

BRAC Base Realignment and Closure



Traffic and Intersection Improvement Studies for Base Realignment and Closure

Andrews Air Force Base
Prince George's County, Maryland

Summary Report

December 2009



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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. Maryland will benefit 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, the National Naval Medical Center at Bethesda (NNMC) in Montgomery County, Fort Detrick in Frederick County and Andrews Air Force Base (AAFB) in Prince George’s County are the five locations that will be gaining most of these positions. In preparation for this action, Maryland State Highway Administration (SHA) initiated a study of the short-term highway transportation needs associated with BRAC at these installations. This document focuses specifically on AAFB.

The study area encompasses the roadway network in the vicinity of AAFB, and includes intersections at 24 locations along the following roadways:

- ➔ Branch Avenue (MD 5) from Auth Road to Coventry Way
- ➔ Old Alexandria Ferry Road from Coventry Way to MD 223
- ➔ Woodyard Road (MD 223) from Old Alexandria Ferry Road to MD 4
- ➔ Dower House Road from MD 223 to MD 4
- ➔ Marlboro Pike from MD 4 to MD 223

The study process involved three 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
- ➔ Identifying priority short-term intersection improvements for design and construction, should funding become available in the future

- ➔ Allentown Road (MD 337) from MD 5 to Forestville Road
- ➔ Suitland Parkway from I-495/I-95 to MD 4
- ➔ Forestville Road from I-495/I-95 to MD 337
- ➔ MD 4 from Westphalia Road to MD 223.

Today, eight of the intersections analyzed are already operating at LOS F during at least one peak hour of each weekday. Under future 2011 conditions, 11 locations are expected to operate at LOS F during one or both peak hours each weekday, because of the anticipated impacts of background growth including planned future development or because of a combination of background growth and BRAC growth. These 11 locations are listed below:

- ➔ Intersection 1: MD 337 at I-495/I-95 NB Off Ramp

- ➔ Intersection 2: MD 337 at Suitland Road (MD 218) / Westover Drive
- ➔ Intersection 5: Forestville Road at I-495/I-95 SB Off Ramp
- ➔ Intersection 6: MD 4 at Suitland Parkway / Presidential Parkway
- ➔ Intersection 7: MD 4 at Dower House Road
- ➔ Intersection 10: Old Alexandria Ferry Road at Virginia Avenue
- ➔ Intersection 13/14: MD 337 at MD 5 Ramps
- ➔ Intersection 15: MD 5 at I-495 / I-95 SB On Ramps / Auth Road
- ➔ Intersection 20: MD 223 at Dower House Road
- ➔ Intersection 23: MD 223 at Marlboro Pike / South Osborne Road
- ➔ Intersection 26: MD 4 at Westphalia Road / Old Marlboro Pike

To prepare for this anticipated increase in traffic volumes, improvement concepts have been developed for six of these eleven failing locations (Intersections 1, 2, 5, 13/14, 20 and 23) and are presented in this report. Four of the remaining locations that are projected to fail in 2011 are being

evaluated under separate studies being conducted by SHA, including the MD 4 (Pennsylvania Avenue) Interchange at Suitland Parkway study, the Metro Green Line Access Project, and a congestion reduction study at MD 223 at Rosaryville Road. Analyses of Intersection 10, Old Alexandria Ferry Road at Virginia Avenue, were included in this study, but because it is the intersection of two County roads, no improvement concepts were developed by SHA.

However, the level of available State funding is not sufficient to program the needed short-term improvements identified in this study. Should funding become available, SHA recommends that the three intersections listed below be the first set of locations for which improvements should be programmed in the Consolidated Transportation Program at the appropriate time. These three intersections are most affected by the anticipated BRAC traffic and are closest in proximity to AAFB gates:

- ➔ Intersection 1: MD 337 (Allentown road) @ I-495/I-95 NB Off-Ramp
- ➔ Intersection 2: MD 337 at Suitland Road (MD 218) / Westover Drive
- ➔ Intersection 23: MD 223 at Marlboro Pike / South Osborne Road



BRAC

Andrews Air Force Base

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. Maryland will benefit 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, the National Naval Medical Center at Bethesda (NNMC) in Montgomery County, Fort Detrick in Frederick County and Andrews Air Force Base (AAFB) in Prince George’s County are the five locations that will be gaining most of these positions. In preparation for this action, Maryland State Highway Administration (SHA) initiated a study of the short-term highway transportation needs associated with BRAC at these installations. This document focuses specifically on AAFB.

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 F) 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 conducted traffic analyses to identify the

intersections that would operate at a failing level of service in 2011 and then worked to develop low cost, low impact improvement concepts that would allow those locations to operate under capacity (LOS E or better). The purpose of this report is to present the results of the travel forecasting, traffic studies and short-term intersection needs assessment at AAFB. The studies included analysis of the impacts to traffic operations that are anticipated based on the effects of BRAC on the roadway network that serves AAFB, and recommendations for transportation system improvements that would provide improved operations in 2011.

The study process involved three 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
- ➔ Identifying priority short-term intersection improvements for design and construction, should funding become available in the future



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Identification of the Study Area

AAFB is located southeast of the Capital Beltway (I-495/I-95), in Prince George's County, Maryland. Traffic studies began by identifying the area around AAFB that is likely to be most affected by the BRAC initiative. Because the purpose of the study was to identify roadway improvements related to the effects of the BRAC action on AAFB, the study area encompasses the roadway network in the vicinity of AAFB. The study included 26 intersections at 24 locations along the roadways listed below:

- ➔ MD 5 (Branch Avenue) from Auth Road to Coventry Way
- ➔ Old Alexandria Ferry Road from Coventry Way to MD 223
- ➔ MD 223 (Woodyard Road) from Old Alexandria Ferry Road to MD 4
- ➔ Dower House Road from MD 223 to MD 4
- ➔ Marlboro Pike from MD 4 to MD 223
- ➔ MD 337 (Allentown Road) from MD 5 to Forestville Road
- ➔ Suitland Parkway from I-495/95 to MD 4
- ➔ Forestville Road from I-495/95 to MD 337
- ➔ MD 4 from Westphalia Road to MD 223.

The intersections included in the study provide access to the four gates to the Air Force Base, and are listed in **Table 1** on page 5. Nineteen intersections are signalized, and seven are unsignalized. Four of the intersections (Intersections 13, 14, 16 and 17) are part of two single point urban interchanges (SPUIs). These intersections are also shown on a map of the study area, in **Figure 1** on page 6.

Travel Forecasting

SHA conducted a 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 AAFB, and to develop recommendations for transportation system improvements.

Existing 2007 conditions, 2011 No BRAC and 2011 With BRAC conditions were evaluated as part of the traffic study. Each of these scenarios is described in more detail below.

Existing Conditions

Existing lane configuration data was determined through site visits to the intersections and interchanges included in the study area. Existing peak period turning movement volumes for intersections 1 through 10 (See Table 1) were obtained from the "Andrews Air Force Base, Maryland BRAC Traffic Impact Study," dated February 2007. The turning movement counts in the February 2007 study were conducted in 2005. Turning movement counts for the additional intersections were collected in late 2007 for the AM peak period only at Intersection 3, for the PM peak period only at Intersections 1, 4 and 5, and for both the AM and PM peak periods at Intersections 11 through 14, 16, 17, 20 through 22, and 24 through 26. The remaining counts (Intersections 15, 18, 19, and 23) were obtained from the SHA traffic data database.

To estimate 2007 data, growth rates were applied to traffic volumes at all locations where counts were performed prior to 2007. The growth rate methodology from the February 2007 study was used for intersections 1 through 10. This

Table 1: Study Intersections

Intersection 1	MD 337 (Allentown Road) @ I-495/I-95 NB Off-Ramp
Intersection 2	MD 337 (Allentown Road) @ MD 218 (Suitland Road)/Westover Drive
Intersection 3	MD 218 (Suitland Road) @ I-495/I-95 SB On-Ramp
Intersection 4	MD 337 (Allentown Road) @ I-495/I-95 NB On-Ramp/Forestville Road
Intersection 5	Forestville Road @ I-495/I-95 SB Off-Ramp
Intersection 6	MD 4 (Pennsylvania Avenue) @ Suitland Parkway/Presidential Parkway
Intersection 7	MD 4 (Pennsylvania Avenue) @ Dower House Road
Intersection 8	Dower House Road @ Pearl Harbor Drive
Intersection 9	Old Alexandria Ferry Road @ Coventry Way
Intersection 10	Old Alexandria Ferry Road @ Virginia Avenue
Intersection 11	MD 337 (Allentown Road) @ Robert M Bond Drive/Command Drive
Intersection 12	MD 337 (Allentown Road) @ Auth Road
Intersection 13/14	MD 337 (Allentown Road) @ MD 5 (Branch Avenue) Ramps
Intersection 15	MD 5 (Branch Avenue) @ Auth Road/I-495/I-95 SB On-Ramps
Intersection 16/17	Coventry Way @ MD 5 (Branch Avenue) Ramps
Intersection 18	MD 223 (Woodyard Road) @ Old Alexandria Ferry Road/Dangerfield Road
Intersection 19	MD 223 (Woodyard Road) @ Rosaryville Road
Intersection 20	MD 223 (Woodyard Road) @ Dower House Road
Intersection 21	Dower House Road @ Old Marlboro Pike/Fetchet Avenue
Intersection 22	Old Marlboro Pike @ Marlboro Pike
Intersection 23	MD 223 (Melwood Road/Woodyard Road) @ Marlboro Pike/South Osborne Road
Intersection 24	MD 223 (Melwood Road/Woodyard Road) @ MD 4 (Pennsylvania Avenue) EB Ramps
Intersection 25	MD 223 (Melwood Road) @ MD 4 (Pennsylvania Avenue)WB On-Ramp/Old Marlboro Pike
Intersection 26	MD 4 (Pennsylvania Avenue) @ Westphalia Road/Old Marlboro Pike

methodology integrated background growth and growth from the Westphalia Development. Growth rates for MD 5 were derived from historic traffic count data. Growth rates applied to the roadways are listed individually:

- ➔ MD 337 (Allentown Road) - 2.0%
- ➔ MD 4 (Pennsylvania Avenue) between I-495 and Suitland Parkway - 4.1%
- ➔ MD 4 (Pennsylvania Avenue) between Suitland Parkway and Dower House Road - 3.2%
- ➔ Dower House Road - 5.4%
- ➔ MD 223 (Woodyard Road) - 5.4%
- ➔ MD 5 (Branch Avenue) - 1.6%

2011 No BRAC Conditions

The 2011 No BRAC conditions were analyzed to provide a meaningful estimate of the roadway improvements required to accommodate 2011 traffic growth, without the additional traffic due to BRAC. These volumes are solely related to the background growth and adjacent developments in the region.

Deriving the 2011 No BRAC volumes involved a two-step process. First, 2007 existing volumes were grown by applying annual growth rates, which were determined by the historic annual daily traffic (ADT) data retrieved from the SHA traffic database. The resulting volumes are the 2011 background volumes. The second step added volumes generated by the adjacent developments to the study network to yield 2011 No BRAC volumes.

The growth rates used for developing the 2011 background volumes were computed from the available SHA ADT data between 2001 and 2007. The following shows the growth rates for each roadway segment:

→ **MD 337 (Allentown Road) - 1%**

A growth rate of 1% was used along Allentown Road, except when approaching MD 4. In this case, a growth rate of 3% was used, since this section contains not only the traffic on Allentown Road, but also Suitland Parkway. The average growth rate between 2001 and 2007 for this section, based on SHA ADT data, is 5.7%. However, the average annual growth rate of 5.7% reflects two years with atypical annual growth rates of 16.1% (2002) and 17.1% (2005). To normalize the annual growth rate a growth rate of 3% was used, which is comparable with the rest of the network.

→ **MD 5 (Branch Avenue)**

North of Allentown Road - 1%

South of Allentown Road - 2.2%

→ **MD 4 (Pennsylvania Avenue) - 1%**

→ **Dower House Road - 2.3%**

→ **MD 223 (Woodyard Road)**

South of MD 4 - 2.3%

North of MD 4 - 3.1%

→ **Old Alexandria Ferry Road - 2.2%**

There is no available historical data. The growth rate being used is consistent with the growth rate of the nearby MD 5 portion.

Based on consultation with the Maryland-National Capital Park and Planning Commission (MNCPPC) and SHA, it was determined that three major adjacent developments will be completed in the vicinity of the study area by 2011. These developments include Alban-Forestville (mixed use of mini-warehouse and automobile center), Penn East Business Park (mixed use of warehousing and industrial light services), and Presidential Corporate Center (mixed use of hotel/motel and single-family housing).

→ **Alban-Forestville** will be located in the northeast quadrant of the intersection of Westphalia Road and MD 4. The traffic generated by this development will have access to Pennsylvania Avenue via Westphalia Road.

→ **Penn East Business Park** will be in the southeast quadrant of the intersection of

Westphalia Road and MD 4. The traffic generated by this development will have access to MD 4 via either Westphalia Road or Presidential Parkway.

→ **Presidential Corporate Center** will be in the southeast quadrant of the intersection of MD 4 and Presidential Parkway, and will use Presidential Parkway for access to MD 4.

The projected site trips generated by each of the three adjacent developments were provided by MNCPPC. The generated site trips were assigned to the network for each adjacent development based on tracing the existing traffic pattern coming in and going out of Westphalia Road and Presidential Parkway. After combining the total site volumes from these three adjacent developments, the 2011 total adjacent development volumes were derived. The 2011 total adjacent development volumes were then added to the 2011 background volumes.

Three roadway improvement projects are currently under construction or are planned to be constructed within the study area, and were therefore considered to be 2011 programmed conditions. These programmed improvements include Phase 1 of the Metro Green Line Access Project, the MD 4 and Suitland Parkway interchange, and MD 223 at Rosaryville Road.

The intersection of MD 5 at Auth Road will be impacted by the completion of Phase 1 of the Metro Green Line Access Project, which is scheduled to be completed in the Fall of 2009. The new access ramp will allow traffic coming from the Metro Green Line station to use Auth Place to access southbound I-495/I-95. Metro traffic wishing to travel on I-495/I-95 south will no longer be required to travel through the intersection of MD 5 at Auth Road, which will eliminate the westbound through movement at this intersection. In addition, the project includes the construction of a new ramp for northbound traffic on MD 5 to access southbound I-495/I-95, which was opened to traffic in August of 2008. Traffic no longer has to make a northbound left turn at the intersection of MD 5 and Auth Road to access the I-495/I-95 on-ramp. As a result, this northbound left turning movement has been eliminated.

The interchange of Suitland Parkway and MD 4 was treated as if construction would be completed by 2011 for the purposes of this study, even though it is expected that improvements at this location will not be constructed until after 2011. The deferral of this project would not change the priorities

identified later in this report, as there were no low-cost, at-grade improvements that could be made to this intersection to improve traffic operations by 2011. Based on the current interchange concept plan, there will be two signals on Suitland Parkway at this diamond interchange with a flyover for the northbound MD 4 to westbound Suitland Parkway movement.

The MD 223 and Rosaryville Road intersection improvement project will provide additional through and turning lanes and be completed prior to 2011.

2011 With BRAC Conditions

The trips generated by the BRAC development at AAFB were obtained from the February 2007 study. The total number of BRAC employees coming to AAFB in 2011 is expected to be 2,700 personnel. The projected total AM peak hour entering and exiting volumes are 1,140 vehicles and 156 vehicles, respectively; the projected total PM peak hour entering and exiting volumes are estimated to be 211 vehicles and 1,031 vehicles, respectively. The trip generation in the February 2007 study is based on the 7th edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual. The 2,700 personnel were treated as general office.

The gate distribution percentages for BRAC provided in the February 2007 study are as follows:

- ➔ Main Gate: 61%
- ➔ North Gate: 4%
- ➔ Pearl Harbor Gate: 15%
- ➔ Virginia Avenue Gate: 20%

The North Gate allows inbound access only during the AM (6 AM - 9 AM) and outbound access only during PM (3 PM - 6 PM). The gate distribution identified for the North Gate for the nonpeak direction was assigned to the two closest gates, the Main and Pearl Harbor Gates.

The nonpeak direction gate distribution percentages for BRAC are as follows:

- ➔ Main Gate: 63%
- ➔ North Gate: 0%
- ➔ Pearl Harbor Gate: 17%
- ➔ Virginia Avenue Gate: 20%

The general assumptions for the trip distributions

were based on the assumptions made in the February 2007 study:

- ➔ BRAC traffic from the west and from the District of Columbia will use the Main Gate only. Based on the existing AAFB traffic patterns, the majority of the inbound traffic coming from these areas uses Suitland Parkway and Suitland Road. The majority of the outbound traffic going to these areas uses Allentown Road
- ➔ BRAC traffic from I-495 / I-95 northbound will use the northbound off-ramp and then use MD 337 to access the Main Gate
- ➔ BRAC traffic traveling to I-495 / I-95 southbound will use the Main Gate to access MD 218 and then use the I-495 / I-95 southbound on-ramp from MD 218
- ➔ BRAC traffic traveling along MD 5 from the south will use the Virginia Avenue and Pearl Harbor Gates
- ➔ The North Gate's BRAC traffic originates from I-495 / I-95 southbound and will use MD 4 and the new interchange of MD 4 and Suitland Parkway
- ➔ The North Gate's BRAC traffic going towards I-495 / I-95 northbound will use the interchange of MD 4 and Suitland Parkway
- ➔ BRAC traffic traveling along MD 4 from the south and east will use the Pearl Harbor and Virginia Avenue Gates
- ➔ The same network distribution percentages are used for both inbound and outbound traffic.

The 2011 With BRAC conditions are a combination of the 2011 No BRAC conditions (that is, with only background growth and additional traffic from other developments) and the trips generated by BRAC development at AAFB.

In 2009, AAFB prepared a Traffic Management Plan as part of its coordination with the National Capitol Planning Commission for its General Plan update. The AAFB planners conducted new traffic counts at 11 intersections within the study area, and updated the gate usage and trip distributions. In addition, SHA performed a new traffic count at the intersection of MD 223 (Woodyard Road) and Alexandria Ferry Road on September 10, 2009. The updated count information, in conjunction with the updated information provided in the Traffic

Management Plan, was used to verify the traffic analyses results obtained using the 2007 study data. The results of these revised analyses were consistent with the original findings based on the 2007 study, and did not ultimately change the recommendations of this study.

Traffic Operational Analysis

Once the study team developed peak hour traffic volumes for all of the intersections and interchanges and assessed the impacts of the future volumes on the existing roadway network, the study team determined the improvements that would be required to accommodate the new trips.

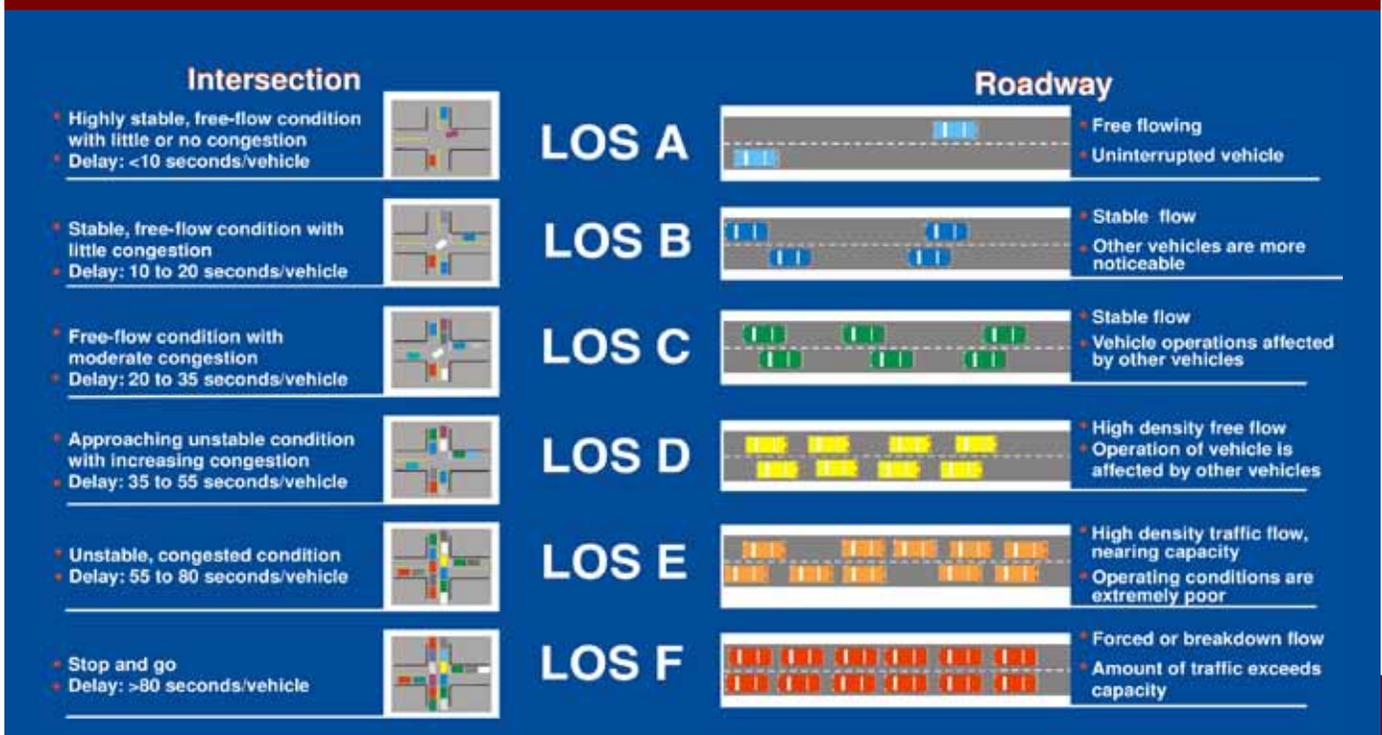
To understand the operations at the key intersections in the study area, a capacity analysis was conducted to determine the volume to capacity (v/c) ratio and LOS at these intersections for both the existing and future (2011) conditions. The v/c ratio is a parameter that describes the relationship between the capacity of the roadway (the maximum amount of traffic that the intersection, roadway segment, ramp, or interchange can process in a given time frame) and the amount of traffic using that portion of the roadway during a particular time period. The LOS is a quantitative measure of traffic operations. On most arterials with signalized intersections, LOS is also a measure of the intersection delays. The characteristics of the LOS

letter grades are presented in **Figure 2**.

Traffic analyses are 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 should ideally be designed to adequately serve the peak hour traffic volume in the peak direction of flow. Since most traffic traveling one way during the morning peak is traveling 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 Analysis (CLA) is the standard SHA tool for the preliminary analysis of intersection improvements, and was used to determine the critical lane volume (CLV) and the v/c ratio of each intersection. If the CLV for an intersection during the peak hour is below its capacity, then the v/c ratio will be below 1.0. As the volume flowing through the intersection increases (as time passes and new developments are constructed, increasing the local number of trips occurring during the peak hours), the v/c ratio will climb towards 1.0, and the LOS will gradually degrade toward LOS F. For this study, if an intersection functioned at LOS F during a particular peak hour with existing lane configurations, then improvement concepts were developed to allow the intersection to function at LOS E or better during that peak hour.

Figure 2: Level of Service (LOS)



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Short-Term Intersection Concept Development

The results of the CLA show that the following eight intersections are operating at a failing LOS under existing conditions:

- ➔ Intersection 2: MD 337 (Allentown Road) @ MD 218 (Suitland Road)/Westover Drive
- ➔ Intersection 6: MD 4 (Pennsylvania Avenue) @ Suitland Parkway/Presidential Parkway
- ➔ Intersection 7: MD 4 (Pennsylvania Avenue) @ Dower House Road
- ➔ Intersection 13/14: MD 337 (Allentown Road) @ MD 5 (Branch Avenue) Ramps
- ➔ Intersection 15: MD 5 (Branch Avenue) @ Auth Road/I-495/I-95 SB On Ramps
- ➔ Intersection 19: MD 223 (Woodyard Road) @ Rosaryville Road
- ➔ Intersection 23: MD 223 (Melwood Road/Woodyard Road) @ Marlboro Pike/South Osborne Road
- ➔ Intersection 26: MD 4 (Pennsylvania Avenue) @ Westphalia Road/Old Marlboro Pike.

As noted above, an intersection improvement project is currently underway at Intersection 19: MD 223 (Woodyard Road) @ Rosaryville Road, and is expected to be completed by 2011.

In analyzing the 26 study area intersections for 2011 conditions, SHA focused on the short-term, immediate effects on traffic operations due to the BRAC initiative and background growth through 2011. The 11 intersections listed below are projected to operate at LOS F for either the AM or PM peak hour in 2011, under No BRAC conditions:

- ➔ Intersection 1: MD 337 (Allentown Road) @

I-495/I-95 NB Off-Ramp

- ➔ Intersection 2: MD 337 (Allentown Road) @ MD 218 (Suitland Road)/Westover Drive
- ➔ Intersection 5: Forestville Road @ I-495/I-95 SB Off-Ramp
- ➔ Intersection 6: MD 4 (Pennsylvania Avenue) @ Suitland Parkway/Presidential Parkway
- ➔ Intersection 7: MD 4 (Pennsylvania Avenue) @ Dower House Road
- ➔ Intersection 10: Old Alexandria Ferry Road @ Virginia Avenue
- ➔ Intersection 13/14: MD 337 (Allentown Road) @ MD 5 (Branch Avenue) Ramps
- ➔ Intersection 15: MD 5 (Branch Avenue) @ Auth Road/I-495/I-95 SB On Ramps
- ➔ Intersection 20: MD 223 (Woodyard Road) @ Dower House Road
- ➔ Intersection 23: MD 223 (Melwood Road/Woodyard Road) @ Marlboro Pike/South Osborne Road
- ➔ Intersection 26: MD 4 (Pennsylvania Avenue) @ Westphalia Road/Old Marlboro Pike.

It should be noted that no at-grade intersection level solutions were found that would allow MD 4 and Dower House Road to operate an acceptable LOS in 2011. SHA is currently proposing a grade separation at this intersection as well as extensive improvements to the MD 4 intersections with Suitland Parkway and Westphalia Road/Old Marlboro Pike as part of the MD 4 study. Therefore no concepts were developed for the three MD 4 intersections as part of this study.

The results of the CLA also show that the following four intersections, which will operate at LOS F in 2011 under No BRAC conditions as noted above, will require additional improvements to operate at LOS E or better under 2011 With BRAC conditions. In other words, these four intersections fail in both the 2011 No BRAC and 2011 With BRAC scenarios, with the BRAC volumes causing additional improvements to be needed over and above those required to accommodate background growth:

- ➔ Intersection 1: MD 337 (Allentown Road) @ I-495/I-95 NB Off-Ramp
- ➔ Intersection 2: MD 337 (Allentown Road) @ MD 218 (Suitland Road)/Westover Drive
- ➔ Intersection 10: Old Alexandria Ferry Road @ Virginia Avenue
- ➔ Intersection 23: MD 223 (Melwood Road/Woodyard Road) @ Marlboro Pike/South Osborne Road.

Figure 3 on page 12 shows the locations of the intersections projected to fail in 2011 due to area developments and background growth. The four intersections requiring additional improvements by 2011 to accommodate BRAC growth are indicated with a red ring. **Table 2** on page 13 summarizes the LOS and v/c for each study area intersection under Existing, 2011 No BRAC (Existing Lane Configurations), 2011 With BRAC (Existing Lane Configurations) and 2011 With BRAC (Improved to LOS E or Better) conditions.

Improvement Concept Development Methodology

Once it was determined which intersections were recommended for improvement, field reviews were conducted to gather additional data. Study team members 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.

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 11-12 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 construction 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. Costs for right-of-way, excavation and spillway structures associated with stormwater management needs were calculated according to the method described on page F-7 of SHA's 2008 Highway Construction Cost Estimating Manual. Sidewalks were included in the improvement concepts for intersections with existing sidewalks, and were assumed to be five inches thick and five feet wide. For reconstruction and/or widening, it was assumed that existing traffic signals would be entirely replaced. Quantities were estimated using design concept drawings, information from field reviews and aerial photography. SHA's 2008 Highway Construction Cost Estimating Manual was also used to obtain unit costs.

SHA also developed right-of-way costs for each intersection. These costs were estimated by determining the approximate limit of disturbance and right-of-way needs based on the preliminary intersection improvement concept designs. The approximate acreage of impact to each affected property parcel was used to determine the right-of-way costs. A contingency of 80% and an overhead cost of 13% were applied to determine the total right-of-way cost for each intersection. The range of total project costs shown for each intersection is comprised of the estimated design, right-of-way, construction costs, and contingency factors appropriate for this level of conceptual planning.

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.

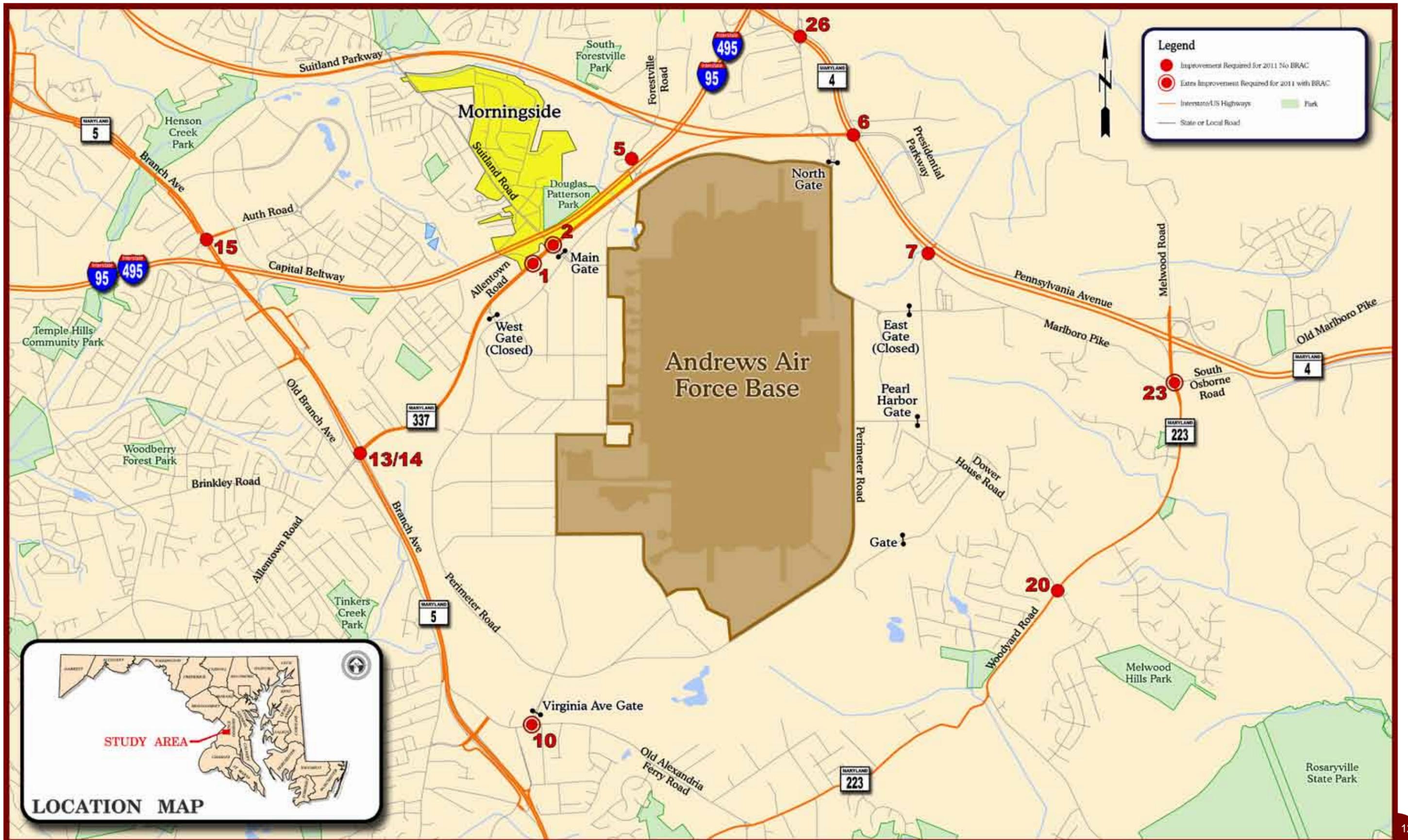


Table 2: Existing (2007), 2011 No BRAC, and 2011 With BRAC Traffic Data Summary

Intersection		Existing Volumes				2011 No BRAC				2011 With BRAC				2011 With BRAC (Improved to LOS E or Better)			
		Existing Lane Configurations				Existing Lane Configurations				Existing Lane Configurations				(Improved to LOS E or Better)			
		AM		PM		AM		PM		AM		PM		AM		PM	
		LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c
1	MD 337 (Allentown Road) @ I-495 / I-95 NB Off-Ramp	D	0.89	A	0.53	F	1.05	A	0.60	F	1.21	B	0.66	D	0.83	A	0.58
2	MD 337 (Allentown Road) @ MD 218 (Suitland Road) / Westover Drive	D	0.87	F	1.31	F	1.01	F	1.46	F	1.26	F	1.63	D	0.91	F	1.00
3	MD 218 (Suitland Road) @ I-495 / I-95 SB On-Ramp	A	0.27	A	0.55	A	0.28	A	0.58	A	0.36	C	0.73	-	-	-	-
4	MD 337 (Allentown Road) @ I-495 / I-95 NB On-Ramp / Forestville Road	B	0.63	A	0.55	B	0.66	A	0.58	B	0.68	C	0.74	-	-	-	-
5	Forestville Road @ I-495 / I-95 SB Off-Ramp	D	0.87	E	0.91	E	0.99	F	1.15	F	1.17	F	1.19	B	0.68	D	0.83
6	MD 4 (Pennsylvania Avenue) @ Suitland Parkway / Presidential Parkway	F	1.17	F	1.12	N/A				N/A				N/A			
6A	MD 4 (Pennsylvania Avenue) @ Suitland Parkway / Presidential Parkway West	N/A				C	0.76	F	1.97	C	0.76	F	1.99	C	0.73	E	0.95
	MD 4 (Pennsylvania Avenue) @ Suitland Parkway / Presidential Parkway East	N/A				B	0.70	C	0.76	B	0.70	C	0.79	-	-	-	-
7	MD 4 (Pennsylvania Avenue) @ Dower House Road	F	1.45	F	1.09	F	1.61	F	1.23	F	1.61	F	1.23	F	1.29	E	0.98
8	Dower House Road @ Pearl Harbor Drive	A	0.19	A	0.44	A	0.23	A	0.50	A	0.36	A	0.62	-	-	-	-
9	Old Alexandria Ferry Road @ Coventry Way	A	0.51	A	0.55	A	0.55	A	0.60	A	0.56	B	0.70	-	-	-	-
10	Old Alexandria Ferry Road @ Virginia Avenue	E	0.91	E	0.97	E	0.94	F	1.02	F	1.09	F	1.15	D	0.85	D	0.85
11	MD 337 (Allentown Road) @ Robert M Bond Drive / Command Drive	A	0.56	A	0.47	B	0.70	A	0.57	B	0.70	A	0.60	-	-	-	-
12	MD 337 (Allentown Road) @ Auth Road	C	0.74	C	0.76	D	0.84	D	0.90	D	0.85	E	0.94	-	-	-	-
13/14	MD 337 (Allentown Road) @ MD 5 (Branch Avenue) Ramps	D	0.88	F	1.08	E	0.96	F	1.17	E	0.96	F	1.21	D	0.86	E	0.94
15	MD 5 (Branch Avenue) @ Auth Road / I-495 / I-95 SB On-Ramps	C	0.74	F	1.30	N/A				N/A				N/A			
	MD 5 (Branch Avenue) @ Auth Road / I-495 / I-95 SB On-Ramps with programmed improvement	N/A				E	0.91	F	1.12	E	0.91	F	1.12	E	0.91	E	0.92
16/17	Coventry Way @ MD 5 (Branch Avenue) Ramps	A	0.45	A	0.62	A	0.50	B	0.69	A	0.53	C	0.73	-	-	-	-
18	MD 223 (Woodyard Road) @ Old Alexandria Ferry Road / Dangerfield Road	B	0.63	C	0.77	B	0.69	D	0.86	C	0.72	D	0.89	-	-	-	-
19	MD 223 (Woodyard Road) @ Rosaryville Road	C	0.81	F	1.33	A	0.61	B	0.71	B	0.64	B	0.72	-	-	-	-
20	MD 223 (Woodyard Road) @ Dower House Road	B	0.67	D	0.89	C	0.77	F	1.01	D	0.85	F	1.03	C	0.81	E	0.99
21	Dower House Road @ Old Marlboro Pike / Fetchet Avenue	A	0.28	A	0.36	A	0.33	A	0.42	A	0.39	A	0.44	-	-	-	-
22	Old Marlboro Pike @ Marlboro Pike	A	0.33	A	0.43	A	0.34	A	0.45	A	0.40	A	0.50	-	-	-	-
23	MD 223 (Melwood Road/Woodyard Road) @ Marlboro Pike / South Osborne Road	D	0.86	F	1.11	E	0.92	F	1.19	E	0.93	F	1.32	E	0.93	D	0.83
24	MD 223 (Melwood Road/Woodyard Road) @ MD 4 (Pennsylvania Avenue) EB Ramps	B	0.66	C	0.81	C	0.72	D	0.85	C	0.72	D	0.85	-	-	-	-
25	MD 223 (Melwood Road) @ MD 4 (Pennsylvania Avenue) WB On-Ramp / Old Marlboro Pike	A	0.26	A	0.26	A	0.28	A	0.29	A	0.28	A	0.29	-	-	-	-
26	MD 4 (Pennsylvania Avenue) @ Westphalia Road / Old Marlboro Pike	F	1.57	F	1.51	F	2.01	F	2.09	F	2.01	F	2.10	F	1.18	F	1.36

Description of Short-Term Intersection Concepts

As noted previously, many of the intersections in the study area are part of other projects, or in the case of Intersection 10: Old Alexandria Ferry Road at Virginia Avenue, the intersection of two County roads. Therefore, five of the 11 intersections projected to operate at LOS F in 2011 were not included in the development of concepts, as discussed below:

Improvements for Intersection 6: MD 4 (Pennsylvania Avenue) @ Suitland Parkway/Presidential Parkway are currently in the detailed design phase (these improvements are unrelated to the BRAC effort). Thus, this intersection was removed from consideration in the AAFB Traffic and Intersection Improvement Study.

MD 4, from I-495/I-95 to MD 223, is currently in the planning phase by SHA for upgrading to a multi-lane freeway. The limits of that study encompass Intersection 7: MD 4 (Pennsylvania Avenue) @ Dower House Road and Intersection 26: MD 4 (Pennsylvania Avenue) @ Westphalia Road/Old Marlboro Pike. Because of the inclusion of these two intersections in the larger MD 4 planning study, and because preliminary analyses of these two intersections revealed that there were no low cost, low impact at-grade solutions which were feasible, these two intersections were also removed from consideration in the AAFB Traffic and Intersection Improvement Study.

Traffic analysis showed that Intersection 10: Old Alexandria Ferry Road @ Virginia Avenue is expected to operate at LOS F in both the AM and PM peak hours in 2011. Because this is an intersection of two County roads, SHA shared this information with Prince George's County but did not develop improvements for this location.

Intersection 15: MD 5 (Branch Avenue) @ Auth Road/I-495/I-95 SB On-Ramps is included as part of the Metro Green Line Access Project. Phase I of the project, described in the 2011 No BRAC traffic section of this report, has already been completed. Phase II is currently in design, and will involve construction of a new Metro access road to connect the Branch Avenue Metro Station to MD 5 and improvements to Auth Place, Auth Road, and Auth Way. Intersection 15 currently operates at LOS F during the PM peak hour, and is projected to fail during the PM peak in 2011. However, it was determined that short-term solutions to achieve LOS E or better were not compatible with the long-term Metro Green Line Access Project. Therefore,

no further recommendations were developed as part of the AAFB Traffic and Intersection Improvement Study.

Intersection improvement concepts were developed for the remaining six locations. These improvement concepts are described below, and are depicted on aerial mapping, which can be found in **Appendix A, Table 3** on page 17 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 1: MD 337 (Allentown Road) @ I-495/I-95 NB Off-Ramp

This intersection currently operates at LOS D during the AM peak with a v/c of 0.89, and LOS A during the PM peak with a v/c of 0.53. In 2011, this location is projected to fail due to a combination of BRAC traffic and background growth. Without improvements, this intersection is forecasted to



operate in 2011 at LOS F during the AM peak, with a v/c of 1.21, and at LOS B during the PM peak, with a v/c of 0.66. Making the recommended improvements will allow the intersection to function at LOS D during the AM peak hour, with a v/c of 0.83, and LOS A during the PM peak hour, with a v/c of 0.58. The proposed improvement is to change the right turn lane on the I-495 NB Off-Ramp to a shared right/left turn lane, and to add a third through lane to EB MD 337.

These proposed improvements would impact two properties, totaling 0.39 acres but would have no total displacements. Approximately 0.16 acres of forest would also be impacted. The total cost is estimated at approximately \$9.5 - \$14.5 million.

Intersection 2: MD 337 (Allentown Road) @ MD 218 (Suitland Road)/Westover Drive

This intersection currently operates at LOS D during the AM peak hour, with a v/c of 0.87 and LOS F



Intersection 2

during the PM peak with a v/c of 1.31. In 2011, this location is projected to fail due to a combination of BRAC traffic and background growth. Without improvements, this intersection is forecasted to operate in 2011 at LOS F during both peak hours, with an AM peak v/c ratio of 1.26 and a PM peak v/c ratio of 1.63. Making the recommended improvements will allow the intersection to function at LOS D during the AM peak hour, with a v/c ratio of 0.91, and LOS F during the PM peak hour, with a v/c ratio of 1.00. The recommended improvements include:

- ➔ Converting the shared through/left and through/right lanes to through lanes and adding a separate free right turn lane on MD 218 in the southbound direction
- ➔ Adding a second left turn lane and separating the shared through/right lane into one through and one free right turn lane on MD 218 in the northbound direction
- ➔ Adding a second left turn lane and separating the shared through/right lane into one through and one right turn lane on MD 337 in the westbound direction.

These proposed improvements would impact five properties, totaling 1.10 acres, but would have no total displacements. No environmental features would be impacted. The total cost is estimated at approximately \$25.5 – \$33.0 million.

Originally, a concept was developed that would allow this intersection to function at LOS D during the AM peak hour with a v/c of 0.91 and LOS E during the PM peak hour with a v/c of 0.99. The improvements under this concept included:

- ➔ Separating the shared through/left lane into one left and one through lane, and separating the shared through/right lane into one through and one right turn lane on MD 218 in the southbound direction
- ➔ Adding a second left turn lane and separating the shared through/right lane into one through and one right turn lane on MD 218 in the

northbound direction

- ➔ Adding a second left turn lane on MD 337 in the westbound direction.

However, because this concept involves adding two additional lanes on MD 218 in the southbound direction, it would require lengthening the two I-495/I-95 bridges over MD 218 to accommodate the roadway widening. As the goal of this study was to develop short term intersection improvements and lengthening the bridges would be a very costly undertaking for a very small improvement in v/c (a difference of only 0.01), it was determined that this improvement concept was not feasible and was not recommended.

Intersection 5: Forestville Road @ I-495/I-95 SB Off-Ramp

This intersection currently operates at LOS D during the AM peak hour with a v/c of 0.87, and LOS E during the PM peak hour with a v/c of 0.91. In 2011, this location is projected to fail due to background growth, but will not require any additional improvements to accommodate BRAC traffic. Without improvements, in 2011 this intersection is



Intersection 5

forecasted to operate at LOS F during both peak hours with an AM peak v/c ratio of 1.17 and a PM peak v/c ratio of 1.19. Making the recommended improvements will allow the intersection to function at LOS B during the AM peak hour, with a v/c ratio of 0.68, and LOS D during the PM peak hour, with a v/c ratio of 0.83. The recommended improvement is to separate the shared left/right lane into one left turn and one free right turn lane on the I-495/I-95 Off-Ramp.

This proposed improvement would impact one property, totaling 0.13 acres, would have no total displacements, and would impact 0.58 acres of forest. The total cost is estimated at approximately \$22.0 - \$29.0 million.

Intersection 13/14: MD 337 (Allentown Road) @ MD 5 (Branch Avenue) Ramps



Intersection 13 / 14

This intersection currently operates at LOS D during the AM peak hour, with a v/c of 0.88, and LOS F during the PM peak hour, with a v/c of 1.08. In 2011, this location is projected to fail due to background growth, but will not require any additional improvements to accommodate BRAC traffic. Without improvements, in 2011 this intersection is forecasted to operate at LOS E during the AM peak hour with a v/c ratio of 0.96 and LOS F during the PM peak hour with a v/c ratio of 1.21. The recommended improvement is to separate the shared through/left lane into one left turn and one through lane on MD 337 in the eastbound direction. This improvement will allow the intersection to function at LOS D during the AM peak hour with a v/c of 0.86 and LOS E during the PM peak hour with a v/c of 0.94.

This proposed improvement would impact six properties with no displacements, totaling 0.25 acres. No environmental features are expected to be impacted. The total cost is estimated at approximately \$8.5 - \$13.5 million.

Intersection 20: MD 223 (Woodyard Road) @ Dower House Road

This intersection currently operates at LOS B during the AM peak hour, with a v/c of 0.67, and LOS D during the PM peak hour, with a v/c of 0.89. In 2011, this location is projected to fail due to background growth, but will not require any additional improvements to accommodate BRAC traffic. Without improvements, in 2011 this intersection is forecasted to operate at LOS D during the AM peak hour with a v/c ratio of 0.85 and LOS F during the PM peak hour with a v/c



Intersection 20

ratio of 1.03. The recommended improvement is to separate the shared left/through/right lane on northbound Dower House Road into one shared left/through lane and one right turn lane. Making this improvement will 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 0.99.

This improvement would impact two properties with no displacements, totaling 0.06 acres. Approximately 0.05 acres of forest would also be impacted. The total cost is estimated at approximately \$1.0 - \$3.0 million.

Intersection 23: MD 223 (Melwood Road/Woodyard Road) @ Marlboro Pike/South Osborne Road

This intersection currently operates at LOS D during the AM peak hour, with a v/c of 0.86, and LOS F during the PM peak with a v/c of 1.11. In 2011, this location is projected to fail due to a combination of BRAC traffic and background growth. Without improvements, this intersection is forecasted to operate in 2011 at LOS E during the AM peak hour with a v/c ratio of 0.93 and LOS F during the PM peak hour with a v/c ratio of 1.32. Making the recommended improvements will



Intersection 23

allow the intersection to function at LOS E during the AM peak hour with a v/c of 0.93, and LOS D during the PM peak hour, with a v/c of 0.83. The recommended improvements include:

- ➔ Adding a second left turn lane to MD 223 in the southbound direction
- ➔ Converting the shared through/left lane on eastbound Marlboro Pike to one separate through lane and one left turn lane.

These proposed improvements would impact nine properties with no displacements, totaling 1.69 acres. Approximately 0.59 acres of forest would also be impacted. The total cost is estimated at approximately \$24.0 - \$29.5 million.

Table 3: Summary of Short-Term Intersection Improvement Concepts

Intersection		Traffic Data (2011)				Right-of-Way			Environmental Features *	Cost (in millions)			
Number	Name	With BRAC (Existing Lane Configurations) AM LOS (v/c)	With BRAC (Existing Lane Configurations) PM LOS (v/c)	With BRAC (Improved) AM LOS (v/c)	With BRAC (Improved) PM LOS (v/c)	Displacements	Properties Impacted	Total Right-of-Way (acres)	Forests (acres)	PE	Construction	Right-of-Way	Total Project Cost
1	MD 337 (Allentown Road) @ I-495 / I-95 NB Off-Ramp	F (1.21)	B (0.66)	D (0.83)	A (0.58)	0	2	0.39	0.16	\$1.5 - \$3.0	\$5.5 - \$7.5	\$2.5 - \$4.0	\$9.5 - \$14.5
2	MD 337 (Allentown Road) @ MD 218 (Suitland Road) / Westover Drive	F (1.26)	F (1.63)	D (0.91)	F (1.00)	0	5	1.10	0	\$3.0 - \$4.5	\$13.0 - \$16.0	\$9.5 - \$12.5	\$25.5 - \$33.0
5	Forestville Road @ I-495 / I-95 SB Off-Ramp	F (1.17)	F (1.19)	B (0.68)	D (0.83)	0	1	0.13	0.58	\$4.0 - \$5.5	\$17.0 - \$21.0	\$1.0 - \$2.5	\$22.0 - \$29.0
13/14	MD 337 (Allentown Road) @ MD 5 (Branch Avenue) Ramps	E (0.96)	F (1.21)	D (0.86)	E (0.94)	0	6	0.25	0	\$0.5 - \$1.5	\$3.0 - \$5.0	\$5.0 - \$7.0	\$8.5 - \$13.5
20	MD 223 (Woodyard Road) @ Dower House Road	D (0.85)	F (1.03)	C (0.81)	E (0.99)	0	2	0.06	0.05	\$0.0 - \$0.5	\$0.5 - \$1.0	\$0.5 - \$1.5	\$1.0 - \$3.0
23	MD 223 (Melwood Road / Woodyard Road) @ Marlboro Pike / South Osborne Road	E (0.93)	F (1.32)	E (0.93)	D (0.83)	0	9	1.69	0.59	\$3.5 - \$5.0	\$14.5 - \$17.0	\$6.0 - \$7.5	\$24.0 - \$29.5
Total:						0	25	3.62	1.38	\$12.5 - \$20.0	\$53.5 - \$67.5	\$24.5 - \$35.0	\$90.5 - \$122.5

* There are no wetland, stream, floodplain or park impacts associated with any of these improvement concepts

BRAC

Andrews Air Force Base

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 AAFB. The following 11 intersections are expected to operate at LOS F in 2011 due to increased traffic volumes resulting from area development, background growth and BRAC traffic:

- ➔ Intersection 1: MD 337 at I-495 / I-95 NB Off Ramp
- ➔ Intersection 2: MD 337 at Suitland Road (MD 218) / Westover Drive
- ➔ Intersection 5: Forestville Road at I-495 / I-95 SB Off Ramp / Sunoco Drive
- ➔ Intersection 6: MD 4 at Suitland Parkway / Presidential Parkway
- ➔ Intersection 7: MD 4 at Dower House Road
- ➔ Intersection 10: Old Alexandria Ferry Road at Virginia Avenue
- ➔ Intersection 13/14: MD 337 at MD 5 Ramps
- ➔ Intersection 15: MD 5 at I-495 / I-95 SB On Ramps / Auth Road
- ➔ Intersection 20: MD 223 at Dower House Road
- ➔ Intersection 23: MD 223 at Marlboro Pike / South Osborne Road

- ➔ Intersection 26: MD 4 at Westphalia Road / Old Marlboro Pike

Improvements for four of these intersections (Intersections 6, 7, 15 and 26) are being developed under separate studies, and SHA developed intersection improvement concepts for the remaining six locations (Intersections 1, 2, 5, 13/14, 20 and 23).

Based on the cost estimates developed for all six intersection improvement concepts, the total cost of the short term improvements near AAFB would be approximately \$90 - \$123 million, including the design, construction, and ROW acquisition phases. Should funding become available, SHA recommends that Intersection 1: MD 337 at I-495 / I-95 NB Off Ramp, Intersection 2: MD 337 at Suitland Road (MD 218) / Westover Drive, and Intersection 23: MD 223 at Marlboro Pike / South Osborne Road be the first set of improvements programmed in the CTP at the appropriate time. These three intersections are most affected by the anticipated BRAC traffic and are closest in proximity to the AAFB gates. If additional funding and resources allow, SHA recommends the remaining three intersection concepts be forwarded for further development as secondary priorities, as they are projected to fail in 2011 due to the traffic impacts resulting from area development and background growth.



BRAC

Base Realignment and Closure