I. PURPOSE AND NEED

This chapter summarizes the project purpose and the specific transportation issues that need to be addressed. The Purpose and Need Statement has been coordinated with the public and regulatory agencies; to ensure that there is a clear understanding of the project early in the process. In April 2008, the regulatory agencies concurred on the project's purpose and need in the *Combined Purpose and Need & Alternates Retained for Detailed Study Package*, January 2008, which is available on the CD of supporting documentation included with this EA/Section 4(f) Evaluation document. The document is also available on the project's website at www.nicebridge.maryland.gov.

A. EXISTING CONDITIONS

US 301 is classified as a Rural Principal Arterial in the Charles County and King George County Comprehensive Plans. Rural Principal Arterial roadways, which include components of the Interstate Highway System, are designed to provide a rural network of continuous routes for interstate and intercounty service at the highest levels of mobility and speed. At the approaches to the Governor Harry W. Nice Memorial Bridge (Nice Bridge), this section of US 301 consists of a four-lane divided roadway with two travel lanes in each direction and outside shoulders (***Appendix A***). The 1.7-mile long Nice Bridge has one travel lane in each direction with no median separation and a narrow offset on each side (approximately one foot). The posted speed on the bridge varies from 40 to 50 miles per hour (mph). There is a four-lane toll plaza north of the Nice Bridge that provides one-way toll collection for southbound vehicles. The percentage of trucks crossing the bridge in 2006 approximated 14 percent of the vehicle mix with nearly 1,200 wide-load vehicle crossings. Due to the limited roadway width on the bridge, the bridge must be closed to two-way traffic flow during each wide-load crossing.

The Nice Bridge is an important transportation element, and is part of the National Highway System (NHS) and Strategic Highway Network (STRAHNET). Current NHS and STRAHNET design standards recommend that the cross section of approach roadways be carried across the bridge; currently these standards are not met at the Nice Bridge.

Provisions for bicyclists and pedestrians are limited on the approach roadways and are not present on the existing Nice Bridge. The Nice Bridge maintenance staff receives approximately one request per month to transport bicycles across the existing bridge. Advance notice from the bicyclist provides the Authority staff time to prepare, though not all bicyclists make arrangements prior to their trip.

On an average weekday, traffic on the Nice Bridge (northbound and southbound) operates at Level of Service (LOS) "D" for most of the day and LOS "E" during the PM peak period. Six LOS are defined and are designated from A to F, with LOS "A" representing the best operating conditions and LOS "F" the worst, or failing. Bridge traffic operates at LOS "E" for at least seven hours during an average summer weekend day. Currently, there are no significant queuing delays associated with weekday traffic flows; however, based on observations, normal weekend queues extend up to one-quarter mile, and on major holiday weekends, queues can extend to at least four miles in both directions.

The most frequent type of reported crash between January 2003 and December 2005 on the Nice Bridge was opposite direction crashes, which can be attributed to the lack of a median between vehicles traveling in opposing directions.

The Nice Bridge meets current American Association of State Highway and Transportation Officials (AASHTO) geometric design standards for horizontal alignment, vertical grades, transition areas, and sight distance, and has acceptable structural ratings. ***Table I-1*** lists the current roadway and bridge geometrics.

Table I-1: *Existing Roadway Geometry along US 301 Within the Nice Bridge Study Area*

SEGMENTS	**North Approach Roadway (Maryland)**		**Bridge**		**South Approach Roadway (Virginia)**	
LIMITS	**Orland Park Road to North Abutment**		**North Abutment to South Abutment**		**South Abutment to Barnesfield Road**	
DIRECTION	**Southbound**	**Northbound**	**Southbound**	**Northbound**	**Southbound**	**Northbound**
Roadway Classification	Rural Principal Arterial					
Posted Speed	55 mph		40 – 50 mph		50 mph	
Median Width	Variable	Variable	No Median		Variable	Variable
Number of Lanes	2	2	1	1	2	2
Transition Length	Approaching Toll Plaza: 350'; Toll Plaza to Bridge: 330'	Bridge to 2-lane section: >700'	None[1]		1050'	
Number of Toll Lanes	4	N/A[2]	N/A	N/A	N/A	N/A
Lane Width	12' n. of plaza; 11' s. of plaza	12' n. of plaza; 11' s. of plaza	11'	11'	11 – 12'	11 – 12'
Shoulder Width/Offset	10' outside; 1' inside	10' outside; 1' inside	1' outside; No inside shoulder/offset	1' outside; No inside shoulder/offset	10' outside	10' outside
Wide Load Vehicle Waiting Area and Vehicle Inspection Area	None	N/A	N/A	N/A	N/A	Opposite Roseland Road
Maximum Vertical Grade	+2.6%	-2.6%	±3.75%	±3.75%	-1.0%	+1.0%

[1] None = there is no Wide Load Vehicle Waiting Area adjacent to the travel lane approaching the bridge.
[2] N/A: a waiting area is not applicable adjacent to the travel lane since the vehicles have already crossed the bridge.

B. PURPOSE OF THE PROJECT

The purpose of the Nice Bridge Improvement Project is to:

- Provide a crossing of the Potomac River that is geometrically compatible with the US 301 approach roadways;
- Provide sufficient capacity to carry vehicular traffic on US 301 across the Potomac River in the design year 2030;
- Improve traffic safety on US 301 at the approaches to the Potomac River crossing and on the bridge itself; and
- Provide the ability to maintain two-way traffic flow along US 301 during wide-load crossings, incidents, poor weather conditions, and when performing bridge maintenance and rehabilitation work.

C. PROJECT NEED

A new bridge crossing would address the following needs:

- Geometric inconsistencies;
- Capacity limitations of the existing two-lane bridge;
- Inefficient Traffic operations and resulting safety issues on US 301 and on the Nice Bridge;
- Other considerations including incident and evacuation management, maintenance requirements, and transportation significance.

1. Geometric Inconsistencies

Although the Nice Bridge meets current AASHTO geometric design standards, transportation improvements are needed to address geometric inconsistencies. Traffic operations are affected by bridge roadway features that are inconsistent with the US 301 approach roadways. These inconsistencies include the 3.75 percent grade on single lanes in each direction with no median separation, the lack of roadside shoulders or medians, and the reduction of lanes from four lanes on US 301 to two lanes on the Nice Bridge. As a result of these geometrical inconsistencies, the bridge is rated functionally obsolete.

2. Capacity Limitations

There is a need to eliminate the current bottleneck along US 301 created by the existing two-lane bridge. The four-lane toll plaza slows vehicle speeds but a single southbound lane over the Nice Bridge results in a Level of Service D and worse conditions during PM peak periods. Trucks account for 14 percent of the traffic on the Nice Bridge during an average weekday, and if the truck has an oversized load, the bridge must be closed to traffic.

a. Capacity Analysis

The bridge roadway capacity in one direction is approximately 1,325 vehicles per hour (vph). The capacity of the southbound toll plaza is 1,900 vph. While the toll plaza reduces the travel speed of vehicles, the four lanes can process more vehicles per hour than the capacity of the southbound bridge roadway. Therefore, it is the bridge and not the toll plaza that is the constraining factor to traffic flow.

The Highway Capacity Manual (Transportation Research Board, 2000) defines Level of Service (LOS) as "a qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience." Analysis of the 2006 traffic counts found that on an average weekday, traffic on the Nice Bridge operates at LOS "D" for most of the day, and LOS "E" during the PM peak period. Nice Bridge traffic operates at LOS "E" for at least seven hours during an average summer weekend day.

On an average summer weekend day, the Nice Bridge operates at LOS "E" from 11 AM to 6 PM; with 3 PM as the peak hour and 1,526 total vehicles traveling on the bridge. For the average weekday, the Nice Bridge operates at LOS "E" from 4 PM to 6 PM. The peak hour on a weekday is 4 PM with 1,585 total vehicles traveling on the bridge.

On a projected 2030 No-Build average summer weekend day, the Nice Bridge is expected to operate at LOS "F" from 11 AM to 6 PM, and for the projected 2030 No-Build average weekday the bridge would operate at LOS "F" from 4 PM to 6 PM.

b. Vehicle Classification

Heavy vehicles (defined as single-unit trucks and larger) accounted for approximately seven percent of total traffic during the average summer weekend observation period. On an average weekday, trucks, or heavy vehicles, accounted for approximately 14 percent of the traffic on the Nice Bridge; this 14 percent exceeds the Maryland Statewide Average of four percent for other rural arterials. Due to the existing two lanes on the Nice Bridge, trucks carrying a wide-load require the bridge to be closed in both directions to other traffic.

3. Traffic Operations and Safety

The two-lane existing Nice Bridge acts as a bottleneck to the adjacent four-lane US 301 approach roadways resulting in poor traffic operations and increased safety concerns.

a. Travel Demand Volumes

Current and projected future capacity constraints at the Nice Bridge impact traffic operations and safety. Nearly 5.2 million vehicles used the Nice Bridge in 2006. As shown in ***Table I-2***, in 2006 the daily trips across the bridge averaged nearly 21,000 vehicles per day (vpd) on summer weekend days and 17,100 vpd on non-summer weekdays. Thus, there was approximately 20 percent more traffic on the Nice Bridge on an average summer weekend day than on a representative average weekday. Also, the total traffic volumes on the existing two-lane bridge approach the capacity of the bridge roadway (2,650 vph) during the existing peak hours. Currently, normal (non-holiday) weekend vehicle queues extend up to one-quarter mile at the bridge. Vehicle queues of at least four miles have been observed in both directions at the Nice Bridge during major holiday weekends.

Average daily traffic volume projections were made for no-build conditions in the year 2030 using a Regional Integrated Travel Demand Model. ***Table I-2*** also shows that in 2030, travel demand across the bridge is expected to be more than double the vehicle volume experienced in 2006.

b. Peak Hour Traffic

Table I-3 shows the two-way peak hour volumes at the Nice Bridge in 2006 and projected for 2030. The peak recorded hour is 3:00 PM to 4:00 PM during a typical summer weekend day and from 4:00 PM to 5:00 PM on an average weekday. The peak hour volume projections for 2030 indicate a 99 percent growth from existing peak hours on summer weekend days, and a 105 percent growth from existing peak hours on average weekdays.

Table I-2: *Average Daily Traffic Volumes*

2006 Total Daily Traffic Volumes			
Date	**Northbound**	**Southbound**	**Total**
Average Summer Weekend Day at the Nice Bridge			
Saturday (June through August 2006)	10,024	10,776	20,800
Sunday (June through August 2006)	11,674	8,426	20,100
Saturday (2030)	20,528	22,072	42,600
Sunday (2030)	23,870	17,230	41,100
Average Weekday at the Nice Bridge			
Weekday (October 2004)	8,670	8,430	17,100
Weekday (2030)	17,745	17,255	35,000

Table I-3: *Two-Way Peak Hour Volumes*

Date	Direction	Peak Hour	Peak Hour Volume
Average Weekend Day and an Average Weekday at the Nice Bridge (2006)			
Average Weekend Day	2-way	3:00 PM to 4:00 PM	1,526
Average Weekday	2-way	4:00 PM to 5:00 PM	1,585
Average Weekend Day and an Average Weekday at the Nice Bridge (No-Build 2030)			
Average Weekend Day	2-way	3:00 PM to 4:00 PM	3,122
Average Weekday	2-way	4:00 PM to 5:00 PM	3,244

c. Travel Demand Trends

Trips across the Nice Bridge consist of local trips with origins and destinations relatively close to the shores, and regional trips with origins and destinations in Maryland, Virginia, and beyond. An origin-destination (O-D) study was completed in 2001 and a follow-up survey conducted in 2004. The 2001 O-D study indicated that most of the typical summer weekend southbound Nice Bridge traffic is traveling from the Washington D.C. metro area to areas south of the O-D study area (e.g., south of Fredericksburg, King George, Dahlgren). On an average weekday, most of the travel is between Charles County, Maryland and King George County, Virginia. The 2004 follow-up survey confirmed the results of the 2001 O-D survey.

On a typical summer weekend day, 31 percent of the southbound traffic using the Nice Bridge comes from the Washington, D.C. metro area, 25 percent from Charles County, and 21 percent from the Baltimore region. Fifty-three percent of the traffic is traveling to areas south of the study area. On an average summer weekend day, 24 percent of the trips are recreation or tourism related and 35 percent have purposes other than those included in the survey.

On an average weekday, 31 percent of southbound traffic is from Charles County, 30 percent from the Washington, D.C. area, and 15 percent from the Baltimore region. Thirty-nine percent of this traffic is traveling to King George County, 24 percent to Fredericksburg, and 34 percent to south of the study area (e.g., south of Fredericksburg, King George, Dahlgren) to I-95 or US

Route 1. On an average weekday, most of the trips (nearly 80 percent) are between home and work.

d. Crash History

Crash data, in the study area along US 301 from MD 234 to VA 206, was analyzed from January 2003 to December 2005. During the study period, a total of 136 crashes occurred in the study area, which equates to 74.8 crashes per 100 million vehicle miles of travel (VMT). This rate is below the Maryland Statewide Average rate for rural arterials, which is 113 crashes per 100 million VMT. The probable cause for over 61 percent of the crashes was "failure to give full time/attention," which may be a result of drivers being distracted by the geometric conditions, volume of traffic, other vehicle occupants, in-vehicle electronic devices, scenery and/or unfamiliar roadways.

On the Nice Bridge, the most frequent type of crash (five out of 14, or 36 percent) was opposite direction, primarily resulting from the lack of a barrier between vehicles traveling in opposite directions. Three of the crashes (21 percent) were due to the driver's failure to give full time/attention. Four crashes (28 percent) reported on the bridge occurred in wet, icy, or other than dry conditions. Approximately 43 percent of the crashes on the Nice Bridge occurred between 2 AM and 7 AM, while 36 percent occurred between 5 PM and 6 PM.

On the approach roadways, the type of crash most often experienced was rear-end collisions (34 percent of all crashes). Approximately 13 percent of the crashes involved trucks, resulting in a truck crash rate of 9.3 crashes per 100 million VMT, which is higher than the Maryland Statewide Average rate of 8.8 crashes per 100 million VMT for similar facilities. Approximately 32 percent of the crashes occurred in the months of June, July, and August when traffic volumes are highest and 39 percent were reported on a Friday, Saturday, or Sunday.

Northern Approach Roadway Crashes

Of the crash types identified, the most frequent type of crashes occurring on the northern approach roadway was rear-end collision (***Table I-4***). This type of crash frequently occurs in congested areas. Four crashes (8 percent) were reported in the immediate vicinity of the toll plaza. Eighteen of the crashes (37 percent) were due to the driver's failure to give full time/attention. Fourteen of the crashes in this segment (22 percent) occurred on wet or snowy roadway surfaces. The split between crashes occurring on Monday through Thursday and crashes occurring on Friday, Saturday, or Sunday was also almost even (47 percent versus 53 percent, respectively).

Table I-4: *Crash Types Occurring on the Northern Approach Roadway to the Nice Bridge**

Crash Type	Number of Crashes	Percent of Total Crashes
Opposite Direction	1	2
Rear End	14	29
Sideswipe	2	4
Left Turn	2	4
Angle	9	18
Fixed Object	6	12
Other	15	31
Total	**49**	**100**

* *From January 2003 to December 2005*

Southern Approach Roadway Crashes

There were 73 reported crashes on the southern approach roadway with rear-end crashes (38 percent) being the most common crash experience reported, potentially resulting from the reduction of travel lanes from two to one (***Table I-5***). Sixty-two of the crashes (85 percent) were due to the driver's failure to give full time/attention. Eight of the crashes in this segment (11 percent) occurred during wet or snowy roadway conditions, fifteen crashes (21 percent) occurred during nighttime hours. Twenty-seven of the crashes (37 percent) were reported on a weekend and the same percent were reported during the summer months.

Table I-5: *Crash Types Occurring on the Southern Approach Roadway to the Nice Bridge**

Crash Type	Number of Crashes	Percent of Total Crashes
Rear End	28	38
Sideswipe	10	14
Angle	24	33
Fixed Object	6	8
Other	5	7
Total	**73**	**100**

* *From January 2003 to December 2005*

Severity of Crashes

Of the 136 crashes occurring in the study period, one resulted in a fatality (1 percent, or 0.5 per 100 million VMT), 54 were injury crashes (40 percent, or 30.1 per 100 million VMT) and 81 were property damage crashes (59 percent, or 44.5 per 100 million VMT). These values result in crash rates that are below the Maryland Statewide rate for fatal crashes (1.8 per 100 million VMT), injury crashes (54.7 per 100 million VMT), and property damage crashes (56.5 per 100 million VMT) for rural arterials.

4. Other Considerations

Other considerations the Authority must factor in determining a solution for the Nice Bridge project are bridge maintenance and the significance of the bridge and roadway on the national, regional and local roadway network. Based on the current condition of the bridge deck and the projected increase in traffic volumes, it is anticipated that the deck will require rehabilitation

between 2015 and 2020. This would affect evacuation, commerce, STRAHNET, and the traveling public due to overnight closures.

Table I-6: *Overall Nice Bridge Study Area (MD 234 to VA 206) Crashes by Severity**

Crash Severity	Number of Crashes	Percent of Total Crashes	Study Rate**	Statewide Rate*
Fatal Crashes	1	1	0.5	1.8
Injury Crashes	54	40	30.1	54.7
Property Damage Crashes	81	59	44.5	56.5
Total Crashes	**136**	**100**	**75.1**	**113.0**

* *From January 2003 to December 2005*
** *Crash rates are calculated as the number of crashes per 100 million vehicle miles of travel.*

a. Emergency Evacuation Capacity

US 301 is an important emergency evacuation route for Southern Maryland the Washington D.C. area to points south. The capacity limitations of the bridge and resulting traffic operations hinder the efficiency of US 301 as an emergency evacuation route. This designation as an evacuation route requires that US 301 must be capable of serving local citizens during emergency evacuations and remain usable during reasonably foreseeable Homeland Security events. If the Nice Bridge should be rendered non-operational, people will have fewer evacuation options and experience longer evacuation times.

b. Bridge Maintenance

The original bridge deck was rehabilitated in 1985, approximately 45 years after it was opened to traffic in 1940. Based on the need for bridge deck rehabilitation approximately every 40 years, it is anticipated that the deck will require rehabilitation between 2015 and 2020 due to the increased loadings from the growing number of annual vehicle crossings. In addition, the bridge is scheduled to undergo a complete cleaning and painting of the bridge steel, and any repairs that may be needed to the superstructure may be made at this time. The bridge was originally designed for an HS 20 (36 ton) loading; however, current design standards for new bridges is a HS 25 (45 ton) loading, which is a 25 percent heavier loading than HS 20. This revision in design standards presents the likelihood that some current bridge elements may be structurally deficient.

Depending on the type and method of construction, rehabilitation of the Nice Bridge could require long-term single lane closures or complete nighttime bridge closures. Due to the lack of nearby alternate routes and the single lane capacity of the bridge in each direction, substantial travel time delays within the areas where traffic would be diverted from could occur during rehabilitation. In addition, routine maintenance, such as repainting pavement markings, sign repair, and snow/ice clearing operations, affects the capacity of the bridge as these activities influence the availability of travel lanes.

c. Transportation Significance

The Nice Bridge facility is part of the NHS and STRAHNET, indicating its importance as a transportation element for both the public and military facilities. Facilities that are part of the NHS and STRAHNET should be designed to the highest standards, including providing consistent bridge and approach roadway features. As previously mentioned, the existing features

of the Nice Bridge are not consistent with the approach roadways and the bridge has been designated as functionally obsolete due to the limited vehicular capacity.

The September 16, 2008 transportation priority letter from Charles County designated the expansion of the Nice Bridge as the seventh highest transportation priority by the Charles County Delegation and Commissioners ***(Appendix B)***. The letter states that the Nice Bridge is a major limiting factor in the path of evacuation from Southern Maryland and the Washington, D.C. metro area to points south. With its capacity currently limited to two lanes, this bridge would create a major bottleneck in the event of a natural disaster or a Homeland Security incident. In addition, the *2006 Charles County Comprehensive Plan* recommends increasing the capacity of the bridge to improve traffic flow, alleviate congestion, and provide an evacuation route of greater capacity; therefore, the Nice Bridge Improvement Project is consistent with the *2006 Charles County Comprehensive Plan*.

US 301 also provides the main access into and out of Naval Support Facility (NSF) Dahlgren. The Navy performs research, development, test, and evaluation operation critical to the defense of sailors, ships, facilities, and infrastructure at NSF Dahlgren. US 301 and the Nice Bridge provide important infrastructure that supports local and regional mobility for the Navy's operations and employees at NSF Dahlgren.

D. CONCLUSION

In general, the Nice Bridge meets current AASHTO geometric design standards for horizontal alignment, vertical grades, transition areas, and sight distance and has acceptable structural ratings. As part of the NHS and STRAHNET, the Nice Bridge should provide consistent travelway features with the US 301 approach roadways. Transportation improvements are needed to address capacity limitations and traffic operation effects of the inconsistent bridge roadway features as compared to the US 301 approach roadways, including the 3.75 percent grade on single lanes in each direction, the lack of roadside shoulders or buffer areas, and the reduction of lanes from the four 11- to 12-foot lanes on US 301 to the two 11-foot lanes on the Nice Bridge. As a result of these geometrical inconsistencies, the bridge is rated functionally obsolete. The most frequent type of crash reported on the bridge was opposite direction, which can be attributed to only one lane in each direction, no separation of opposing flows of traffic and minimal offsets on the structure.

In addition, planned future maintenance and rehabilitation of the Nice Bridge deck could require long-term lane closures or complete nighttime bridge closures which would result in substantial travel time delays. Improvements to the Nice Bridge are needed to maintain a safe crossing (i.e., replace bridge deck, improve load rating of structural members) and to provide sufficient capacity to carry passenger vehicle and truck traffic on US 301 across the Potomac River in the design year 2030; improve traffic safety on US 301 at the approaches to the Potomac River crossing and on the bridge itself; and provide the ability to maintain the transportation significance of the bridge by improving two-way traffic flow during wide-load crossings, incidents, poor weather conditions, and when performing bridge maintenance rehabilitation work.