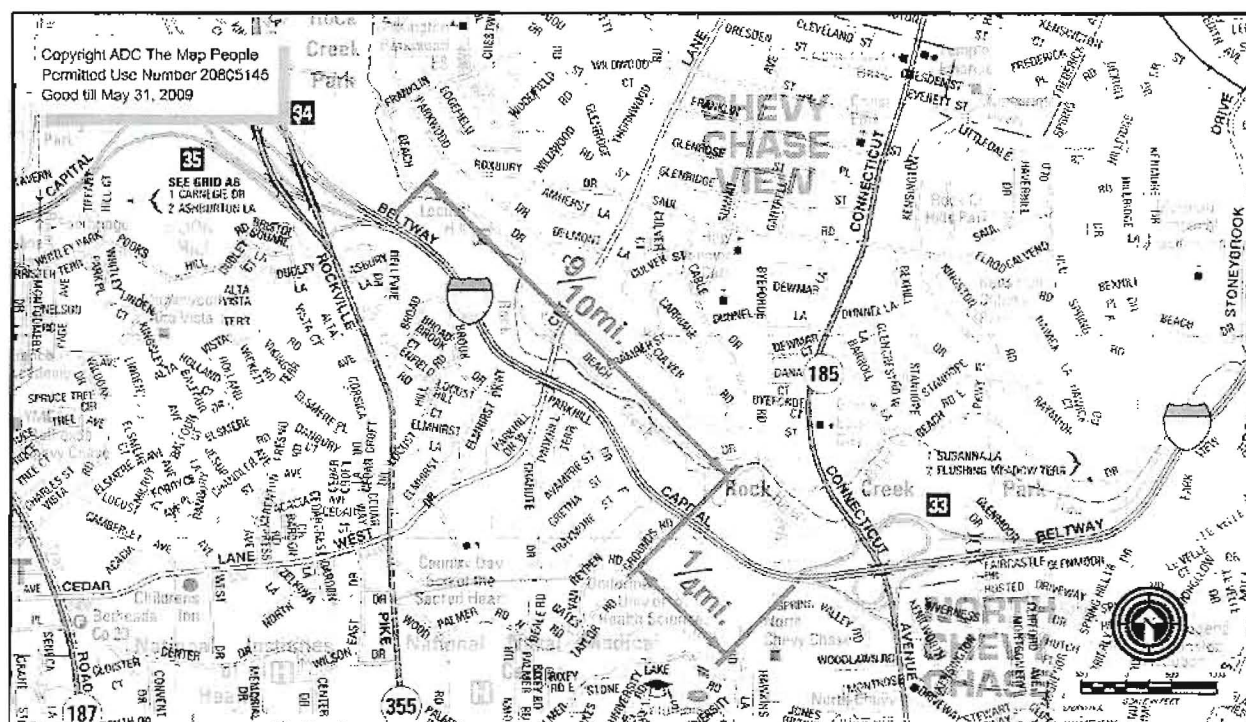
Interstate interchanges and access modifications are considered when conflicting high traffic volumes exceed those that can be handled efficiently and safely with at-grade intersections. They are also used to control access to a primary highway. Slip ramps typically consist of diagonal ramps connecting the principal highway with a parallel frontage road.

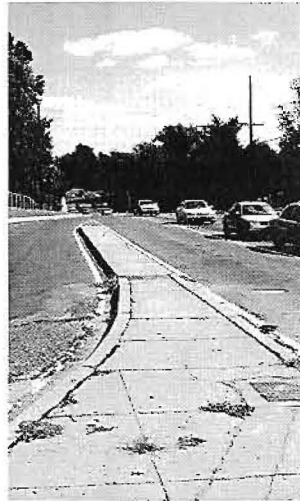
23 C.F.R. § 625 provides that the design standards contained in A Policy on Geometric Design of Highways and Streets, AASHTO 2001 be used for roadway projects. Under AASHTO standards, the minimum interchange spacing is one mile in urban areas and two miles in rural areas. Currently, there are two separate entrances to the Capital Beltway from I-270 and MD 355, in close proximity to one another, located on the Inner Loop (eastbound), as shown below in Figure 3. With 1.15 miles in between the two existing access points at I-270 and MD 185, a new access point would decrease interchange

spacing so that it would fall below the one-mile AASHTO standard. In addition, while spacing of less than one mile may be permissible in urban areas with the provision of grade-separated ramps or by adding collector-distributor (C-D) roads to accommodate weaving traffic flows, providing these design elements typically adds significantly to the complexity and cost of an interchange project.

The I-270/MD 355/Capital Beltway interchange is a complex system with successive left-entering merge conditions and significant weaving movements in a highly congested area. Based on traffic count data collected in September 2005, the eastbound I-495 AM peak hour vehicle volume is approximately 7,000 vehicles, which equates to a level of service (LOS) E for the segment between I-270/MD 355 and MD 185. Adding a new access point in the short segment between this interchange and the MD 185/Capital Beltway interchange (approximately 9/10 mile from the I-270/MD 355 beltway access point and ¼ mile from the MD 185 access point) would further complicate the traffic conditions in this area, and present significant operational and safety concerns.

Figure 3: Distances Between Existing I-495 Interchanges and Possible Location of Proposed New Access Point





Traffic entering the Capital Beltway from the I-270 and MD 355 ramps would be required to merge into traffic traveling eastbound from the west and then quickly weave across up to four travel lanes to exit at a new NNMC access ramp. Although the amount of traffic that would choose to make this weaving movement is not accurately known, the Navy's traffic study indicates that approximately 68% of the traffic volume that would use the new access point would originate on I-270. Thus, it is very likely that the amount of new traffic that would be added to the mix of traffic traveling eastbound and from I-270/MD 355 to the new access point would degrade the operations of the interstate.

The situation described above is similar to the maneuver that is currently needed to exit at MD 185 from the I-270/MD 355 access point, within approximately one mile after entering the Capital Beltway from I-270/MD 355 on the west. Aside from the potential traffic safety concern, as explained above, this new traffic movement would also pose additional Beltway traffic flow problems. A new slip ramp access to NNMC would not only disturb traffic flow from traffic weaving and merging across multiple lanes in such a short distance; it would also be further complicated by the curving horizontal alignment of the Beltway between the I-270 East Spur entrance and the MD 185 interchange. Having three or four interstate access points so close to one another would likely degrade the integrity of the interstate system by increasing the complexity of the roadway system and presenting both safety and flow concerns due to multiple weaving conflicts. For these reasons, SHA concurs with the Navy and does not recommend that

Interstate Access Point Approval (IAPA) from FHWA be pursued.

Travel Demand and Traffic Relief Issues

The SHA evaluated the potential traffic demand for a slip ramp and the diversion of traffic to a proposed ramp from other roadways in the network, based on the findings in the Navy's DEIS traffic study. The traffic study was conducted using both Critical Lane Analysis (CLA) and LOS approach to determine the capacity of intersections in the study area with a Beltway slip ramp in place.

CLA was used to generate intersection Critical Lane Volume (CLV) for the intersections surrounding NNMC. The CLV was then compared to the CLV standard for Montgomery County, where 1,600 vehicles is the maximum lane capacity per hour. The LOS approach defines intersection capacity through the use of a rating system. Ratings range from LOS A to F, where LOS A represents intersections with minimal delays and LOS F represents intersections that are over capacity with excessive delays and long queues. Generally LOS ratings of A through D are acceptable, while E, which is approaching capacity, is also acceptable in some jurisdictions, including Montgomery County.

Table 4 on page 20 shows the results of the Navy's traffic study for the AM and PM CLVs and Levels of Service (LOS) for intersections surrounding the NNMC, for both the No-Build and Slip Ramp scenarios, as presented in its March 2008 FEIS. It also presents the

Table 4: AM and PM CLV and LOS for the 2011 No-Build and Slip Ramp Scenarios

Intersection	No-Build AM CLV/LOS	AM CLV/LOS with Slip Ramps	Percent Decrease in CLV	No-Build PM CLV/LOS	PM CLV/LOS with Slip Ramps	Percent Decrease in CLV
Grosvenor Lane & Rockville Pike	1331/C/D	1320/C/D	0.83%	1097/B	1085/B	1.09%
West Cedar Lane & Rockville Pike	2100/F	2079/F	1.00%	1822/F	1841/F	1.04% increase in CLV
Jones Bridge Road & Rockville Pike	1365/D	1365/D	0.00%	1722/F	1722/F	0.00%
Jones Bridge Road & Connecticut Avenue	1559/E	1543/E	1.03%	2078/F	2038/F	1.92%

Source: Final Environmental Impact Statement For Activities to Implement 2005 Base Realignment and Closure Actions At National Naval Medical Center Bethesda, Maryland, March 2008

percent decrease in CLV from No-Build to Slip Ramp conditions.

Adding a new access point to the NNMC campus would not significantly decrease traffic volumes at the intersections shown above in Table 4. Failing intersections still fail, and improvements in traffic operations are incremental at best with or without a slip ramp available. At most, there would be a 1.9 percent decrease in PM CLV at the Jones Bridge Road and Connecticut Avenue intersection, which still results in a failing level of service with a mere 40-vehicle per hour decrease in traffic.

Contrary to the assumption that providing direct access from the Capital Beltway to the NNMC campus would divert traffic from other major access roads and thereby allow intersections on these roads to operate at a better level of service, the original Navy traffic study provided data showing that estimated 2011 traffic volumes that would be diverted from existing gates due to a new access point would not be significant. As this original Navy traffic study only took into account the BRAC-related eastbound traffic that may use the slip ramp, SHA traffic engineers assumed that 50 percent of all of the traffic destined to NNMC, including both existing traffic and BRAC traffic, would use this ramp to access NNMC from the Capital Beltway. Assuming that vehicles entering NNMC via this route would exit

via the reverse route, the estimated total amount of traffic that would be diverted from the existing gates along MD 355 and Jones Bridge Road is shown in Table 5 on page 21.

It is estimated that approximately 11,000 vehicles enter the grounds daily at NNMC presently with its current population of 1,900 civilians, 2,700 military personnel, 497,000 annual outpatient visits, and 7,700 annual admissions ("BRAC Growth – Facts and Figures," Maryland Department of Business and Economic Development, May 16, 2008). The Navy's DEIS traffic analysis used a conservative assumption of growth that examined the potential transportation impacts of accommodating 2,500 new employees at NNMC by 2011 (NNMC DEIS, 4.7, p. 4-36). The 2011 projected traffic volume on southbound MD 355 just south of the MD 355 and Cedar Lane intersection (approaching the main entrances to NNMC) is expected to be approximately 4,055 vehicles during the AM peak hour with 1,275 of those vehicles entering the NNMC gates. If, in accordance with Table 5, approximately 600 vehicles divert from the existing gates during the peak hour with the addition of a new interstate access to the NNMC campus, the effects of the diversion on the critical lane volumes shown in Table 4 would not be significant. This would hardly be a cost-effective solution to the traffic problems posed by BRAC. In addition, because these vehicles may be coming from

Table 5: Estimated 2011 Volumes Diverted from Existing Gates with a New Access Point

	AM Peak Hour (vehicles)	PM Peak Hour (vehicles)
Entering Volume	630	230
Exiting Volume	195	600

a variety of locations using a variety of routes, the diversion of these vehicles to the new access point would not result in a reduction of 600 vehicles at any one location. Instead, it could be a reduction of 150 vehicles at one location, 75 at another, and so on.

Therefore, it is unlikely that a new access point would provide significant relief to surrounding roadways because the effect of the diversion is diluted throughout the system due to the multitude of routes to and from the NNMC campus. While more detailed studies would need to be conducted to determine what impacts this concept may have on the existing I-495/MD 185 interchange and other nearby locations, it is anticipated that the intersections included in the study would continue to operate at similar levels of service, with or without slip ramps that provide a direct connection to the NNMC. It is also important to note that while the vast majority of new traffic resulting from the BRAC action will be in the system by 2011, it would not be possible to construct a slip ramp(s) until much later than that.

Environmental Issues

Section 4(f) of the U.S. Department of Transportation (U.S. DOT) Act stipulates that the FHWA and other U.S. DOT agencies cannot approve the use of land from a significant publicly-owned public park, recreation area, wildlife or waterfowl refuge, or any significant historic site for a transportation purpose unless there is no feasible and prudent alternative to the use of that land, and the action includes all possible planning to minimize harm to the property resulting from the transportation use. Two parks are located in the area adjacent to NNMC, Rock Creek Park and North Chevy Chase Park, both of which would likely be impacted by a potential new access

ramp. Some portions of the area between the MD 355 and MD 185 interchanges feature steep topography (up to an approximate 2:1 slope), which may require regrading for slip ramp construction to meet AASHTO requirements. A tributary to the Rock Creek is also present, which would result in stream impacts and could require the construction of a structure for a proposed ramp. County and private property, including established residences, may also be impacted. Given the fact that other feasible roadway improvement alternatives exist, and that the traffic studies have shown a limited amount of traffic relief from a potential new access ramp, it is even more unlikely that FHWA would approve the use of this parkland for a new interstate access point.

Summary of Beltway Ramp Access Investigation

Due to the existing complexity of the Capital Beltway between I-270 and MD 185, adding a new access point at this location would further complicate traffic flow and create additional safety concerns due to weaving conflicts. In addition, the environmental constraints associated with a new access point could be significant. The traffic analyses conducted by the Navy and SHA show that the operational effectiveness of a direct access ramp on local traffic congestion would be limited, at best, due to several identified traffic flow and safety concerns. Given the current traffic operations and volumes associated with the MD 355 and MD 185 Beltway Inner Loop ramps and the issues presented in this discussion paper, SHA does not consider an additional interstate access point from the Capital Beltway to the NNMC to be a viable option for consideration and will not pursue an IAPA from FHWA.

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Summary & Conclusions

The results of the study indicate that the existing roadway capacity will be exceeded by the influx of new traffic due to the BRAC action and other related growth at the NNMCC. Under existing conditions, four intersections, MD 355 (Rockville Pike) @ Cedar Lane, MD 355 (Rockville Pike) @ North Drive, MD 355 (Rockville Pike/Wisconsin Avenue) @ Center Drive/Jones Bridge Road, and MD 185 (Connecticut Avenue) @ Jones Bridge Road/Kensington Parkway, were already failing during the AM or PM peak hour, with a LOS F. Travel forecasts show that a total of seven of 27 intersections are projected to operate at LOS F for either the AM or PM peak hour in 2011.

To prepare for this anticipated increase in traffic volumes, SHA is recommending five intersection improvement concepts covering these seven locations. However, the level of available funding is not sufficient to program all of the needed improvements. Therefore SHA, in coordination with the Montgomery County BRAC Committee and the NNMCC, developed

a list of priority intersections that were desired to be implemented, should funding become available.

In addition, the possibility of adding a new access point from the Capital Beltway to the NNMCC campus was also examined to provide more direct access and to decrease the amount of traffic on arterial roadways surrounding the campus. However, due to the existing complexity of the Capital Beltway between I-270 and MD 185 and weaving conflicts, adding a new access point at this location would further worsen traffic flow and safety concerns. The traffic analyses conducted by the Navy and SHA show that the operational effectiveness of a direct access ramp on local traffic congestion would be limited, at best, and the environmental constraints associated with a new access point could be significant. Therefore, SHA does not consider an additional interstate access point from the Capital Beltway to the NNMCC to be a viable option for consideration and will not pursue an IAPA from FHWA.