II. PURPOSE AND NEED

A. Existing Conditions

US 301 is classified as a Rural Principal Arterial and both approaches to the Nice Bridge are four-lane divided roadways, consisting of two 11 to 12-foot travel lanes in each direction with 10-foot outside shoulders. The 1.7-mile long Nice Bridge has one 11-foot lane in each direction with no median separation and a one-foot offset on each side. The posted speed on the bridge varies from 40 – 50 miles per hour (mph). There is also a four-lane toll plaza north of the Nice Bridge that provides one-way toll collection for southbound vehicles ***(See Figures 2 and 3)***. The percentage of trucks crossing the bridge in 2005 was approximately 14 percent of the vehicle mix with nearly 1,200 wide-load vehicle (in excess of ten feet) crossings. In 2006, there were 1,708 recorded vehicles that used the unofficial pull-off areas for staging and inspection (including permit checks and wide loads). 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 facility is part of the National Highway System (NHS) and Strategic Highway Network (STRAHNET), indicating its importance as a transportation element. Current NHS and STRAHNET design standards recommend that the cross section of approach roadways be carried across the bridge; these standards are not currently met at the Nice Bridge.

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. Bridge traffic operates at LOS "E" for at least 7 hours during an average summer weekend day ***(See Tables 9 and 10)***. Currently, there are no significant queuing delays associated with weekday traffic flows; however, based on citizen observation, normal weekend queues extend up to 0.25 miles, 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 bridge (36 percent) was opposite direction crashes primarily resulting from the lack of a barrier between vehicles traveling in opposing directions.

B. Project Purpose

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

There is a need to eliminate the current bottleneck along US 301 created by the existing two-lane bridge, and to provide a bridge crossing that matches the current four-lane US 301 roadway approach features. Current and projected future capacity constraints at the Nice Bridge that impact traffic operations and safety need to be addressed. ***Table 1*** lists the current roadway and bridge geometrics. In

addition, the NHS and STRAHNET designations indicate its importance as a transportation element, and due to its location, it is a critical evacuation route for Southern Maryland (e.g., Calvert Cliffs power plant) and the Washington D.C. area to points south.

1. Current Roadway and Bridge Design Features

As part of the NHS and STRAHNET, the Nice Bridge should provide travelway features consistent with the approach roadways. The Nice Bridge meets current AASHTO geometric design standards for horizontal alignment, vertical grades, transition areas, and sight distance and has acceptable structural ratings. However, 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. Inconsistencies include 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 following is a summary of current roadway and bridge design features along US 301 within the study area.

- Median Separation:
  The approach roadways to the Nice Bridge include a varying width median that provides a physical separation for vehicles traveling in opposing directions. The Nice Bridge does not have physical lane separation between vehicles traveling in opposing directions. This lack of a median barrier between opposing vehicles on the bridge increases the opportunity for and potential severity of opposite direction crashes. In addition, as shown in ***Figure 2***, there is currently full movement access from Roseland Road (approximately 500-feet from bridge, north of US 301) in Virginia to northbound and southbound US 301. This full movement access needs to be maintained for residents along Roseland Road.

- Number of Travel Lanes:
  The approach roadways of US 301 to the Nice Bridge consist of four lanes with two travel lanes in each direction. The Nice Bridge has one travel lane in each direction. This reduction in travel lanes directly impacts traffic operations as vehicles in the two lanes on the approach roadways must merge to one lane to cross the bridge, and the capacity of the bridge is less than the approach roadways.

- Width of Travel Lanes:
  The approach roadways of US 301 to the Nice Bridge consist of two 11 to 12-foot wide travel lanes in each direction. The Nice Bridge travel lanes are 11-feet wide with minimal offsets (one-foot from roadway to parapet). The narrower travel lanes on the bridge reduce its capacity, as 12-foot travel lanes are typically desired and would lessen the frequency of bridge closures for wide-load crossings. In addition, AASHTO guidelines recommend for roadways with over 2,000 vehicles per day (vpd) and design speed of 60 miles per hour (mph), the minimum width of traveled way should be 24-feet wide with eight-foot shoulders. The existing 11-foot travel lanes with one-foot offset to parapet are substandard when compared to the desired typical section for a long bridge (those over 200-feet) with two thru traffic lanes (one lane in each direction), which, according to AASHTO design standards, should be as wide as the approach roadway traffic lanes (i.e., 12 feet in this case).

- Available Shoulder:
  The approach roadways of US 301 to the Nice Bridge include a 10-foot wide outside shoulder in each direction; however, the travel lanes on the Nice Bridge have substandard one-foot outside buffers to the bridge parapet. AASHTO recommends 10-feet as the normal shoulder width that should be provided along high-type facilities, such as the Nice Bridge, which is a NHS and STRAHNET facility. Vehicular capacity is reduced on the bridge as a result of this lack of shoulder area. The existing

one-foot outside buffer provides an inadequate width for disabled vehicles to pull out of the travelway, for emergency vehicles to access incidents on the bridge, and for minor repair or maintenance activities to be performed without closing one direction of travel on the bridge. In addition to physical restraints, the one-foot outside buffer affects driver behavior, including the tendency to reduce speeds on the bridge. As well as outside shoulders, AASHTO standards recommend that long bridges (over 200 feet in length) have at least four feet between the parapet and the edge of the traveled way on both sides of the roadway.

- Vehicle Inspection Stations:
  There are no vehicle inspection stations for either northbound or southbound wide-loads or commercial permit vehicles. Currently southbound wide-loads and permit vehicles wait in the shoulder of US 301 north of the toll plaza for inspection and escort, as indicated in ***Figure 3***. Northbound vehicles wait in an inadequate area in the shoulder of US 301 across from Roseland Road as indicated on ***Figure 2***. Virginia currently has weigh stations for both northbound and southbound permit vehicles approximately 0.9 miles south of the Nice Bridge.

- Vertical Grade:
  The maximum vertical grade on the northern and southern approach roadways of US 301 to the Nice Bridge are 2.6 percent and 1.0 percent, respectively. Vertical grades on the bridge reach 3.75 percent for lengths of over 3,100 feet on the Virginia side of the main span and over 2,500 feet on the Maryland side, making it difficult for heavy trucks to maintain the posted speed limit (40 – 50 mph) and reducing the average travel speeds and capacity of the bridge. Trucks account for approximately seven percent of total traffic on an average summer weekend day and between 14 to 20 percent on an average weekday, which exceed the Maryland Statewide Average (4 percent) on other four-lane rural principal arterials. As a comparison to other long bridges, the William Preston Lane Memorial Bay Bridge (Bay Bridge) and Woodrow Wilson Bridge both have a maximum vertical grade of 3.0 percent on the bridges. The maximum grade desired by AASHTO on level freeways with a design speed over 60 mph is 3.0 percent. Grades in excess of 3.0 percent for lengths longer than 1,320 feet will affect the performance of heavy vehicles. Decreasing the existing grade on the bridge to 3.0 percent would result in the bridge grade tying into existing US 301 approximately 1,000 feet closer to the Virginia shore and 900 feet further into the Maryland shore in the vicinity of the existing toll plaza.

2. Traffic Operations and Safety ***(See Appendix B)***.

The two-lane existing bridge acts as a bottleneck to the adjacent four-lane approach roadways. A total of 6.4 million vehicles used the Nice Bridge in 2005, and 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 in 2006. Traffic operation analysis indicates that the total traffic volumes on the existing two-lane bridge approach the capacity of the bridge roadway (2,650 vehicles per hour or vph) during the existing peak hours. Currently, normal (non-holiday) weekend vehicle queues extend up to 0.25 miles at the bridge. Vehicle queues of several miles (at least four) have been observed by citizens in both directions at the bridge during major holiday weekends, depending on the peak direction of travel.

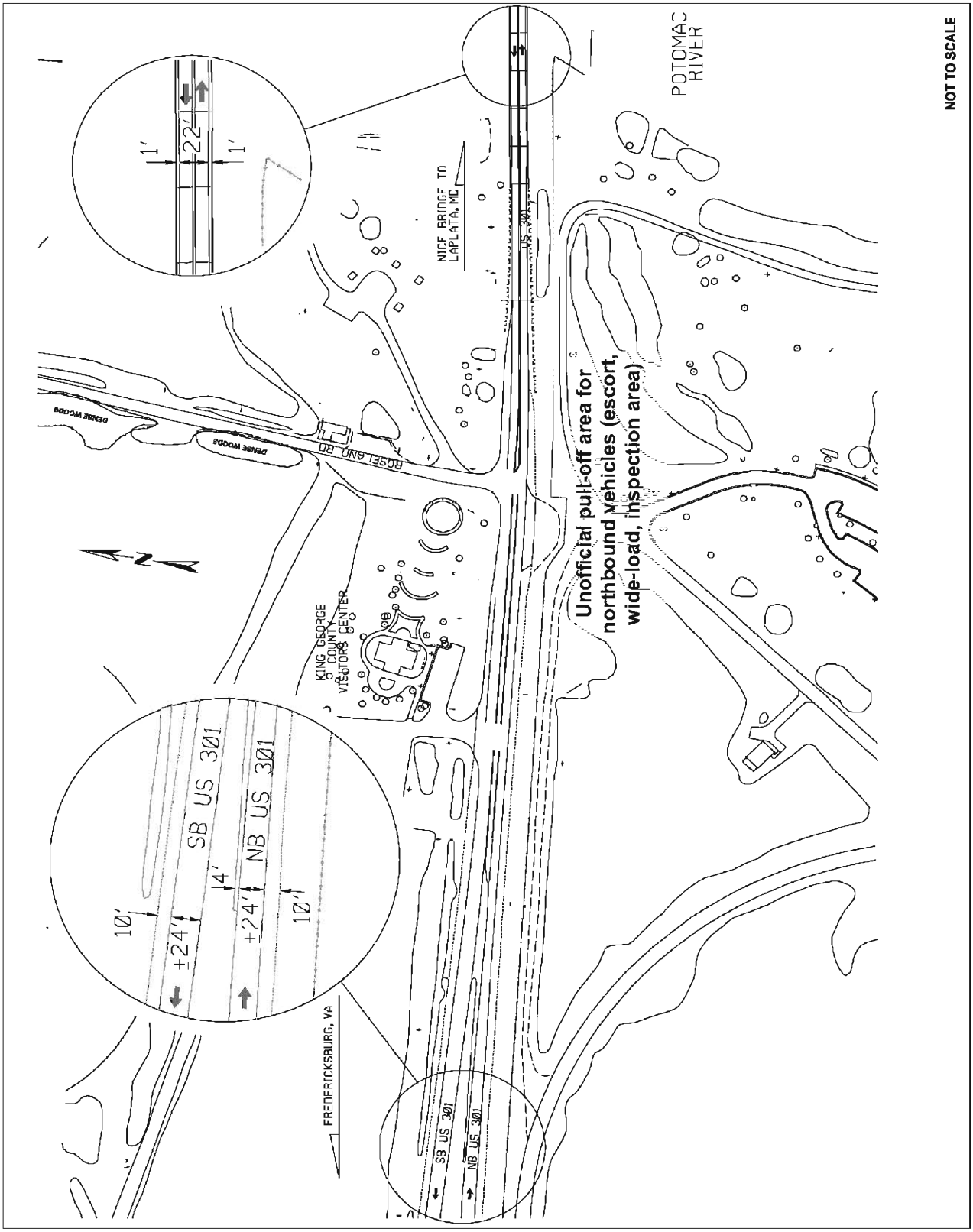


Figure 2. Southern Approach Roadway to the Nice Bridge (King George County, VA).

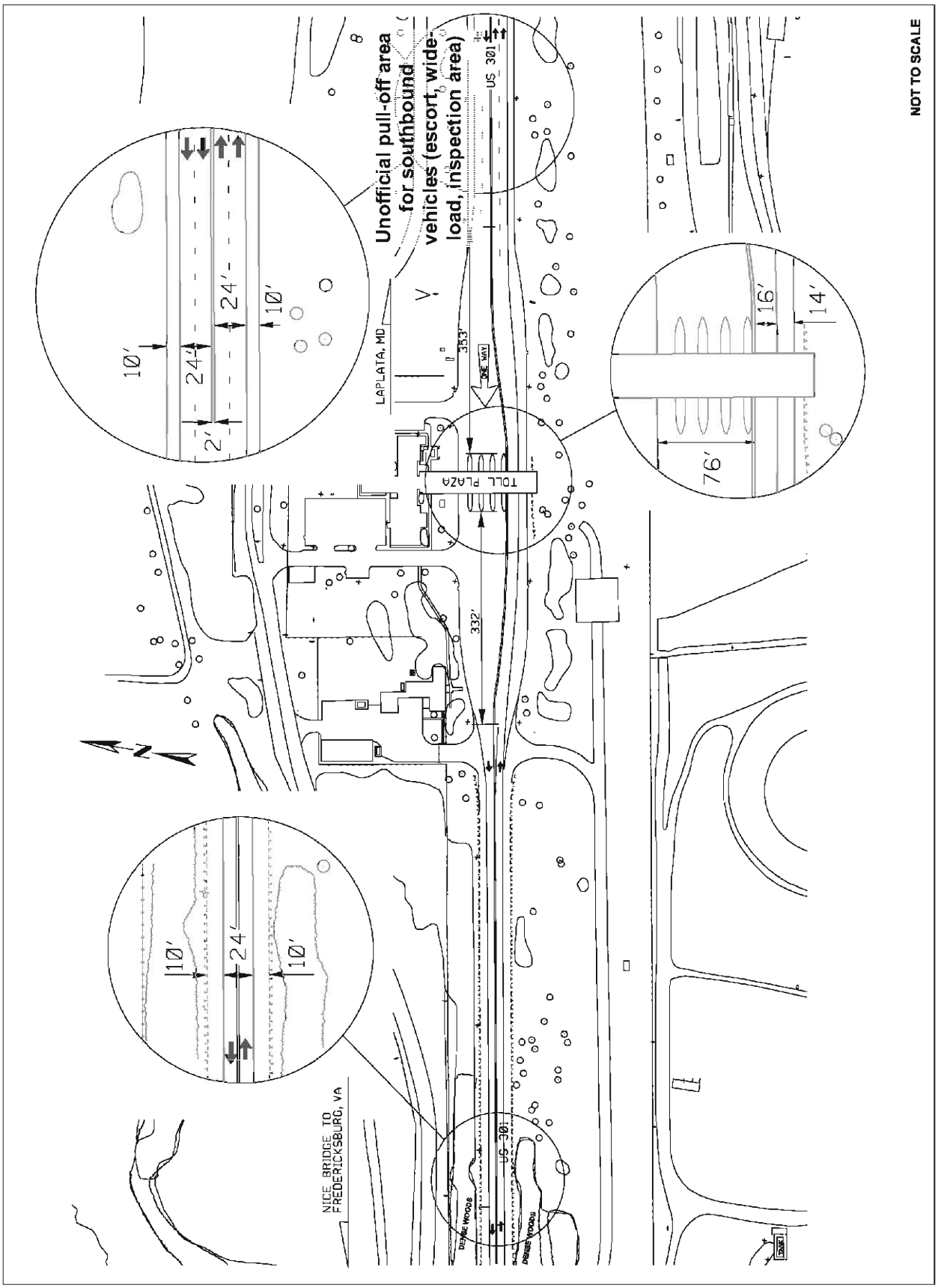


Figure 3. Northern Approach Roadway to the Nice Bridge (Charles County, MD).

Table 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		1050'	
Number of Toll Lanes	4	N/A	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	N/A	Opposite Roseland Road	N/A	N/A	None	N/A
Maximum Vertical Grade	+2.6%	-2.6%	±3.75%	±3.75%	-1.0%	+1.0%

a. Travel Demand Trends

Trips across the Nice Bridge consist of local trips (such as work related and discretionary trips) with origins and destinations relatively close to the shores, and regional trips (such as commerce and regional traffic) with origins and destinations in Maryland, Virginia and beyond. To understand the travel patterns in the study area, the Authority completed an origin-destination (O-D) study in 2001 and a follow-up survey in 2004. Separate O-D surveys were conducted in the southbound direction on a day during a summer weekend (Saturday in August) and an "average" weekday (Wednesday in October) to capture seasonal variations in traffic across the Bridge. The follow-up survey conducted in April 2004 included both northbound and southbound motorists. Of the 14,554 surveys distributed in 2001, 9,272 surveys were distributed on a summer weekend day in August and 5,282 surveys were distributed on an average weekday in October. Of the forms distributed, 15 and 21 percent of the forms were returned for the summer weekend day and average weekday, respectively. This represents valid return rates that

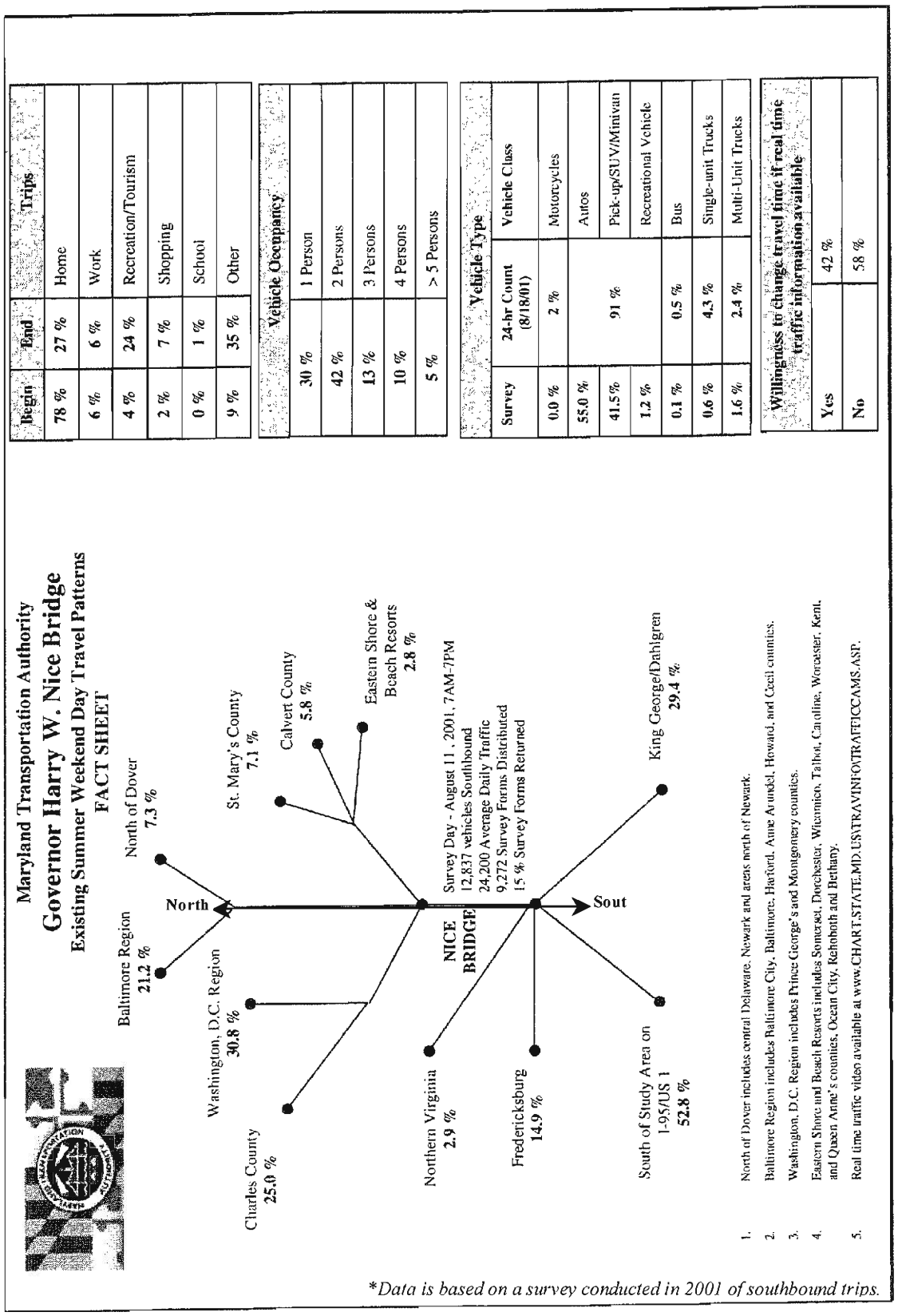
provided sufficient data, adequate sample size, and information on both summer weekend and average weekday travel. The O-D study indicated that most of the typical summer weekend southbound bridge traffic is traveling from the Washington, D.C. area with the most frequent destination being areas south of the O-D study area (e.g., 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 had a similar response rate as the 2001 survey and confirmed the results of the 2001 O-D survey.

As shown on ***Figure 4***, on a typical summer weekend day, 31 percent of the southbound traffic using the Nice Bridge comes from the Washington, D.C. 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 ***(See Figure 5).*** 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) on I-95 or U.S. Route 1. On an average weekday most of the trips (nearly 80 percent) are between home and work.

b. Travel Demand Volumes:

Traffic counts were conducted June through August of 2006 on weekends (representative of average summer weekend days), and Wednesday, October 6, 2004 (representative of an average weekday). ***Table 2*** summarizes the existing (2006) total daily traffic volume information collected for the summer weekend and ***Table 3*** summarizes the representative average weekday at the Nice Bridge. Traffic count results indicate that the bridge currently carries approximately 20 percent more traffic on an average summer weekend day than on a representative average weekday.



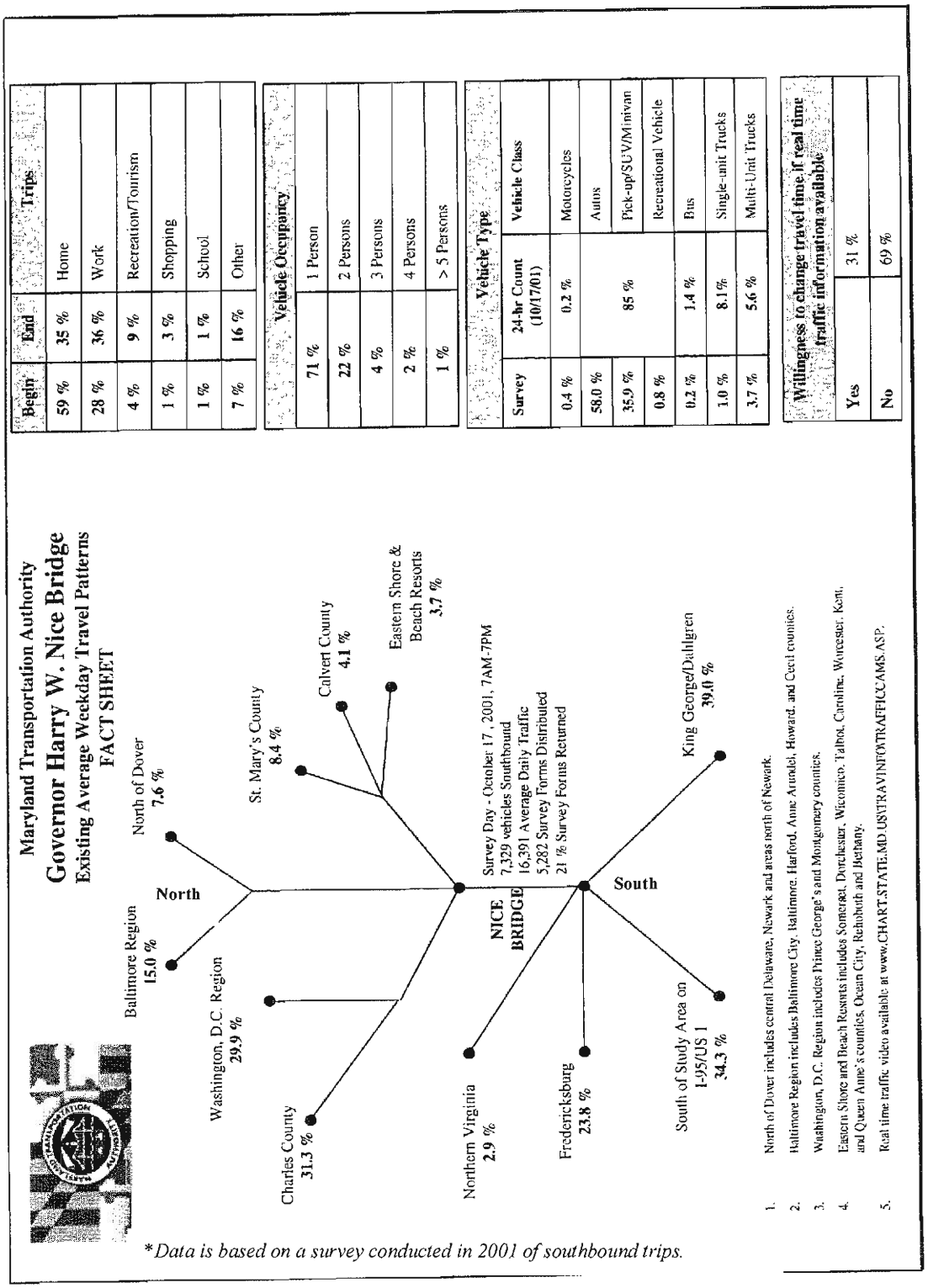
Begin	End	Trips
78 %	27 %	Home
6 %	6 %	Work
4 %	24 %	Recreation/Tourism
2 %	7 %	Shopping
0 %	1 %	School
9 %	35 %	Other

Vehicle Occupancy	
30 %	1 Person
42 %	2 Persons
13 %	3 Persons
10 %	4 Persons
5 %	> 5 Persons

Vehicle Type		
Survey	24-hr Count (8/18/01)	Vehicle Class
0.0 %	2 %	Motorcycles
55.0 %	91 %	Autos
41.5%		Pick-up/SUV/Minivan
1.2 %		Recreational Vehicle
0.1 %	0.5 %	Bus
0.6 %	4.3 %	Single-unit Trucks
1.6 %	2.4 %	Multi-Unit Trucks

Willingness to change travel time if real time traffic information available	
Yes	42 %
No	58 %

Figure 4. 2001 Survey Results showing Existing Regional Travel Patterns on an Average Summer Weekend Day.



Begin	End	Trips
59 %	35 %	Home
28 %	36 %	Work
4 %	9 %	Recreation/Tourism
1 %	3 %	Shopping
1 %	1 %	School
7 %	16 %	Other

Vehicle Occupancy	
71 %	1 Person
22 %	2 Persons
4 %	3 Persons
2 %	4 Persons
1 %	> 5 Persons

Vehicle Type		
Survey	24-hr Count (10/17/01)	Vehicle Class
0.4 %	0.2 %	Motorcycles
58.0 %	85 %	Autos
35.9 %		Pick-up/SUV/Minivan
0.8 %		Recreational Vehicle
0.2 %	1.4 %	Bus
1.0 %	8.1%	Single-unit Trucks
3.7 %	5.6 %	Multi-Unit Trucks

Willingness to change travel time if real time traffic information available	
Yes	31 %
No	69 %

Figure 5. 2001 Survey Results showing Existing Regional Travel Patterns on an Average Weekday.

Table 2. 2006 Total Daily Traffic Volume for an Average Summer Weekend Day on US 301 at the Nice Bridge.

DATE	NORTHBOUND	SOUTHBOUND	TOTAL
Saturday (June through August 2006)	10,024	10,776	20,800
Sunday (June through August 2006)	11,674	8,426	20,100

Table 3. 2006 Total Daily Traffic Volume for a Representative Average Weekday at the Nice Bridge.

DATE	NORTHBOUND	SOUTHBOUND	TOTAL
Wednesday (October 6, 2004)	8,670	8,430	17,100

Average Daily Traffic

Average daily traffic volume projections were made for no-build conditions in the year 2030 at the Nice Bridge using the regional Integrated Travel Demand Model developed for the Authority, which incorporates data from the Metropolitan Washington Council of Government Model (MWCOG), Baltimore Metropolitan Council's Regional Model (BMC), Delaware Department of Transportation's Statewide Model (DelDOT), and the Rappahannock Area Development Commission Model (RADCO) also known as the FAMPO model (Fredericksburg Area MPO). ***Tables 4 and 5*** summarize the projected total daily traffic volumes for 2030 summer weekends and average weekdays at the Nice Bridge. Results show that in 2030, the bridge is expected to carry more than double the vehicle volume experienced in 2006.

Table 4. 2030 No-Build Total Projected Daily Traffic Volume for an Average Summer Weekend Day at the Nice Bridge.

DATE	NORTHBOUND	SOUTHBOUND	TOTAL
Saturday (2030)	20,528	22,072	42,600
Sunday (2030)	23,870	17,230	41,100

Table 5. 2030 No-Build Total Projected Daily Traffic Volume for an Average Weekday at the Nice Bridge.

DATE	NORTHBOUND	SOUTHBOUND	TOTAL
Weekday (2030)	17,745	17,255	35,000

Vehicle Classification

The vehicle classifications recorded at the Nice Bridge on Saturday, August 18, 2001, and Wednesday, March 29, 2006, are illustrated as percentages in ***Table 6.*** Heavy vehicles, defined as Single-Unit trucks* and larger, accounted for approximately 7 percent of total traffic during the August weekend observation period and about 14 percent during the March weekday observation period. The trucks travel predominantly during off-peak periods; however, the truck percentage of 14 percent for an average weekday exceeds the Maryland Statewide average of 4 percent for other rural arterials.

Table 6. Vehicle Classifications (Percent) recorded at the Nice Bridge on Saturday, August 18, 2001 and Wednesday, March 29, 2006.

Date	Direction	MC	Cars	Buses	Heavy Vehicles					
					SU	WB40	WB50	WB60	>66'	Total
Saturday August 18, 2001	**NB**	0.7	92.8	0.3	3.0	0.6	2.3	0.2	0.1	6.2
	SB	1.8	91.0	0.5	4.3	0.8	1.5	0.1	0.0	6.7
Wednesday March 29, 2006	**NB**	0.7	84.6	0.1	3.8	2.0	7.7	0.9	0.2	14.6
	SB	0.9	82.6	1.5	6.0	4.1	3.7	0.6	0.5	14.3

MC – Motorcycles, SU – Single Unit Trucks, WB – Wheel Base (in feet)
NB – Northbound, SB – Southbound
*Single-Unit (Class E) truck: A motor vehicle consisting primarily of a single motorized device with more than two axles or more than four tires.

Peak Hour Traffic

Table 7 shows the two-way peak hour volumes at the Nice Bridge for the two observation periods. The peak hour is 3:00 PM – 4:00 PM during a typical summer weekend day and from 4:00 PM – 5:00 PM on an average weekday.

Table 7. 2006 Peak Hour Volume Summary for an Average Weekend Day and an Average Weekday at the Nice Bridge.

DATE	DIRECTION	PEAK HOUR	PEAK HOUR VOLUME
Average Weekend Day	2-way	3:00 – 4:00 PM	1,526
Average Weekday	2-way	4:00 – 5:00 PM	1,585

Table 8 shows the two-way peak hour volumes at the Nice Bridge projected for 2030 average weekend days and average weekdays. The peak hour projections for 2030 during a typical summer weekend day indicate a 99 percent growth from existing peak hours on summer weekend days, and a 105 percent growth from existing peaks hours on average weekdays.

Table 8. 2030 No-Build Projected Peak Hour Volumes for an Average Weekend Day and an Average Weekday at the Nice Bridge.

DATE	DIRECTION	PEAK HOUR	PEAK HOUR VOLUME
Average Weekend Day	2-way	3:00 PM – 4:00 PM	3,122
Average Weekday	2-way	4:00 – 5:00 PM	3,244

Traffic Operations:

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." Six LOS are defined for each type of facility and are designated from A to F, with LOS "A" representing the best operating conditions and LOS "F" the worst, or failing.

c. Levels of Service (LOS)

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. 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 citizen observation, normal weekend queues extend up to 0.25 miles, and on major holiday weekends, queues can extend to at least four miles in either direction of the bridge depending on the direction of the peak flow.

Capacity Analysis

The bridge roadway capacity in one direction is approximately 1,325 vph. The capacity of the southbound toll plaza is 1,900 vph (900 vph for the one exclusive E-ZPass lane and 333 vph for each of the three combined E-ZPAss/cash lanes). 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 concluding that it is the bridge itself and not the toll plaza that is the constraining factor to traffic flow.

The mathematical relationships presented are based on the procedures contained within the 2000 Edition of the *Highway Capacity Manual* (Transportation Research Board, 2000), in particular, "Chapter 20 – Two-Lane Highways." The actual calculations were performed using the input and output mechanisms enclosed in HCS-2000 Highway Capacity Software, Version 4.1b.

Table 9 shows the results of the analysis for the average summer weekend day when the Nice Bridge operates at LOS "E" from 11 AM to 6 PM. ***Table 10*** shows the results of the analysis for the average weekday when the bridge operates at LOS "E" from 4 PM to 6 PM.

Table 9. 2006 Hourly Level of Service (LOS) for an Average Summer Weekend Day at the Nice Bridge.

START TIME	2006 TOTAL NB	2006 TOTAL SB	TOTAL	LOS
7:00 AM	175	401	576	C
8:00	269	537	805	D
9:00	401	676	1,077	D
10:00	533	768	1,301	D
11:00	659	751	1,409	E
12:00 PM	766	717	1,483	E
1:00	831	685	1,516	E
2:00	849	663	1,511	E
3:00	879	647	1,526	E
4:00	919	598	1,517	E
5:00	881	554	1,435	E
6:00	793	477	1,269	D

Table 10. 2006 Hourly Level of Service (LOS) for an Average Weekday at the Nice Bridge.

START TIME	2006 TOTAL NB	2006 TOTAL SB	TOTAL	LOS
7:00 AM	549	565	1,114	D
8:00	494	517	1,011	D
9:00	404	455	859	D
10:00	406	447	853	D
11:00	416	403	819	D
12:00 PM	401	386	787	D
1:00	410	450	860	D
2:00	490	492	982	D
3:00	674	649	1,323	D
4:00	740	845	1,585	E
5:00	624	750	1,374	E
6:00	472	547	1,019	D

Table 11 shows the results of the analysis for the projected 2030 No-Build average summer weekend day when the Nice Bridge is expected to operate at LOS "F" from 11 AM to 6 PM. ***Table 12*** shows the results of the analysis for the projected 2030 No-Build average weekday when the Bridge operates at LOS "F" from 4 PM to 6 PM.

Table 11. 2030 Projected No-Build Hourly Level of Service (LOS) for an Average Summer Weekend Day at the Nice Bridge.

START TIME	2030 TOTAL NB	2030 TOTAL SB	TOTAL	LOS
7:00 AM	359	820	1,178	D
8:00	550	1,098	1,648	E
9:00	821	1,384	2,205	E
10:00	1,090	1,572	2,662	E
11:00	1,348	1,536	2,883	F
12:00 PM	1,567	1,468	3,034	F
1:00	1,700	1,402	3,102	F
2:00	1,736	1,356	3,092	F
3:00	1,798	1,324	3,122	F
4:00	1,880	1,225	3,104	F
5:00	1,802	1,134	2,936	F
6:00	1,621	975	2,596	E

Table 12. 2030 Projected No-Build Hourly Level of Service (LOS) for an Average Weekday at the Nice Bridge.

START TIME	2030 TOTAL NB	2030 TOTAL SB	TOTAL	LOS
7:00 AM	1,124	1,157	2,281	E
8:00	1,010	1,058	2,068	E
9:00	827	931	1,758	E
10:00	831	915	1,746	E
11:00	851	824	1,675	E
12:00 PM	820	790	1,610	E
1:00	839	921	1,760	E
2:00	1,003	1,007	2,010	E
3:00	1,380	1,328	2,708	E
4:00	1,515	1,729	3,244	F
5:00	1,277	1,535	2,812	F
6:00	966	1,120	2,086	E

d. Crash Experience:

Crash data in the Nice Bridge study area along US 301 from MD 234 to VA 206 (including the Nice Bridge) was analyzed for the period 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 listed on the police reports 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.

The type of crash most often experienced along US 301 between MD 234 and VA 206 (including the Nice Bridge) 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.

Crashes on the Bridge

The most frequent type of crash on the bridge (5 of 14, or 36 percent) was opposite direction crashes, primarily resulting from the lack of a barrier between vehicles traveling in opposite directions. Other crash types included rear end, fixed object, sideswipe, and other crashes. Three of the crashes, 21 percent, were due to the driver's failure to give full time/attention. Other causes for crashes included failure to keep right of center, going too fast for conditions, fell asleep or fainted, and followed too closely. Four crashes (28 percent) reported on the bridge occurred in wet, icy, or other than dry conditions. Finally, approximately 43 percent of the crashes on the bridge occurred between 2 AM and 7 AM while 36 percent occurred between 5 PM and 6 PM.

North Approach Roadway Crashes

Of the crash types identified, the most frequent type of the crash (14 of 49, or 29 percent) occurring on the north approach roadway was rear-end collision ***(See Table 13)***. The remaining crash types included angle, fixed object, and other crashes. 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. Other causes for crashes included being under the influence of alcohol or drugs, failure to yield right-of-way, improper lane change, following too closely, too fast for conditions, failure to keep right of center, fell asleep and failure to obey traffic signal. 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 13. Crash Types Occurring on the North Approach Roadway to the Nice Bridge (from January 2003 to December 2005).

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

South Approach Roadway Crashes

There were 73 reported crashes on the south approach roadway with rear-end crashes (38 percent) being the most common crash experience reported. Sixty-two of the crashes, 85 percent, were due to the driver's failure to give full time/attention ***(See Table 14)***. Other causes for crashes included being under the influence, too fast for conditions, defective equipment, wet roadway and unknown. 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 14. Crash Types Occurring on the South Approach Roadway to the Nice Bridge (from January 2003 to December 2005).

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

Severity of Crashes

The total crashes, by severity, are shown in ***Table 15.*** Of the 136 crashes occurring in the study period between January 2003 and December 2005, 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 (59 percent, or 44.5 per 100 million vmt) crashes. These values resulted 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.

Table 15. **Overall Nice Bridge Study Area (MD 234 to VA 206)Crashes by Severity (from January 2003 to December 2005).**

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	74.8	113.0

** Crash rates are calculated as the number of crashes per 100 million vehicle miles of travel.*

Truck Crashes

There were 17 truck-related crashes reported during the study period within the study area. This results in a truck crash rate of 9.3 crashes per 100 million VMT, slightly above the statewide average of 8.8 truck-related crashes per 100 million VMT.

Weather Conditions

There were 24 reported crashes that occurred on a wet surface within the study area. The percentage of wet surface crashes, 18 percent, is lower than the statewide average for other principle arterials, which is 28 percent. The percent of crashes occurring on the bridge during wet or icy surfaces was 28 percent, or four crashes.

3. Bridge Maintenance

The original bridge deck was rehabilitated in 1985, approximately 45 years after it was opened to traffic (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 would also undergo a complete cleaning and painting of the bridge steel, and any repairs that may be needed to the super or substructure would be made at this time. The bridge was designed for an HS 20 (36 Ton) loading;

however, current design standards for new bridges is HS 25 (45 Ton) loading, which is 25 percent heavier loading than HS 20. This revision in design standards presents the likelihood that some current bridge members 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 as was done during the last deck rehabilitation in 1985. Due to the lack of nearby alternate routes and the single lane capacity of the bridge in each direction, substantial travel time delays and decreased economic revenue within the areas where traffic will be diverted could occur during rehabilitation. In addition, routine maintenance such as painting of pavement markings, sign repair, and snow/ice clearing operations, affect the capacity of the bridge as these activities influence the availability of travel lanes.

4. 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 (i.e. Naval Support Facility Dahlgren and the Patuxent River Naval Air Station Complex, or Pax River). Facilities that are part of the NHS and STRAHNET should be designed to the highest standards and follow NHS and STRAHNET guidelines, including providing consistent bridge and approach roadway features. As mentioned, the 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 May 30, 2007 transportation priority letter from Charles County designates the expansion of the Nice Bridge as the seventh highest transportation priority by the Charles County Delegation and Commissioners (***See Appendix A***). The letter specifically states that the bridge is a major limiting factor in the path of evacuation from Southern Maryland and the Washington, D.C. 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 not inconsistent with the 2006 *Charles County Comprehensive Plan*.

Another element related to Homeland Security is adequate vehicle inspection stations along the northbound and southbound approach roadways to the bridge. Currently, vehicle inspections are conducted on the Maryland or Virginia approach roadways in unofficial pull-off areas. Southbound vehicles wait in the shoulder of US 301 north of the toll plaza for inspection and escort, and northbound vehicles wait in an area across from Roseland Road as indicated on ***Figure 2***. Vehicle Inspection Stations will be evaluated as part of this study.

The existing Nice Bridge Facility Campus is outdated (buildings range in age from 25 to 40 years old) and no longer meets the needs of the facility. Improvements to the campus facilities will be evaluated as part of this study to support increasing resource needs (maintenance, operations, police, etc.) at the facility.

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 bridge should provide consistent travelway features as the 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 likely result in substantial travel time delays. Improvements to the Nice Bridge are needed to maintain a structurally 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 two-way traffic flow during wide-load crossings, incidents, poor weather conditions, and when performing bridge maintenance and rehabilitation work.