

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

August 22, 2011



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I. Introduction/Problem Statement

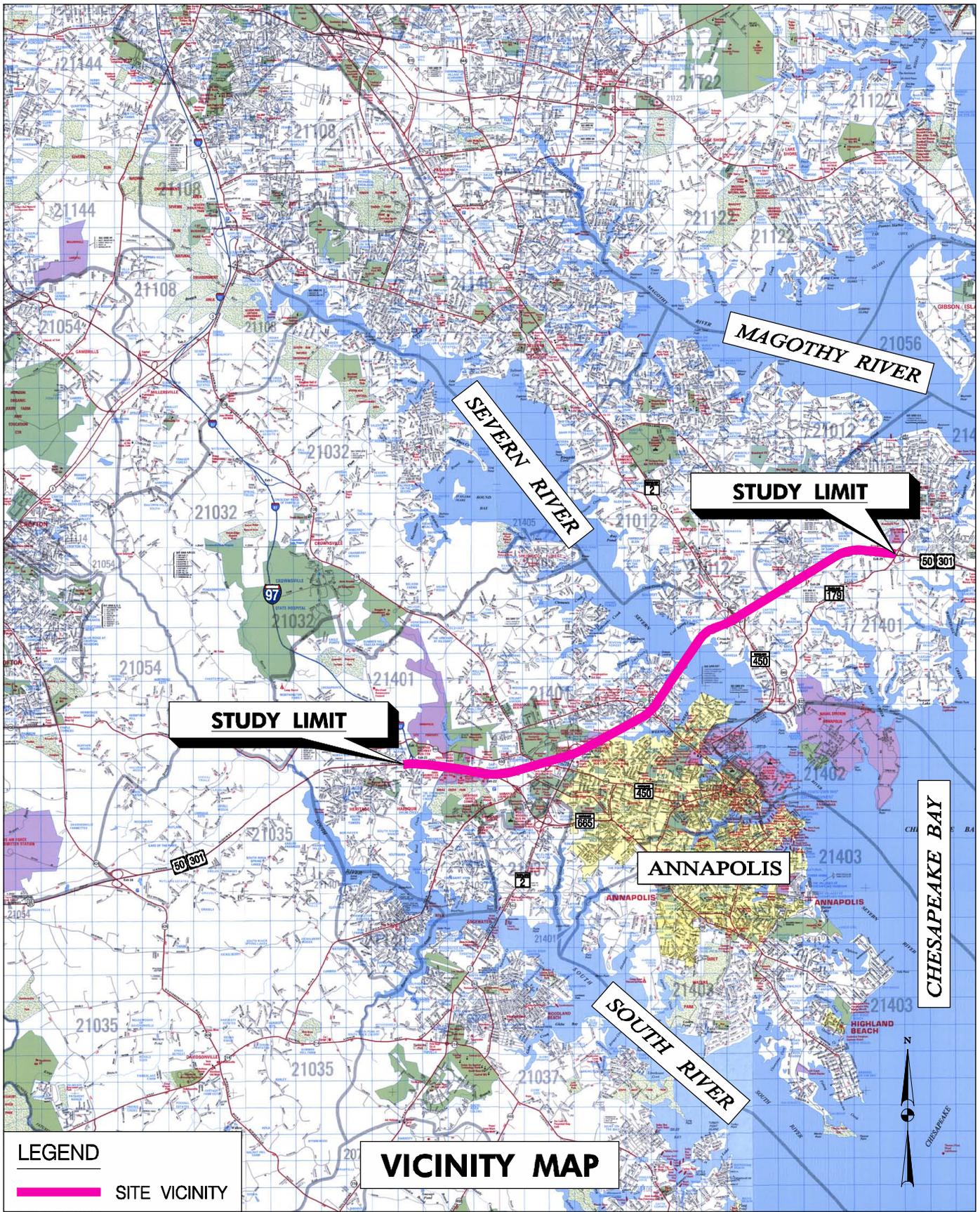
The purpose of this feasibility study is to investigate short term solutions associated with traffic congestion along US 50 (John Hanson Highway), in the vicinity of the Severn River Bridge, located in Annapolis, Maryland. The project limits extend along US 50 from I-97 to MD 179 (St. Margaret's Road), approximately 8 miles. Figures 1 and 2 show the Vicinity Map and the Project Area Map.

The heavy traffic congestion within this section of US 50 has long been an area of concern for the traveling public and the City of Annapolis. SHA has received numerous letters and complaints about eastbound traffic congestion during the PM peak period. In addition, the City of Annapolis has expressed concerns with cut through traffic as a result of congestion along US 50. Anne Arundel County has identified improvements along US 50 (in the vicinity of the bridge) as a top priority in their Transportation Priority Letter. This study will include the development of preliminary concepts specifically designed to either alleviate or reduce traffic congestion during the morning and evening peak travel periods, as well as during peak summer travel periods across the US 50 bridge over the Severn River. The study will also consider both short-term and long-term measures to improve traffic operations along US 50.

II. Existing Conditions/Observations

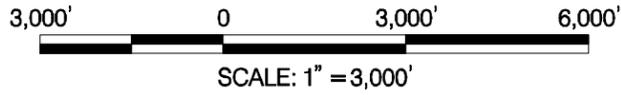
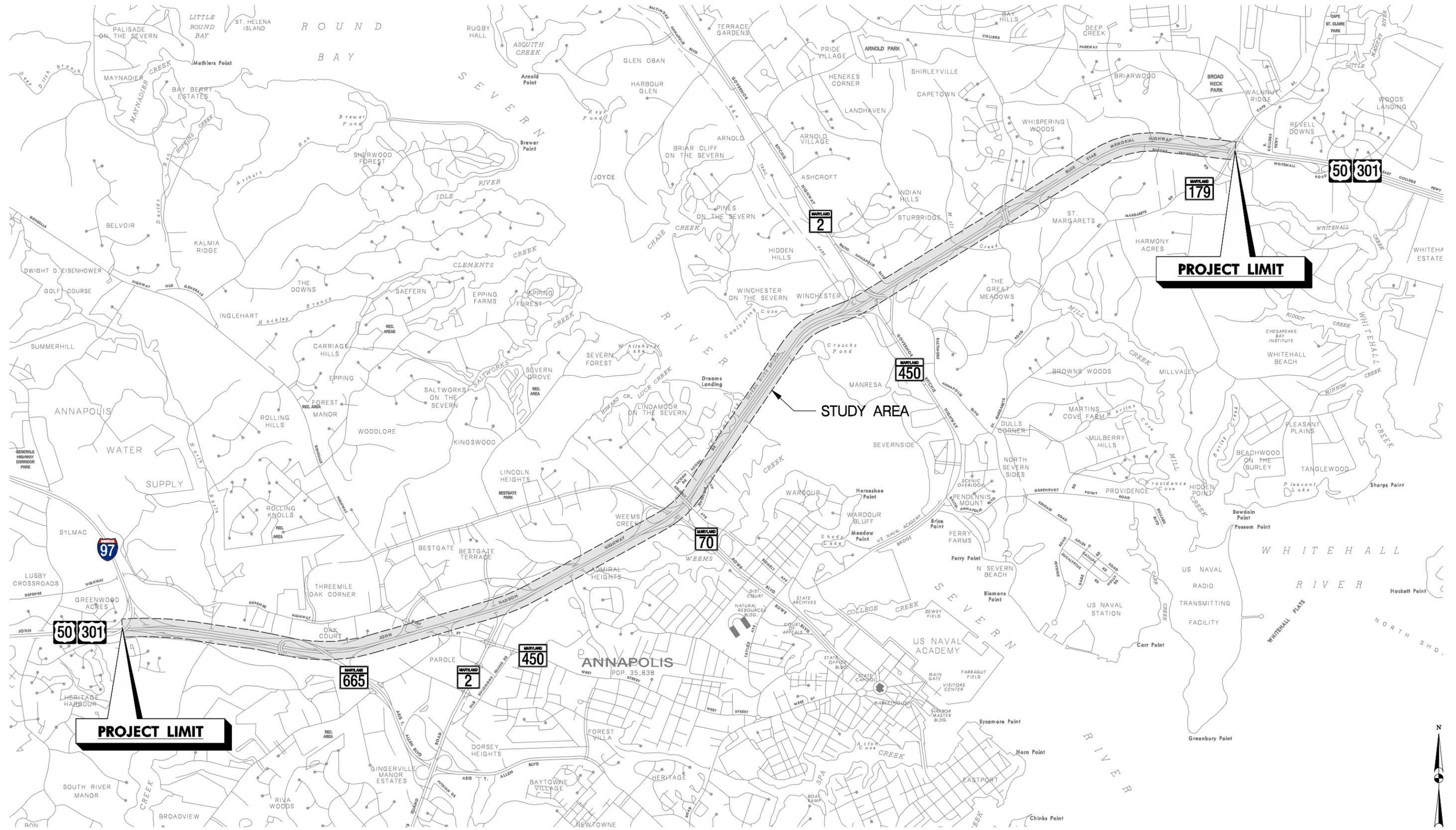
Within the study area, US 50 maintains three (3) through lanes eastbound and three (3) through lanes westbound. As many as two (2) additional auxiliary lanes and/or acceleration/deceleration lanes are periodically added and dropped adjacent to the outside through lanes. The existing travel lanes are 12 feet wide, the median width varies from five (5) to 28 feet, and the outside shoulder width varies from three (3) to 24 feet. The median alternates between a standard concrete traffic barrier and a six (6) foot wide traffic barrier from I-97 to the MD 2/MD 450 interchange. East of the MD 2/MD 450 interchange, the median is grass with a w-beam traffic barrier. Several of the superelevated curves are bifurcated and bridge piers exist within the median at every overpass. The distance between the I-97 overpass and the MD 179 (St. Margaret's Road) overpass is approximately eight (8) miles. Eight (8) interchanges provide access to US 50 within the study area.

Across the Severn River Bridge, US 50 has three (3) through lanes eastbound and three (3) through lanes westbound. As illustrated in Figure 3, the lanes are 12 feet wide, the median is five (5) feet wide with two single faced concrete traffic barriers, and the outside shoulders are three (3) feet wide. From inside parapet wall to inside parapet wall, the bridge is 83 feet wide. The structure supports two bridge deck slabs separated by a one (1) inch wide open joint. The original structure was built in 1953 and was rehabilitated/widened in 1969 and 1988. The existing bridge is in good condition with a Bridge Sufficiency Rating of 83.0 and a Deck Condition Rating of 7, based on the January 2010 inspection. The Office of Structures estimates that the deck should last another fifteen years or more. The bridge cannot be widened any further, however, without adding more pier footings and columns in the river, or adding a new parallel structure immediately adjacent to the existing bridge.



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US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY	
 STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION PROJECT MANAGEMENT DIVISION	FIGURE 1 MAY 2010

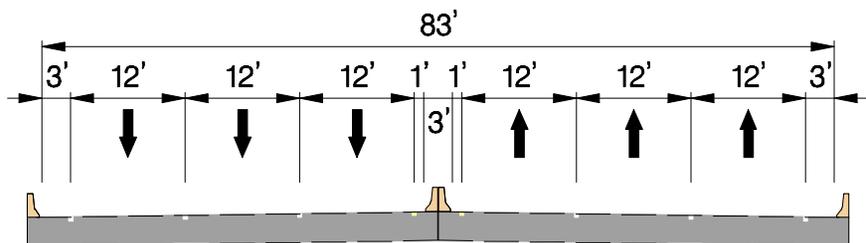


PROJECT AREA MAP

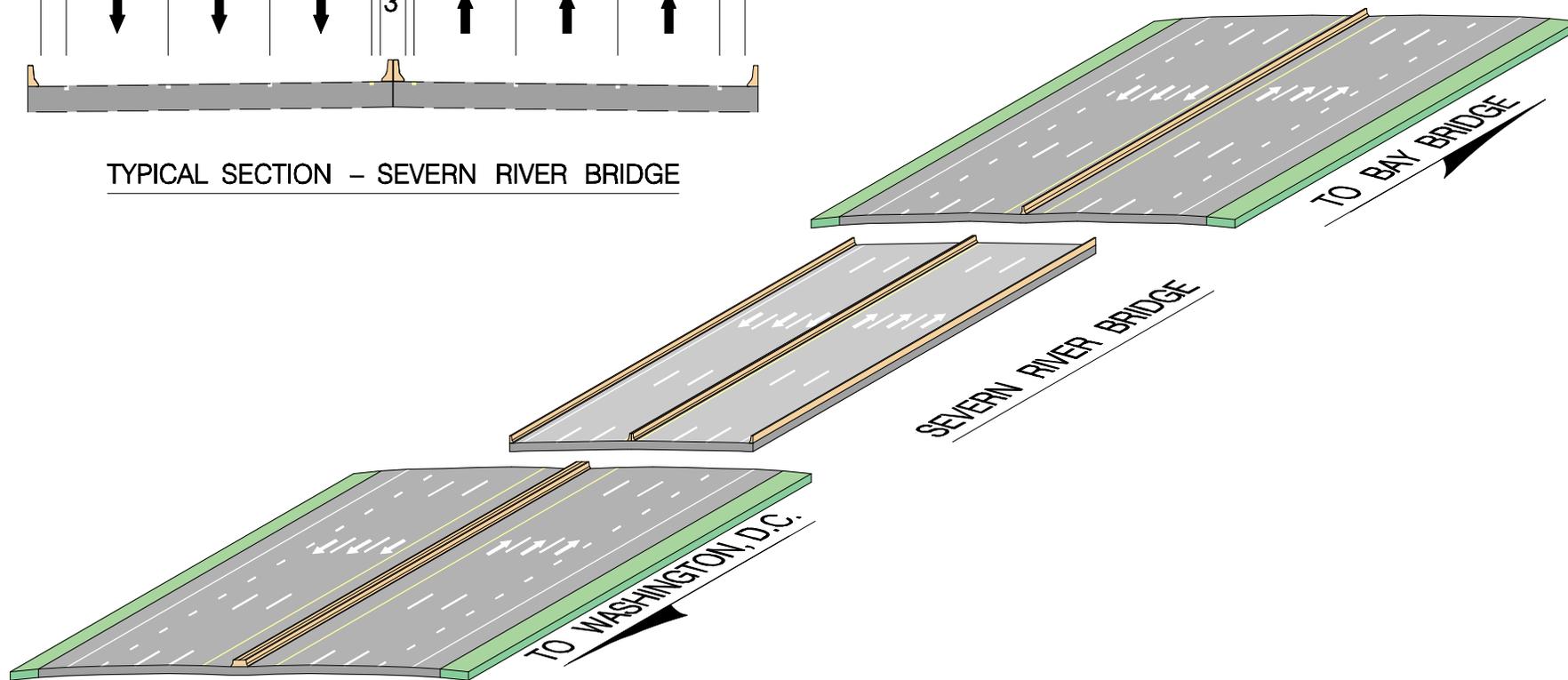
US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

SHA STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
PROJECT MANAGEMENT DIVISION

FIGURE 2
MAY 2010



TYPICAL SECTION – SEVERN RIVER BRIDGE



LEGEND

 EXISTING CONCRETE BARRIER

EXISTING CONDITIONS

Existing traffic congestion exists on US 50, particularly in the eastbound direction approaching the Severn River Bridge during the P.M. peak hours. Volume is not the only cause of the congestion, however. The initial traffic analyses indicated that capacity is sufficient to accommodate the current traffic demand. It is a combination of volume, geometric and human factors that affect traffic operations and congestion in this area. Merging traffic from MD 70 (Rowe Blvd) does not occur at a steady rate, but rather in a series of platoons of vehicles as they're released from traffic signals along MD 70. In addition, the shoulders on both sides of the highway are reduced approaching the bridge, creating a tunneling effect immediately at the end of the merge. Just beyond the merge point, vehicles begin to lose speed as the grade on the bridge begins to rise. The fact that all of this generally occurs at the same location, creates much of the congestion. Once vehicles reach the middle of the bridge, the congestion eases. Other observed activities contributing to the congestion include queue jumping and aggressive driving both east and west of the MD 70 interchange. In addition, it is suspected that part of the congestion is a result of drivers that are distracted by the view across the Scenic Severn River.

III. Preliminary Concepts

The following preliminary concepts were developed. These concepts were examined in detail to determine the overall congestion relief provided by each concept.

- **Concept 1A.** Reversible Lanes with a Moveable Barrier (Replace the existing median barrier with a movable barrier)
- **Concept 1B.** Additional Eastbound Lane (Shift existing median barrier to add a lane)
- **Concept 2A-D.** Reversible Lanes with a Moveable Barrier (Maintain existing median barrier and add a movable barrier to each side)
- **Concept 2E-H.** Reversible Lanes without a Moveable Barrier (Maintain existing median barrier and convert one lane to a reversible lane)
- **Concept 3.** Collector-Distributor (CD) Road or Express Lanes
- **Concept 4.** Lane Speed Control or Variable Speed Limits
- **Concept 5.** Ramp Metering and Signal Timing
- **Concept 6.** New Severn River Bridge

The study includes an analysis of Existing (2007), Short Term (2015) and Design Year (2030) traffic volumes. The results from this study will provide stakeholders, elected officials, and SHA a sense of how each of the concepts may improve congestion approaching the Severn River Bridge. It will also determine what might be necessary to improve long term transportation and safety needs. The results from this study are preliminary in nature, but may provide the basis for a more detailed Project Planning Study or a Highway Design Project.

IV. Traffic Volumes/Travel Forecasts

The traffic volumes used in this study were provided by the Travel Forecasting Division and are included in Appendix A. Traffic volumes for existing conditions were developed from traffic counts conducted in the year 2007. Count data was collected in the months of August

and October to determine traffic volumes for three primary peak periods: typical AM peak hour, typical PM peak hour, and summer Friday peak hour (3:00 PM to 4:00 PM). A balanced network of existing volumes was generated based on the count data for each peak period for the entire study area, extending along US 50 from I-97 to MD 179 (St. Margaret's Road).

Currently, the Average Daily Traffic (ADT) crossing the Severn River Bridge is approximately 115,000 vehicles per day. This number is projected to increase by approximately 1.5% per year to about 160,000 vehicles per day by the year 2030. Travel forecasts for the entire study area were developed using the travel demand model from the Baltimore Metropolitan Council (BMC), using Round 7 land use assumptions. Forecast volumes were projected for the future years of 2015 and 2030. Since the highest levels of congestion occur during the PM peak period, especially in the eastbound direction, Figure 4 and Figure 5 contain diagrams that summarize the existing and design year PM peak hour volumes throughout the corridor.

V. Traffic Analysis

Previous studies had used Highway Capacity Software (HCS) and CORSIM simulation software to try to analyze the conditions across the Severn River Bridge. However, the HCS outputs did not match existing conditions, and the CORSIM simulation tool did not provide enough flexibility to accurately replicate the unique driver behavior and operational conditions observed in the field at the base of the Severn River Bridge. Therefore, VISSIM simulation software was chosen for use in this study. VISSIM is a more complex simulation model that allows the user to manually modify the capacity of freeway links and better match the conditions observed on the Severn River Bridge.

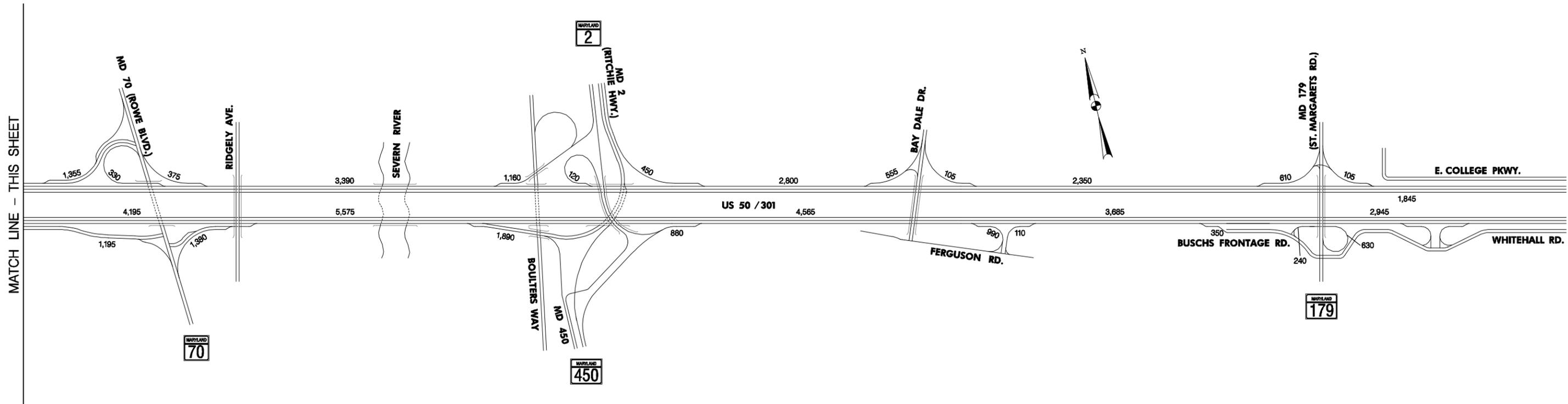
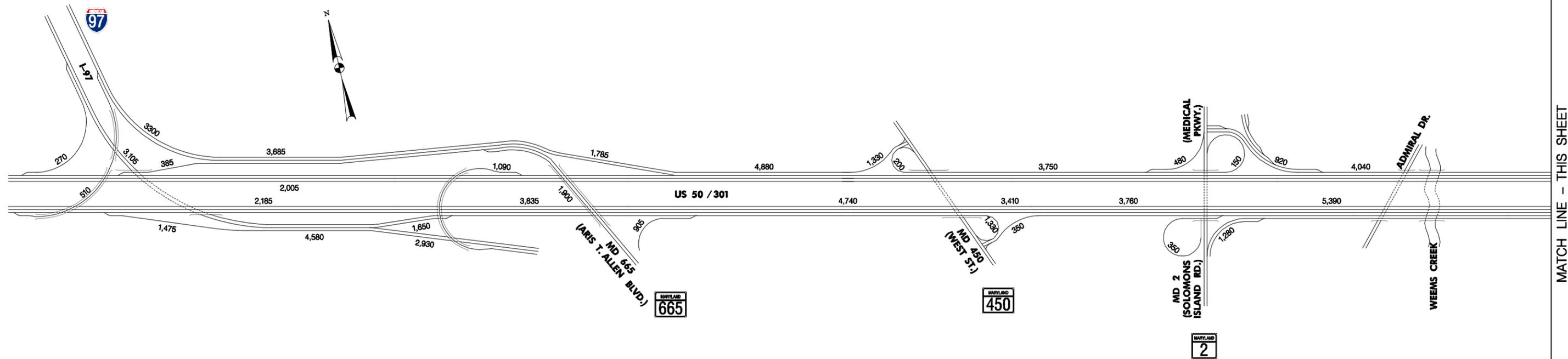
A VISSIM network of existing conditions was developed along US 50, extending from west of I-97 to east of MD 179. The network also included segments of MD 70 (Rowe Boulevard) and MD 2 (Governor Ritchie Highway), in order to capture the full extent of queuing resulting from congestion on the Severn River Bridge. The geometric network was coded with the data from the balanced traffic volume networks to develop three VISSIM models of existing conditions – AM peak, PM peak, and summer Friday peak.

The VISSIM models of existing conditions were calibrated to match observed queue lengths and data from travel time runs. During field visits, queue lengths were charted throughout the peak periods for comparison with the VISSIM model outputs. Additionally, travel time runs were conducted during the peak periods using GPS receivers to determine the average speed profile for vehicles traveling along US 50. Parameters in the VISSIM model were then modified to replicate driver behavior, until the model output matched observed conditions. As shown in Figure 6, the speed profile from the calibrated VISSIM model matches the actual speed profile recorded in the field along eastbound US 50 during the summer Friday peak period. This demonstrates that the model has been calibrated effectively. Ensuring proper calibration allows the design team to feel comfortable using the VISSIM model to test the Build concepts.

The calibrated VISSIM network was used as a base, and each of the potential concepts were coded into VISSIM. Several Measures of Effectiveness (MOE's) were determined for each

Build concept to compare to existing and No-Build conditions, including maximum queue length, vehicle throughput during the peak hour, and overall system delay. The analysis results are presented in Section VII of this report.

It should be noted that 2030 volumes far exceed the capacity of the existing bridge, as well as most of the preliminary concepts, with the exception of Concept 6, which provides a parallel span. As a result, all of the analysis presented here is based on existing (2007) traffic volume levels only.



LEGEND
 ——— EXISTING BRIDGE

EXISTING – 2007 P.M. PEAK HOUR VOLUMES

NOT TO SCALE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

STATE OF MARYLAND
 DEPARTMENT OF TRANSPORTATION
 STATE HIGHWAY ADMINISTRATION
 PROJECT MANAGEMENT DIVISION

FIGURE 4
 MAY 2010

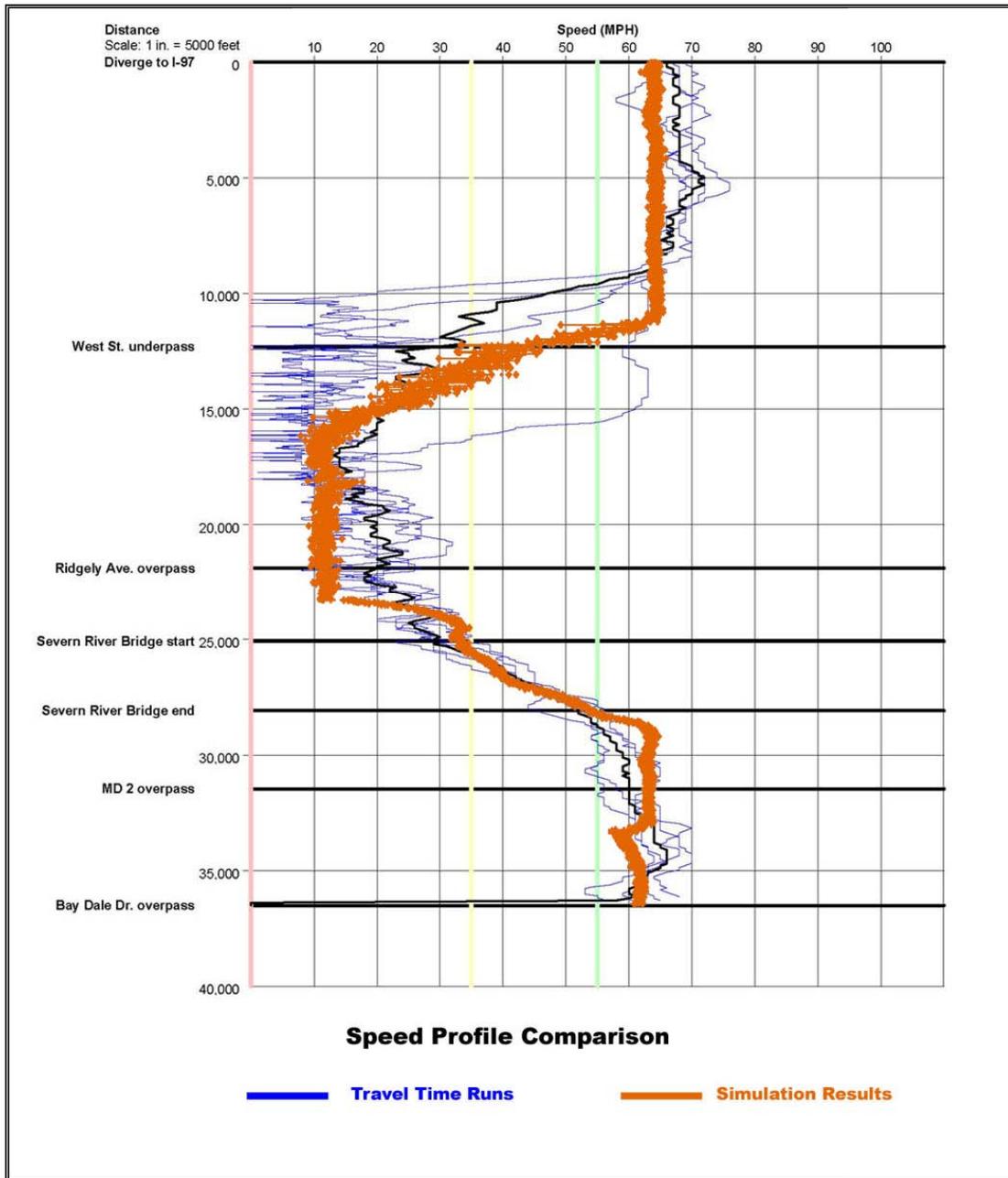


Figure 6: VISSIM Calibration – Speed Profile Comparison (US 50 Eastbound, Summer Friday)

VI. Safety

A crash analysis was performed for the three year period from January 1, 2005 to December 31, 2007 for US 50. The information reviewed included summaries of crash types and severities throughout the project area, as well as the crash rates per 100 million vehicle miles of travel versus the comparable weighted statewide rates for all similarly designed state maintained highways. The study corridor was divided into three segments. Crash rates for individual segments are summarized in Table 1.

TABLE 1: Crash Rate Summary

Roadway	3-year Average Total Crash Rate (per 100 million vehicle miles)	Statewide Average Total Crash Rate for Similar Roadways (per 100 million vehicle miles)
US 50 (From I-97 Interchange to MD 70 Interchange)	19.9	47.3
US 50 (MD 70 Interchange to MD 2/450 Interchange)	18.7	47.3
US 50 (From MD 2/450 Interchange to MD 179 Interchange)	30.3	47.3

The segment of US 50 between the I-97 and MD 70 interchanges is approximately 3½ miles long. As shown in the table above, the weighted crash rate for this segment is less than the statewide average crash rate for similar roadways. There were a total of 88 crashes over the three year study period. Of these crashes, one was a fatal collision, 19 resulted in injuries, and 68 resulted in property damage only. Most collisions occurred during the day and on a dry pavement. The predominant collision type was rear end with 47 occurrences followed by fixed object and sideswipe collisions with 16 and 14 occurrences, respectively. No crash type had a rate that was higher than the statewide average. Failure to give full time and attention was cited as the probable cause for most of the collisions. Almost two-thirds of the collisions involved vehicles traveling in the eastbound direction.

The segment of US 50 between the MD 70 and MD 2/MD 450 interchanges is 1.9 miles long. As shown in the table above, the weighted crash rate for this segment is less than the statewide average crash rate for similar roadways. There were a total of 51 crashes over the three year study period. Of these crashes, 19 resulted in injuries and 32 resulted in property damage only. None of the crashes resulted in a fatality. Most collisions occurred during the day and on a dry pavement. The predominant collision type was rear end with 26 occurrences followed by other and fixed object collisions with 10 and 8 occurrences, respectively. All crash types except those classified as ‘other’ had a rate that was lower than the statewide average. The probable cause for most collisions was unknown. Failure to give full time and attention was cited as the probable cause for most of the remaining collisions. More than half of the collisions involved vehicles traveling in the eastbound direction.

The segment of US 50 between the MD 2/MD 450 and MD 179 interchanges is approximately 2½ miles long. As shown in the table above, the weighted crash rate for this segment is less than the statewide average crash rate for similar roadways. There were a total of 72 crashes over the three year study period. Of these crashes, 22 resulted in injuries and 50 resulted in property damage only. None of the crashes resulted in a fatality. Most collisions occurred during the day and on a dry pavement. The predominant collision type was fixed object with 25 occurrences followed by rear end and sideswipe collisions with 20 and 12 occurrences, respectively. All crash types except those classified as ‘other’ had a rate that was lower than the statewide average. Failure to give full time and attention was cited as the probable cause for most of the collisions. More than half of the collisions involved vehicles traveling in the westbound direction.

VII. Operational Analysis Results of Preliminary Concepts

In an effort to relieve congestion within the project area, six (6) concepts were considered. Only three of them, however, have a measurable impact on traffic operations across the Severn River Bridge. As described later in this section, Concepts 1A, 1B and 2 result in an increase in the number of travel lanes in the peak direction. Concept 2, however, also results in a decrease in the number of travel lanes in the off-peak direction. All of them include narrower travel lanes.

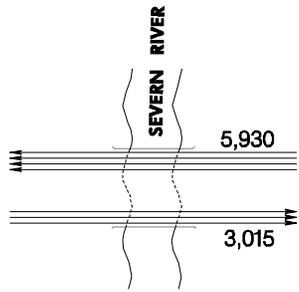
Tables 2, 3 and 4 show a comparison of the analyses results for Concept 1A, 1B and 2 versus existing geometric conditions. Table 2 illustrates the maximum queues, Table 3 provides a comparison of system delay and throughput across the Severn River Bridge, while Table 4 identifies the User Cost Benefits. Figure 7 illustrates the existing peak hour volumes across the bridge.

TABLE 2: Queuing Across Severn River Bridge (2007 Volumes)

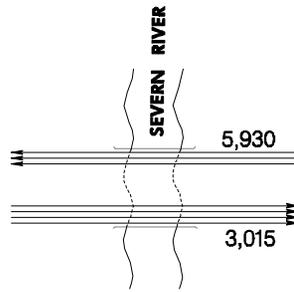
Scenario	Peak Period	US 50 EB	US 50 WB	MD 2 SB
		(Miles)	(Miles)	(Miles)
Existing	Summer	3.0	None	None
	AM	None	1.5	1.5
	PM	2.5	None	None
Concept 1A	Summer	None	None	None
	AM	None	None	None
	PM	None	None	None
Concept 1B	Summer	None	None	None
	AM	None	2.0	1.5
	PM	None	None	None
Concept 2	Summer	None	2.0	1.5
	AM	None	None	None
	PM	None	0.5	1.3

Legend
Better than Existing
Worse than Existing

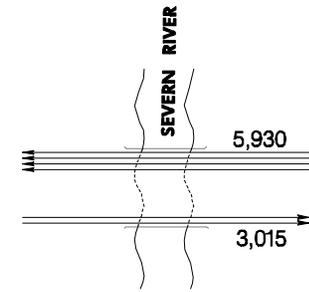
As shown in Table 2, eastbound US 50 queues are the same as or better than existing under each of the 3 concepts. Westbound US 50 queues are the same as or better than existing except for the AM peak hour under Concept 1B and the Summer and PM peak hours under Concept 2. This is a result of the reduced lane width under Concept 1B and the reduction of one westbound travel lane under Concept 2. Southbound MD 2 queuing is the same as or better than existing, except under Concept 2 during the Summer and PM peak hours. This is due to the westbound queues across the bridge that spill back and impact MD 2 traffic.



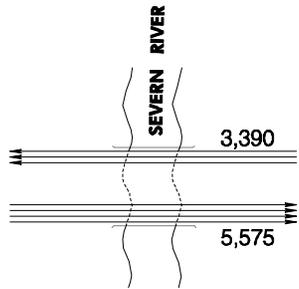
A.M.



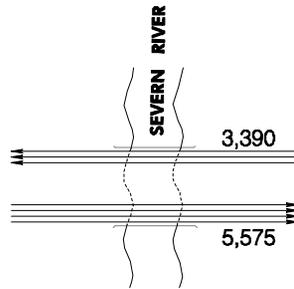
A.M.



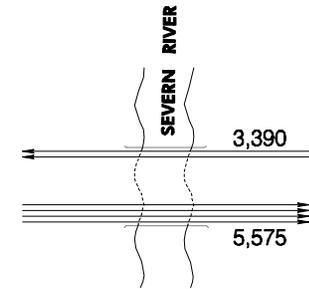
A.M.



P.M.



P.M.



P.M.

CONCEPT 1 – OPT. A

CONCEPT 1 – OPT. B

CONCEPT 2

2007 PEAK HOUR VOLUMES

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY



STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
PROJECT MANAGEMENT DIVISION

FIGURE 7

MAY 2010

TABLE 3: System Delay / Throughput Across Severn River Bridge (2007 Volumes)

Scenario	Peak Period	Delay	Throughput	
		(Veh-Hours)	US 50 EB	US 50 WB
Existing	Summer	1091	4701	4042
	AM	962	2952	5011
	PM	1119	4718	3282
Concept 1A	Summer	371	5402	4042
	AM	529	2956	5843
	PM	352	5450	3282
Concept 1B	Summer	361	5402	4042
	AM	1198	2955	4570
	PM	346	5448	3283
Concept 2	Summer	1358	5433	3018
	AM	514	2952	5720
	PM	677	5402	3131

Legend
Better than Existing
Worse than Existing

As shown in Table 3, overall delay is improved under each of the 3 concepts except for the AM peak hour under Concept 1B and the Summer peak hour under Concept 2. Eastbound throughput is the same as or better than existing under all three concepts. Westbound throughput, however, is generally the same as or slightly worse under concepts 1B and 2 due to the reduced lane widths under both concepts and the reduction of one westbound lane during the PM peak hour under Concept 2.

TABLE 4: User Costs (2007 Volumes)

Scenario	Annual User Cost (\$M)	Change (\$M)	% Change
Existing	\$8	---	---
Concept 1A	\$0	-\$8M	-100%
Concept 1B	\$3.5M	-\$4.5M	-56.3%
Concept 2	\$7M	-\$1M	-12.5%

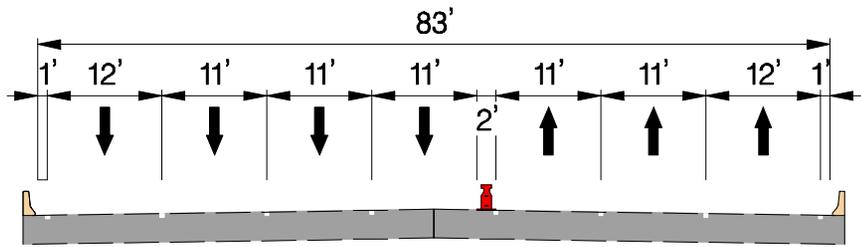
As illustrated in Table 4, Concept 1A is shown to reduce the Annual User Costs from \$8 Million to \$0. The additional lane that's added in the peak direction during both peak hours is projected to eliminate congestion approaching the bridge. In actual practice, however, it is likely that users will still experience some delay as a result of the merging, diverging and weaving that will continue to exist throughout the corridor. Under Concept 1B, the Annual User Costs are reduced eastbound, but increase slightly westbound due to the reduced lane width. Under Concept 2, the Annual User Costs are reduced in the peak direction, but increase significantly in the off-peak direction due to the elimination of one lane.

The following describes each concept.

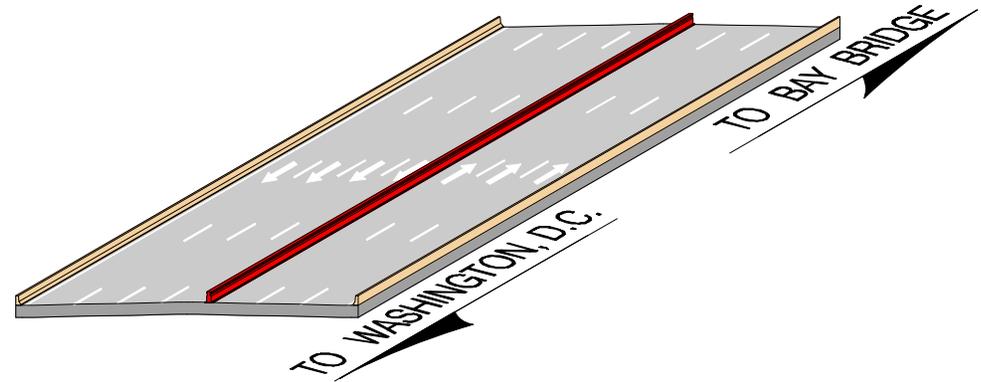
- **Concept 1, Option A – Reversible Lane with Moveable Barrier (Replace the existing median barrier with a movable barrier):** This will remove the existing concrete median traffic barrier between the Ridgely Avenue overpass and the MD 2/MD 450 interchange; a total length of approximately 1½ miles. As illustrated in Figure 8, US 50 will be re-striped to provide seven (7) through lanes. By removing the concrete median traffic barrier on the Severn River Bridge, the one (1) inch open joint will be exposed to traffic. Therefore, a seven (7) foot wide portion of the deck will need to be replaced. Existing cross slopes and drainage patterns can be maintained since water will be able to flow under the moveable barrier sections. At the bridge approaches, the median will be reconstructed with traffic bearing full depth hot mix asphalt (HMA) pavement and a single run of moveable barrier will be positioned to allow for four (4) through lanes in the peak direction while maintaining three (3) through lanes in the non-peak direction. All lanes will be narrowed to 11 feet. A single barrier transfer machine will manage the reversible lane by moving the barrier twice a day; once prior to the A.M. peak period and once prior to the P.M. peak period. Traffic will be able to enter and exit the reversible lane at any point along its length. Overhead lane use signals and variable message signs will be used to manage traffic and warn drivers prior to the end of the reversible lane.

The geometric changes associated with these options were coded into the VISSIM simulation model to determine the anticipated operational improvements. The results of the VISSIM analysis indicate that this concept would be projected to virtually eliminate queuing during all peak hours studied (AM peak, PM peak, summer Friday peak) using current volume levels. This option is projected to significantly decrease the overall system delay and increase the vehicle throughput of the system. . The cost for this concept is between \$21 and \$25 million plus \$205,000 in annual operating & maintenance costs.

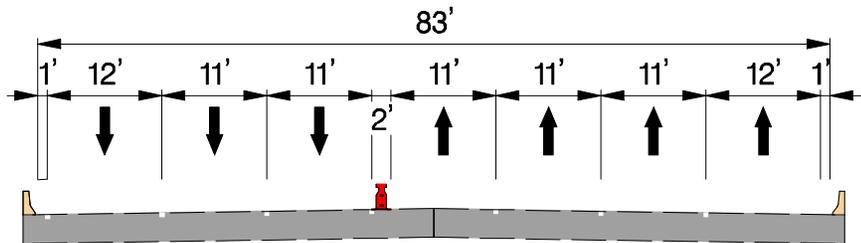
- **Concept 1, Option B – Additional Eastbound Lane (Shift existing median barrier to add a lane):** Option B is similar to Option A in that the existing median barrier will be removed between the Ridgely Avenue overpass and the MD 2/MD 450 interchange, and US 50 will be re-striped to provide seven (7) through lanes. Similarly, a seven (7) foot wide portion of the deck will need to be replaced. Instead of a moveable barrier, however, a new permanent concrete median traffic barrier will be constructed to provide four (4) through lanes in the eastbound direction and three (3) through lanes in the westbound direction at all times. Drainage modifications will be required for the bridge, because the permanent barrier will no longer be located at the high point of the bridge cross section. The project team believes it can address this issue while maintaining the existing cross slopes. Water will drain to the south side of the new barrier, collected by a series of scuppers and piped to the existing drainage system under the structure. Concept 1, Option B is illustrated in Figure 9.



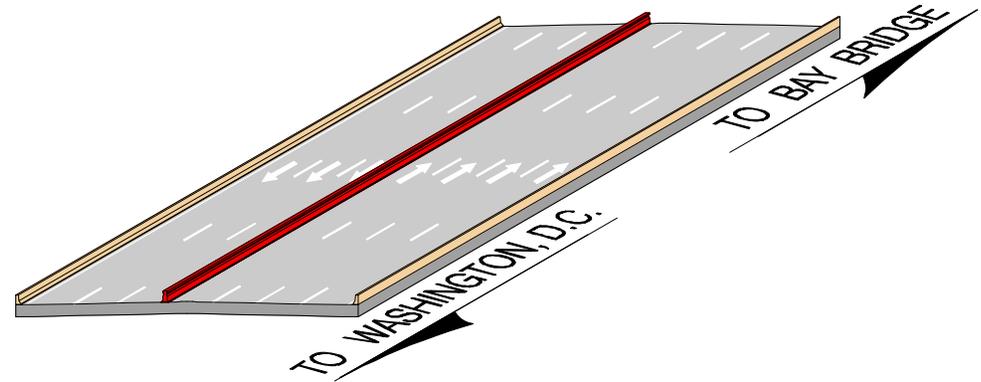
TYPICAL SECTION – SEVERN RIVER BRIDGE



A.M. PEAK HOURS



TYPICAL SECTION – SEVERN RIVER BRIDGE

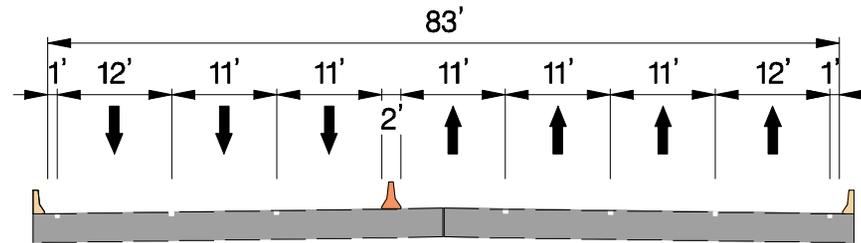


P.M. PEAK HOURS

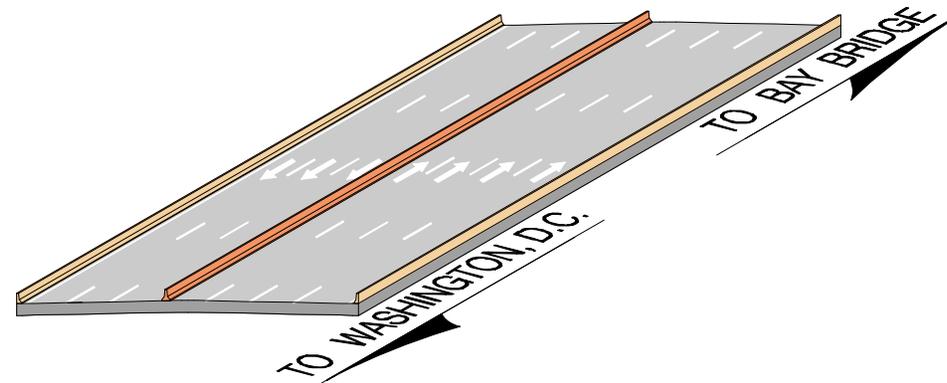
LEGEND

-  EXISTING CONCRETE BARRIER
-  PROPOSED MOVEABLE BARRIER

CONCEPT 1 – OPTION A



TYPICAL SECTION – SEVERN RIVER BRIDGE



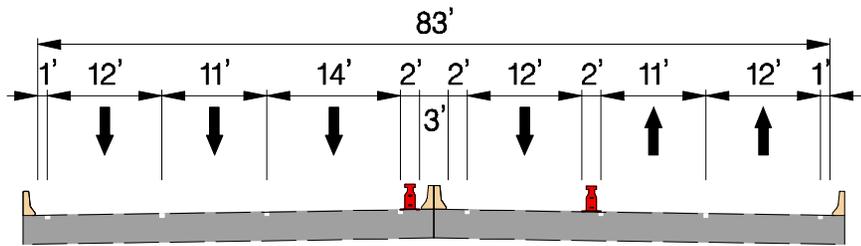
LEGEND

-  EXISTING CONCRETE BARRIER
-  PROPOSED CONCRETE BARRIER

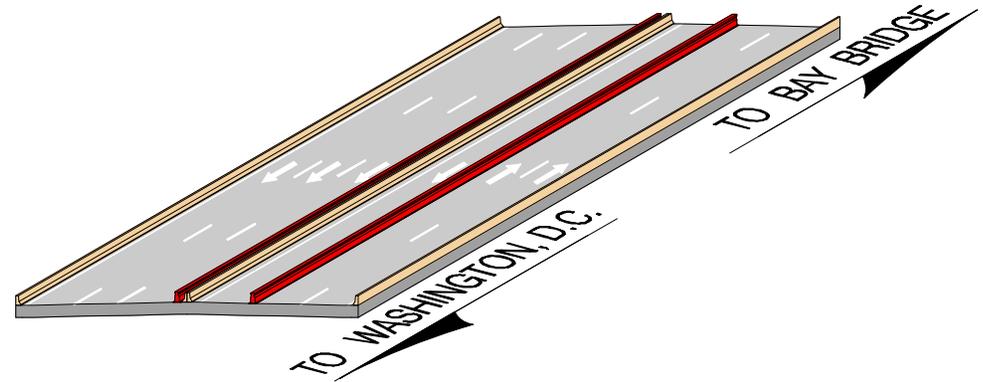
CONCEPT 1 – OPTION B

The results of the VISSIM analysis indicate that Concept 1, Option B would be projected to provide similar benefits as Concept 1, Option A during the PM peak period and the summer Friday peak period. However, during the AM peak period, when westbound is the peak direction of travel, this option does not provide any benefits to the system. In fact, total vehicle delay and queue lengths are projected to *increase* compared to existing conditions during the AM peak hour. This increase occurs because the westbound lane and shoulder width have to be narrowed to accommodate the additional eastbound lane. This operational difference needs to be weighed against the cost savings of reducing capital costs and eliminating annual operating and maintenance cost of the moveable barrier system required under Option A. The cost for Concept 1, Option B is between \$16 and \$19 million. There are no annual operating and maintenance costs because there is no moveable barrier system.

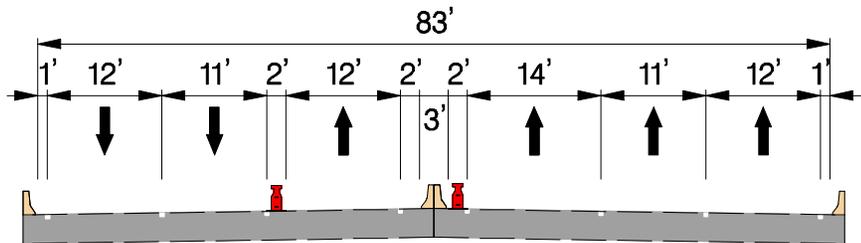
- **Concept 2, Options A through D – Reversible Lane with Moveable Barrier (Maintain existing median barrier and add a movable barrier to each side):** This concept will maintain the existing concrete median traffic barrier except in transition areas where traffic will shift from one side of the median barrier to the other. The median pavement will need to be reconstructed in these transition areas with traffic bearing full depth HMA pavement. Two runs of moveable barrier will be placed adjacent to the existing concrete median traffic barrier; one run on the eastbound side and one run on the westbound side. Two barrier transfer machines will manage the reversible lanes by moving each barrier twice a day; once just prior to and once just after the A.M. peak period on the westbound side as well as once just prior to and once just after the P.M. peak period on the eastbound side. During off peak hours, three (3) through lanes will be maintained in both directions. During the peak hours, the peak direction will have four (4) through lanes and the non-peak direction will only have two (2) through lanes. To accommodate the space needed for the moveable barriers across the Severn River Bridge, the bridge’s shoulders will be narrowed to 1 foot and the outer most lanes will be narrowed to 11 feet wide. This is illustrated in Figure 10. Traffic will only be able to enter and exit the reversible fourth lane at the transition areas located at the beginning and end of each reversible lane option. In order for traffic to safely cross from one side of the existing median barrier to the other, the required 2000 foot long transition areas are proposed within long tangent sections. The following options were considered as the limits of the reversible lanes:
 - **Option A** – 600 feet east of the Weems Creek Bridge to 2,100 feet west of the Bay Dale Drive Overpass (3.0 miles)
 - **Option B** – 1,500 feet east of the I-97 Overpass to 600 feet west of the MD 179 (St. Margaret’s Road) Overpass (7.4 miles)
 - **Option C** – 600 feet east of the Weems Creek Bridge to 600 feet west of the MD 179 (St. Margaret’s Road) Overpass (4.8 miles).
 - **Option D** – 1,500 feet east of the I-97 Overpass to 2,100 feet west of the Bay Dale Drive Overpass (5.6 miles)



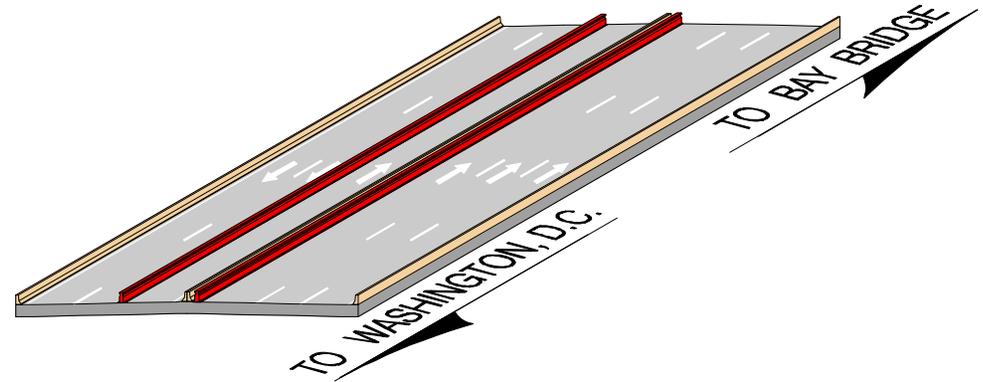
TYPICAL SECTION – SEVERN RIVER BRIDGE



A.M. PEAK HOURS



TYPICAL SECTION – SEVERN RIVER BRIDGE



P.M. PEAK HOURS

LEGEND

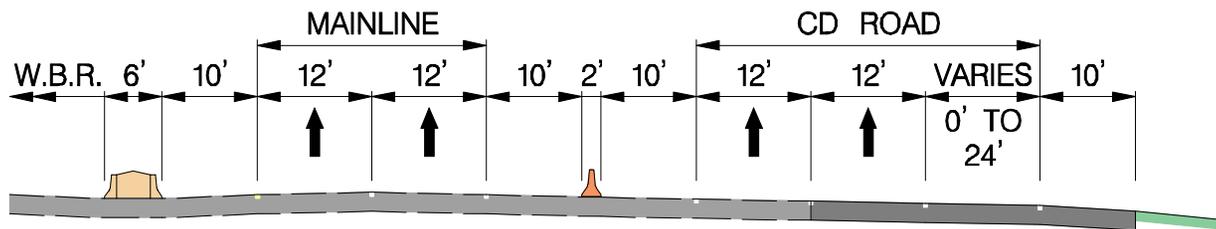
-  EXISTING CONCRETE BARRIER
-  PROPOSED MOVEABLE BARRIER

CONCEPT 2

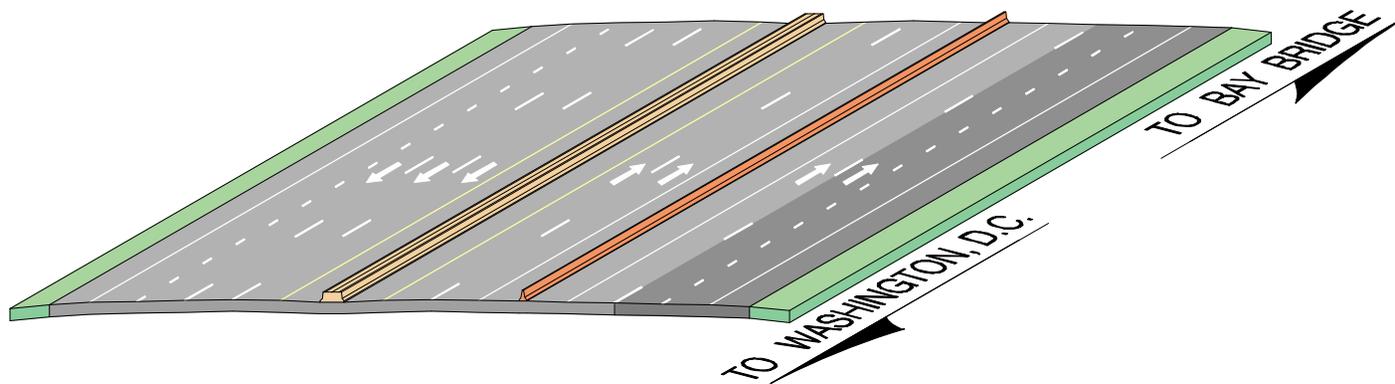
The results of the VISSIM analysis indicated that Concept 2 would be projected to provide similar benefits as Concept 1, Option A in the peak direction of travel (i.e., westbound during the AM peak, and eastbound during the PM peak and summer Friday peak). However, because this option eliminates one lane in the off-peak direction, the model results indicate that it would cause congestion and queuing in the off-peak direction. This is particularly evident during the summer Friday peak period, in which the traffic volumes are more evenly split between eastbound and westbound (57% eastbound, 43% westbound) across the Severn River Bridge. As a result, the model projects significant delays for westbound traffic, and the overall system delay during the summer Friday peak period under Concept 2 is actually *higher* than under existing conditions.

It should be noted that the optimum benefits in the peak direction under Concept 2 were achieved in the model using the shortest of the 4 options (Option A). There are several drawbacks to the longer options, including increased cost and less potential utilization of the reversible lane. Only vehicles traveling all the way through can use the reversible lane under Concept 2 since there are no opportunities to enter or exit the reversible lane except at each end. However, these other options could be considered if there are geometric or environmental constraints for Option A. The cost for Concept 2 is between \$47 and \$144 million plus between \$540,000 and \$1.4 million in annual operating & maintenance costs, depending on which option is selected.

- **Concept 2, Options E through H – Reversible Lane without Moveable Barrier (Maintain existing median barrier and convert one lane to a reversible lane):** These Options are similar to Options A through D, except that moveable barriers are not used. Instead, traffic is shifted to use one lane of traffic on the opposite side of the existing median barrier. Overhead lane use signals and variable message signs will be used to manage traffic. The traffic operations of Concept 2, Options E through H would be similar to Concept 2, Options A through D. Therefore, these options were not modeled separately.
- **Concept 3, Option A – CD Road / Express Lanes:** This Option will extend the eastbound CD Road at I-97 from its current terminus prior to the MD 665 (Aris Allen Boulevard) interchange to the MD 70 (Rowe Blvd) interchange, providing local access to MD 665, MD 450, MD 2 and MD 70. It will effectively split through trips from local trips, keeping local trips out of the recurring congestion approaching the Severn River Bridge. As illustrated in Figure 11, the CD Road will be separated from the mainline by a concrete median traffic barrier since a painted buffer will be ineffective during periods of heavy congestion. In order to evaluate impacts, Figure 12 illustrates year 2030 volumes and the number of lanes required to accommodate the demand. Since the CD Road volumes exceed the mainline volumes, this Option will function more as an Express Lane/Local Lane system rather than a CD Road. In order to accommodate the traffic split, an additional eastbound travel lane, along with the space required for the traffic barrier and associated shoulders, is required. As a result, acquisition of additional right of way will be necessary, full depth HMA roadway widening will have to occur



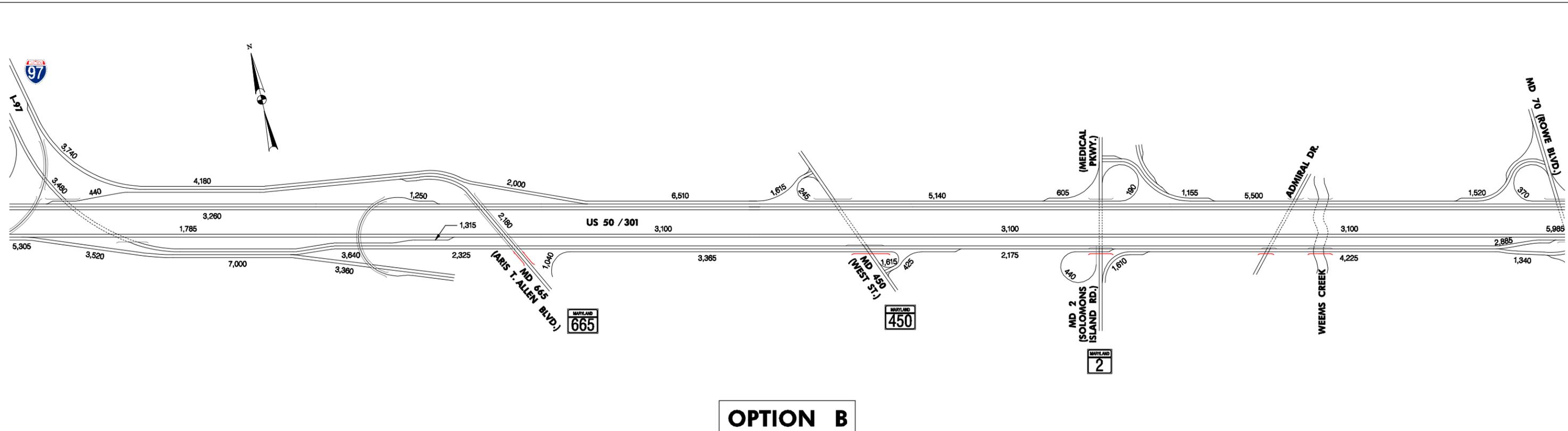
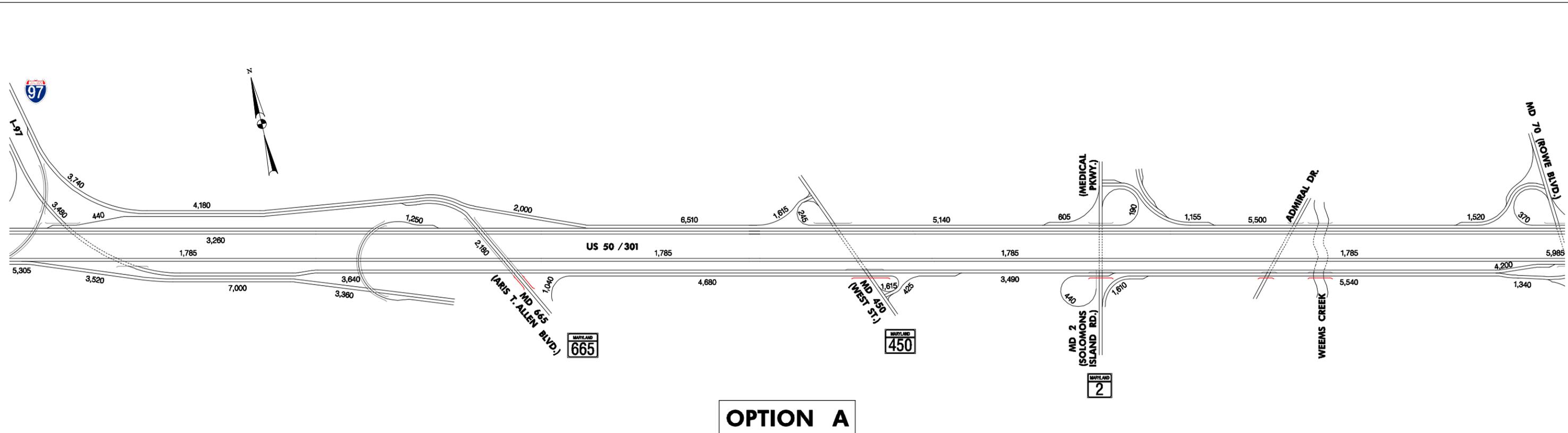
TYPICAL SECTION – WEST OF SEVERN RIVER BRIDGE



LEGEND

-  EXISTING CONCRETE BARRIER
-  PROPOSED CONCRETE BARRIER

CONCEPT 3



LEGEND

- EXISTING BRIDGE
- PROPOSED BRIDGE WIDENING

CONCEPT 3 – 2030 P.M. PEAK HOUR VOLUMES

NOT TO SCALE

and 6 bridges will be impacted (4 on US 50 need to be widened and 2 over US 50 need to be lengthened).

Vehicles from I-97 are precluded from entering the Express Lanes under this option. It should be noted that while Concept 3 results in an overall system benefit, especially by accommodating local access, it would have no impact on the cause of the congestion at the Severn River Bridge. The cost for Concept 3 is between \$144 and \$193 million, not including right-of-way.

- **Concept 3, Option B – CD Road / Express Lanes:** Option B is similar to Option A in that it will extend the eastbound CD Road at I-97 from the MD 665 interchange to the MD 70 interchange and provide local access to MD 665, MD 450, MD 2 and MD 70. It will also result in similar right of way acquisitions, full depth HMA roadway widening and impacts to existing bridges. However, instead of separating the traffic from the US 50 mainline for the CD Road's entire length between I-97 and MD 70, a slip ramp will be provided to allow traffic from I-97 an opportunity to enter the Express Lanes. The slip ramp will be a single lane and will be located in the vicinity of the MD 665 interchange.
- **Concept 4 – Lane Speed Control / Variable Speed Limit:** Lane Speed Control (LSC) or in other words varying speed limits by lane is a concept that is new in the United States. In fact, there are no known examples of such a system in the country. LSC systems are in use in Europe, however, these systems require strict adherence to posted speed limits to be effective.

The concept of a Variable Speed Limit (VSL) system is similar to the concept of a LSC system. VSL's are identified by the Federal Highway Administration (FHWA) as a speed management technique. VSL systems use sensors to monitor prevailing traffic and weather conditions, and post appropriate enforceable speed limits on dynamic message signs. FHWA proposes this technique of speed management with applications in areas such as work zones, congestion management, incident management, weather advisory and motorist warning systems. The equipment necessary to implement a VSL system include portable changeable message signs, variable speed limit signs, vehicle detectors, CCTV cameras, static signs, a communications network, equipment in the operations center and appropriate software. The initial cost of a VSL system varies between one and two and a half million dollars for hardware and software procurement, installation, and maintenance over a two year period. A VSL system is currently being tested on the Woodrow Wilson Bridge construction project by the Maryland State Highway Administration and the Virginia Department of Transportation at the Telegraph Road interchange project. Several other states such as New Jersey, Delaware and Missouri use VSL systems on a permanent basis in various application areas and for various purposes.

The theory associated with this concept is that if you reduce the speed of the vehicles as they approach a known area of congestion, thus reducing the differential between upstream and downstream travel speeds, there will be a reduction in sudden braking, a reduced potential for rear end collisions, shorter overall queues and shorter travel times.

However, since the VISSIM model is calibrated against existing conditions, applying variable speed limits in the VISSIM model resulted in a negligible effect on queue length. In the model, queues formed at the same location, with the same magnitude, regardless of the approach speed.

As a real-world application, however, this concept could have some benefit. It should be considered on a trial basis before implementing a more-costly concept. The system was recently used during construction on the Woodrow Wilson Bridge project with some success.

- **Concept 5 – Ramp Metering / Signal Timing:** One component that contributes to the queuing at the Severn River Bridge is the merge from MD 70 (Rowe Boulevard) to eastbound US 50. This concept examines the potential operational changes to mitigate the impacts of this merge. Ramp metering was considered at this on-ramp to try to eliminate the platooning effect on the ramp that appeared to be contributing to the congestion, based on field observations. The project team also tried modifying the signal timing along MD 70 to reduce the platooning effect for vehicles accessing eastbound US 50.

The results of the VISSIM analysis indicated that providing ramp metering on the ramp from MD 70 to eastbound US 50 would not reduce the existing queues at the Severn River Bridge. The model showed that ramp metering would introduce congestion on the ramp itself and on MD 70, in addition to the congestion on mainline US 50. Similarly, modifying the signal timing and phasing along MD 70 had no effect on the US 50 queues.

- **Concept 6 – New Severn River Bridge:** This concept considers the construction of a new span over the Severn River that would be constructed parallel and adjacent to the north side of the existing bridge. The new span would need to accommodate at least five (5) lanes of traffic with 10 foot shoulders for westbound US 50. For estimating purposes, however, we have assumed a 6 lane bridge to match the typical section across the existing bridge. The existing bridge would remain in place, but would be modified to accommodate eastbound US 50. New and reconstructed roadway, approaching each end of the bridge, would be required as well as the reconfiguration and reconstruction of both the MD 70 (Rowe Boulevard) and MD 2/MD 450 interchanges. A significant amount of right-of-way acquisition would be required.

Concepts 1 through 5 are primarily short-term improvements. The analysis results presented in this section showed that these short-term improvements could improve existing operations at the Severn River Bridge based on current (year 2007) volume levels. However, none of the previous concepts studied would be able to sustain acceptable levels of service (LOS) as traffic grows along US 50 approaching the future study year of 2030 (or even 2015). The ultimate long term solution for this area is a new bridge with additional capacity. The cost for Concept 6 is between \$483 and \$590 million, which does not include right-of-way.

VIII. Quickchange Moveable Barrier / Barrier Transfer Machine

As illustrated in Figure 13, the two types of moveable barriers available are an 18 inch wide Concrete Reactive Tension System and a 13 inch wide Steel Reactive Tension System. The main differences between the two types are width and cost. The current cost of the Steel System is approximately three times higher than the Concrete System. When impacted by an errant vehicle, both types of barrier exhibit similar low deflection characteristics, which are largely dependent upon the vehicle’s weight, speed, and angle of impact. The standard barrier section has a length of 39 inches, but variable length barriers are available for both types. Variable length barriers can be applied to account for variations in run lengths around horizontal curves.

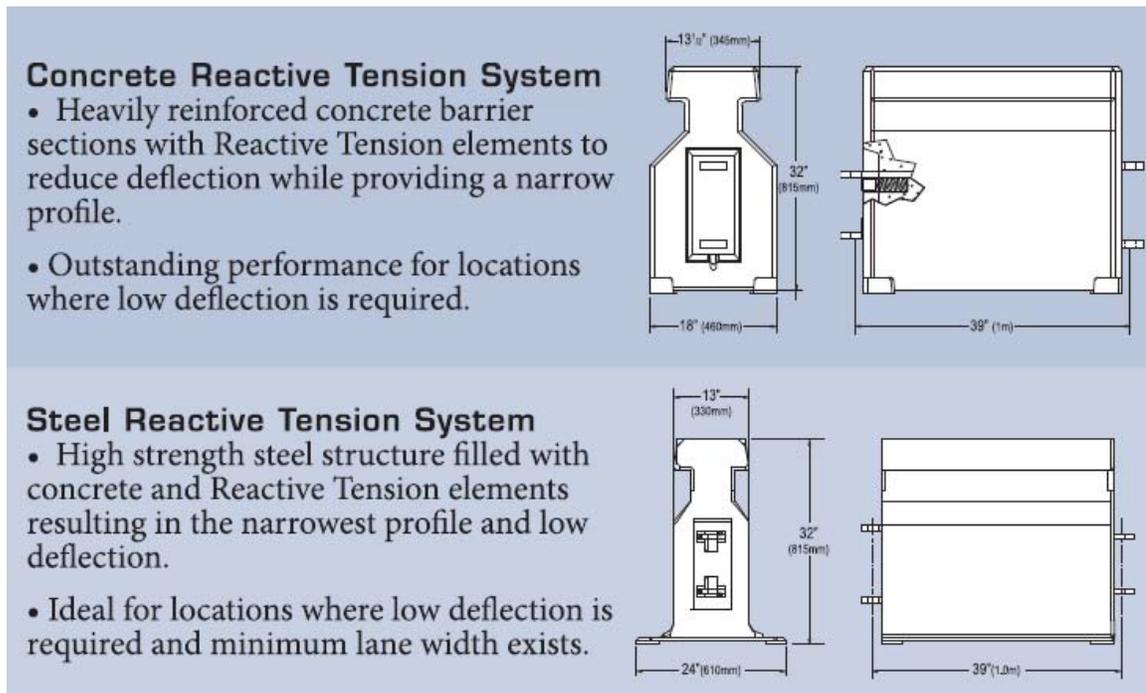


FIGURE 13: Types of Moveable Barrier

The moveable barrier is positioned by a Barrier Transfer Machine, shown in Figure 14. The machine can hydraulically transfer a moveable barrier at speeds of up to 10 miles per hour. When not transferring the barrier, the machine has a maximum travel speed of approximately 20 miles per hour. The machine is typically nine and a half (9½) feet wide and can laterally transfer the moveable barrier up to 26 feet. To ensure the barrier is positioned consistently during each transfer, a small computer strip can be embedded into the pavement to automate the barrier transfer process. A machine operator will ride with the machine to manage the transfer. Additional assistance will be required to transport the operator to and from the machine(s) just before and after the daily scheduled transfers.

The Barrier Transfer Machine is powered by a 400 horsepower diesel engine. The capacity of the machine’s fuel tank is 120 gallons consumed at a rate of approximately 6 gallons per hour. To assist refueling efforts, a storage tank can be placed on-site. An existing system operating in Boston has a storage tank with a capacity of 1,000 gallons. Table 5 details the anticipated fuel consumption of each moveable barrier option.

TABLE 5: Anticipated Fuel Consumption

Concept	Option	Transfer Length (miles)	Fuel Consumed (gallons/year)	Minimum Refueling Frequency (refills/year)
1	A	1.6	500	5
2	A	3.0	1,875	18
2	B	7.4	4,620	46
2	C	4.8	3,000	28
2	D	5.6	3,495	34



FIGURE 14: Barrier Transfer Machine

IX. Environmental Overview

Community Resources

John Hanson Highway (US 50) is a major east/west transportation corridor in Anne Arundel County, Maryland. US 50 connects with the following regional arterial roadways in the vicinity of the Severn River Bridge: I-97, MD 886, MD 178, MD 450, MD 70, MD 2, MD 848, and MD 179. These roadways predominately provide access to all areas of Anne Arundel County (County) including the City of Annapolis. Additionally, US 50 is the major access route from Central Maryland to the Eastern Shore, which has numerous recreational locations including Ocean City. Therefore, the corridor experiences high volumes of rush hour and seasonal traffic.

The city limit of Annapolis is immediately south of the US 50 corridor west of the Severn River. Current development within the study area predominantly includes suburban housing and regional commercial centers. Shoreline communities and water recreational facilities associated with the Severn River is located in the middle of the study area. Land uses within the study area predominately include retail and single family dwellings. Industrial, transportation, natural open space, office, townhouse, multiple family dwelling, and government/institutional uses are also present. The study area falls under the Anne Arundel County 1997 *General Development Plan* (GDP) which divides the County in to 16 Small Planning Areas (SPA). The study area spans three of these SPAs. Future land use would include 10 commercial sites, one minor residential subdivision, one major commercial development, one major residential development, and one major federal development that are currently in various stages of planning and development. The SPAs focus notable attention on the following improvements to the US 50 corridor:

- Transportation Demand Management measures, as well as new construction to mitigate traffic impact;
- Noise mitigation;
- Aesthetic improvements; and
- Improved signage.

The proposed transportation improvements are consistent with the GDP.

There are three community facilities within the study area, as follows:

- The Baltimore and Annapolis Trail Park,
- Broadneck United Methodist Church, and
- West Annapolis Fire Department.

The off-road portion of the Baltimore and Annapolis Trail Park has a terminus located north of the US 50/MD 450 intersection. The Baltimore and Annapolis Trail continues south as an on-road biking lane underneath US 50. There is a parking area south of US 50 off of MD 450 designated for trail users. The Baltimore and Annapolis Trail Park can be accessed by bike or foot from the parking area via Boulders Way. The Broadneck United Methodist Church is located near the US 50/Cape St. Claire Road interchange at the eastern terminus of the project. The West Annapolis Fire Department is located off of Jennifer Road, west of the US 50/MD 70 interchange.

Based on an initial review of U.S. Census 2000 data, seven of the 16 block groups that abut or intersect the study area could be considered environmental justice populations due to their minority and low-income population percentages. Further research of the socioeconomic resources and characteristics will be conducted during the project planning phase to ensure that these communities are aware of this project and to ensure that this project does not disproportionately or adversely affect any environmental justice populations.

Cultural Resources

The study area contains archeological sites, historic structures listed in the Maryland Inventory of Historic Properties (MIHP), and historic structures that are potentially eligible for and listed on the National Register of Historic Places (NRHP). Maryland Historic Trust (MHT) records indicate that 12 archeological sites are located within the study area or its

immediate vicinity. One site is eligible for the NRHP. Determinations of eligibility for the NRHP have not been made have been made for the other sites.

The MIHP lists 15 properties within the study area or its immediate vicinity. Properties on this list include those that are listed or eligible for listing on the NRHP, were found ineligible for listing, or have not received a determination of eligibility. One property in the study area, Howard's Inheritance (AN-136), is listed on the NRHP, and two are eligible for listing – Bridge 2081, Weems Creek Bridge (AN765) and the Annapolis Water Company (AN932). Six properties have been found ineligible for listing on the NRHP. The remaining six properties have not received a determination of eligibility for listing on the NRHP from MHT.

Not all portions of the study area have been surveyed. These unsurveyed portions may contain archeological sites and historic structures that are eligible for listing on the MIHP or the NRHP.

Natural Resources

The study area is in the Lower Severn River watershed that ultimately drains into the Chesapeake Bay. The Severn River, which bisects the study area, is tidal and located in the Western Coastal Plain physiographic province. The study area crosses several major streams and minor tributaries. From west to east, the study area crosses the following waterways: a) a tributary of Broad Creek near the western end of the study area, b) Weems Creek east of the MD 2 interchange, c) an unnamed tributary of Severn River just west of the Severn River Bridge, d) Severn River, e) Mill Creek east of the MD 648 interchange, and f) tributary to Whitehall Creek that crosses the study area in several locations west of the MD 179 interchange. US 50 bisects the 100-year floodplain in five areas. The tributary of Broad Creek has a Use I water designation (water contact recreation and protection of aquatic life). All other streams and rivers in the study area have a Use II water designation (shell fish harvesting). The Severn River is a designated State Wild and Scenic River. According the Maryland Department of Natural Resources (DNR) Environmental Review Unit, the perennial portions of the creeks and rivers in this area support spawning anadromous fish including white perch and yellow perch. The portion of the Severn River within the study area supports or is within 500 yards of areas of natural oyster bars.

The *National Wetlands Inventory for Anne Arundel County, Maryland* identifies multiple wetlands within the study area. The wetlands are generally located in close proximity to the streams and tributaries within the study area, in addition to a small wetland located just northeast of the MD 450 interchange. There are no wetlands of special state concern within the study area.

Portions of the study area are located within the Chesapeake Bay Critical Area, which is managed by the Critical Area Commission (CAC). The CAC designated three categories of land development within the Critical Area: Intense Development Area (IDA), Limited Development Area (LDA), and Resource Conservation Area (RCA). The study area passes through IDA, RCA, and LDA land. The Critical Area Act also establishes a 100-foot buffer of natural vegetation that extends 100 feet landward from the mean high water line of tidal waters or the edge of tidal wetlands and tributary streams. Within the study area, the Critical

Area buffer along the shoreline is classified as “buffer exempt.” Also, the study area is located within Maryland’s Coastal Zone.

There are no Sensitive Species Project Review Areas or Wildlife Management Areas in the study area. Only small areas of forest cover exist in the study area. The Baltimore Annapolis Trail is designated by DNR as a Greenway.

Smart Growth Initiatives require the state to direct its growth-related programs and funding to support locally designated growth areas. These designated growth areas, or Priority Funding Areas (PFAs), generally include established towns and communities, as well as existing/proposed commercial areas and industrial sites. The study area west of Severn River Bridge is entirely located within a PFA. East of the bridge, the study area is predominately outside of PFAs.

A copy of the Environmental Feasibility Study is included in Appendix B

X. Public Involvement

On December 16, 2009, the State Highway Administration hosted a Public Open House at Anne Arundel Community College to present the study and concepts being considered to the community. In addition to members of the Project Team, there were 91 other attendees. Representatives from County Executive Leopold’s Office, the Anne Arundel Fire and Police Departments, the Greater Severna Park Council and the Capital Newspaper were also in attendance. The purpose of this meeting was to provide information on the Feasibility Study and to solicit feedback from citizens and elected officials.

The team received 57 comments cards on-site and one comment via e-mail. The following is a summary of concerns expressed at the open house.

General Comments:

- Views were mixed on the movable barrier. Some attendees liked the flexibility the reversible lane provided to adapt to different traffic situations. There were concerns regarding the operations of the movable barrier (potential breakdowns, daily maintenance and associated costs, etc)
- There were comments that SHA should address the long term issues with the bridge rather than band-aid solutions. Long term solutions are not currently addressed in the concepts.
- The Mill Creek and Sturbridge communities would like to consider sound barriers when developing the concepts. Representatives from this community wanted to know why they were not included when the other sound barriers were constructed.
- Others were concerned about trucks encroaching into their lanes as they travel around the curve on the east side of the bridge. It was suggested that a visual barrier be added to solve the rubbernecking across the bridge. This suggestion was included in a written letter/article.
- Several people had general maintenance questions about debris, drainage, landscaping, etc.

- A citizen was concerned that this project would not be needed if there was some regulation of housing developments based on job creation.

Traffic:

- A few citizens commented that they did not agree with the traffic data and delay numbers shown in the table. They expressed that their delays are worse than what was shown. SHA noted that delays would be increased if there was an incident, bad weather, or particularly heavy traffic in a given day.
- Numerous people asked about the impact construction will have on traffic.
- It was suggested that SHA should consider the effect of narrowing the lanes on the bridge to truck traffic in their analysis since there are many trucks crossing the bridge.
- There was interest in viewing the VISSIM animation by the public and there were requests to have a video be put on the webpage.
- It was asked whether relieving congestion within the project limit would just push it somewhere else downstream.
- Many individuals suggested short-term improvements, primarily to improve the merge conditions approaching the bridge and to eliminate "queue jumping" behaviors.

Concepts Being Considered:

- Concepts 1A and 1B were generally preferred over the others with Concept 1A getting the most feedback of the two.
- Several people did not think Concept 4 would work without aggressive enforcement, similar to what they do in Europe. Some people suggested using Concept 4 in conjunction with other concepts or as a trial before constructing another concept.
- Many people supported Concept 1A, because it had the greatest operational benefit for all directions. However, there were some compelling arguments for Concept 1B which included:
 - Having the EB lane add at Rowe Blvd and drop at Richie Highway. They were not sure that enough vehicles would voluntarily move into the extra lane under Concept 1 A. They also had concerns regarding the merge from 4 lanes to 3 lanes under Concept 1 A.
 - It was noted that the duration of the AM peak congestion is typically shorter than the PM peak congestion. They indicated that the AM congestion generally cleared within a half hour, while the PM and summer congestion can last for hours. Based on this, they did not see the need to improve westbound conditions and supported Concept 1B.
- There was some support for Concept 6 (new bridge). They understood that this concept should be dropped as a short-term solution, but wanted to be sure that it was still considered in the future because it is the only concept that addresses long-term needs.

Suggestions included:

- Eliminate the long two-lane weave section between Solomon's Island Road and Rowe Boulevard. This section is primarily used only to "queue jump." Convert to a shorter merge at Solomon's Island Road, followed by a shorter diverge to Rowe Blvd.
- Shorten the merge from Rowe Blvd. This would force vehicles to merge in advance of the bridge, instead of having the merge right at the base of the bridge. It would also reduce "queue jump" maneuvers at this location.
- It was suggested that the exit lane at Rowe Blvd be restriped to reduce the number of lanes.
- The comment was made that the increase in merge lanes from Rowe Blvd. to the base of Severn Bridge has been the major culprit for the traffic jams.
- The comment was made that narrow lanes on bridge, and lack of shoulders causes the reduction in speed (braking), which in turn causes the beginning of the traffic congestion experienced along Route 50.
- It was suggested that speed limits along US 50 and Rowe Blvd. be reduced.

A copy of the Project Newsletter, along with copies of the comments cards received, are provided in Appendix C.

XI. Concepts Retained & Dropped

Following the public meeting, the project team met and reduced the number of Concepts under consideration. Concepts retained were 1A, 1B, 2 and 4. Table 6 was developed to summarize the operational benefits of each of the Concepts to be retained.

TABLE 6: Operation Benefits Summary

Benefit	Concept 1A	Concept 1B	Concept 2	Concept 4
Improves peak period operations in the eastbound direction toward the Bay Bridge	Yes	Yes	Yes	Minimal
Improves peak period operations in the westbound direction toward I-97	Yes	No*	Yes	No
Maintains good operations in the off-peak direction	Yes	Yes	No	Yes
Reduces overall system delay during Summer Friday peak period	Yes	Yes	No	Minimal

* Concept 1B makes peak period operations slightly worse in the WB direction.

After a more detailed analysis of each concept, advantages and disadvantages were developed so that SHA could identify which concepts address the problem statement, determine which concepts should be retained, and which concepts should be dropped from further consideration. The following lists the advantages and disadvantages of each concept.

Concept 1A (Reversible Lanes with a Moveable Barrier / Replace the existing median barrier with a movable barrier) - Retained

This concept has been retained due to the elimination of congestion during all peak periods.

- Advantages
 - Projected to virtually eliminate congestion at the Severn River Bridge for all peak periods (including Summer) in the near term
 - This concept was generally well received by the stakeholders
 - Existing drainage patterns can be maintained.
- Disadvantages
 - Requires that a portion of the deck across the bridge to be replaced
 - Requires that the median be reconstructed
 - Requires a moveable barrier transfer machine and all associated operating and maintenance costs
 - Does not accommodate design year volumes (Projected to exceed capacity in the year 2018)
 - Slight reduction in capacity in the non-peak direction due to reduced lane and shoulder widths
 - Overhead sign structures need to be replaced with cantilever sign structures
 - Need to get the barrier transfer machine operator to and from the transfer machine, which is stored in the median.

Concept 1B (Additional Eastbound Lane / Shift existing median barrier to add a lane) - Retained

This concept was retained due to the elimination of congestion during the PM and Friday PM peak periods and the benefits of providing a continuous lane between Rowe Blvd. and MD 2/MD 450.

- Advantages
 - Projected to virtually eliminate congestion in the eastbound direction at the Severn River Bridge for all peak periods (including Summer) in the near term
 - Eliminates the eastbound merge at Rowe Boulevard
 - Does not require a moveable barrier transfer machine or any of the associated operating and maintenance costs
 - This concept was generally well received by the stakeholders.
- Disadvantages
 - Requires that a portion of the deck across the bridge to be replaced
 - Drainage modifications will be required for the bridge. A series of scuppers will need to be installed as part of the new barrier and piped to the existing drainage system under the structure
 - Requires that the median be reconstructed
 - Does not eliminate or improve the queue in the westbound direction
 - Slight reduction in capacity in the westbound direction due to reduced lane and shoulder widths (Westbound volumes currently exceed Bridge capacity in the AM peak hour – this concept reduces capacity slightly in westbound direction)
 - Does not accommodate design year volumes (Projected to exceed capacity in the eastbound direction in the year 2018)
 - Several overhead sign structures would need to be replaced

Concept 2 (A-D) (Reversible Lanes with a Moveable Barrier / Maintain existing median barrier and add a movable barrier to each side) – 2A Retained / 2B,C &D Dropped

This concept has been retained due to the elimination of peak direction congestion during all peak periods. Concepts 2B thru 2D were dropped due to the increased cost without any additional benefit.

- Advantages
 - Maintains the existing median barrier
 - Projected to virtually eliminate congestion at the Severn River Bridge in the peak direction for all peak periods (including Summer) in the near term
 - Stakeholder reaction was mixed.
- Disadvantages
 - Requires a portion of the median be reconstructed in transition areas
 - Requires 2 runs of moveable barrier and 2 moveable barrier transfer machines and all associated operating and maintenance costs
 - Does not accommodate design year volumes (Projected to exceed capacity in the peak direction in the year 2018)
 - Eliminates one lane in the non-peak direction
 - Introduces significant congestion and queuing in the non-peak direction, particularly during the Summer peak
 - The longer options result in reduced demand since traffic is “trapped” in the reversible lane (can’t get in or out except at each end)
 - A disabled vehicle between the permanent and moveable barrier may block traffic due to the limited width between the barriers.
 - Need to get the barrier transfer machine operator to and from the transfer machine, which is stored in the median.

Concept 2 (E-H) (Reversible Lanes without a Moveable Barrier / Maintain existing median barrier and convert one lane to a reversible lane) – Dropped

This concept was dropped due to safety concerns and the increased potential for head-on collisions.

- Advantages
 - Maintains the existing median barrier
 - Projected to virtually eliminate congestion at the Severn River Bridge in the peak direction for all peak periods (including Summer) in the near term
- Disadvantages
 - Does not provide a moveable barrier or barrier separation
 - Requires a portion of the median be reconstructed in transition areas
 - Requires overhead dynamic lane use signs
 - Does not accommodate design year volumes (Projected to exceed capacity in the peak direction in the year 2018)
 - Eliminates one lane in the non-peak direction

- Introduces significant congestion and queuing in the non-peak direction, particularly during the Summer peak
- The longer options result in reduced demand since traffic is “trapped” in the reversible lane (can’t get in or out except at each end)
- This concept was not favored by the stakeholders.

Concept 3 (CD Road / Express Lanes) - Dropped

This concept was dropped due to cost and impacts, but primarily since it did not address the congestion approaching the bridge outlined in the problem statement.

- Advantages
 - Adds eastbound capacity through each of the interchanges from I-97 to MD 70
 - Separates local interchange traffic from through trip congestion
- Disadvantages
 - Does not improve congestion at the bridge
 - Requires a barrier to separate through trips from local trips
 - Requires widening along eastbound US 50, impacting 5 bridges
 - Does not accommodate design year volumes, because it does not improve an existing failing condition at the Severn River Bridge
 - There was little reaction, positive or negative, from the stakeholders.

Concept 4 (Lane Speed Control / Variable Speed Limit) - Retained

This concept was retained due to its minimal cost, the potential to incorporate it with any other concept, and the potential for some limited improvements to congestion.

- Advantages
 - Minimal cost, particularly if used on a trial basis
 - May improve traffic operations
 - Could be used with any other Concept
 - While the stakeholders did question its effectiveness in reducing congestion, they generally agreed that it should be considered.
- Disadvantages
 - Unproven technology
 - Lane Speed Control – No examples in the US
 - Variable Speed Limits – Limited US experience for congestion management
 - Does not accommodate design year volumes (Cannot determine projected fail year because it is difficult to quantify the potential effect on bridge capacity)
 - Cannot effectively model potential impacts

Concept 5 (Ramp Metering / Signal Timing) - Dropped

This concept was dropped after the traffic analysis indicated no improvements to congestion.

- Advantages
 - Minimal cost

- Could be used with any other Concept
- Disadvantages
 - Not shown to improve traffic operations on US 50
 - Does not improve congestion at the bridge
 - Does not accommodate design year volumes because it does not improve an existing failing condition at the Severn River Bridge
 - There was little reaction, positive or negative, from the stakeholders.

Concept 6 (New Severn River Bridge) - Dropped

This concept was dropped since it's considered a more long term solution to the current congestion. Due to its considerable impacts and costs, this would be evaluated as part of a more comprehensive Project Planning Study.

- Advantages
 - Does accommodate design year volumes (and beyond)
 - Does eliminate design year congestion
- Disadvantages
 - Is not effective unless US 50 and the interchanges east and west of the bridge are improved.
 - High Costs
 - ROW Impacts
 - Environmental impacts
 - Although many of the Stakeholders believe this to be the ultimate solution to the congestion, that also recognize the difficulty in implementing such a solution in the near term.

Based on the public comments and a review of the advantages and disadvantages of each concept, the project team determined that Concept 2A should be dropped from further consideration. In addition to being the most costly, peak direction traffic operations were no better than under Concepts 1A and 1B. In addition, other significant disadvantages include: requiring 2 runs of moveable barrier and 2 moveable barrier transfer machines and all associated operating and maintenance costs, and eliminating one lane in the non-peak direction, resulting in significant congestion and queuing in that direction, particularly during the Summer peak.

The team noted that Concept 1A and Concept 1B were the preferred concepts under consideration. Additionally, Concept 4 could be combined with any concept and/or implemented on a trial basis to determine if there would be a benefit, since the modeling efforts did not offer a significant benefit to the system. In order to determine which of the concepts would be preferred for this feasibility study, the project team met to discuss and develop an advantages and disadvantages list for both Concepts 1A and Concept 1B.

XII. Key Issues in Consideration of a Preferred Option

Concepts 1A and Concept 1B each provide a viable solution to the recurring congestion based on the analysis, along with both being supported by the public. However, the project

team was directed to select one preferred concept following a meeting with the SHA Administrator on August 19, 2010. A review of the following key issues and unknown factors helped the project team to reach a conclusion.

- Human factors contribute to driver behavior and existing congestion on the bridge. This lead the project team to conclude that there may be motorists who will shy away from using the additional lane because of the open joint. This is more critical under Concept 1A, which requires motorists to voluntarily move into the reversible lane to be effective.
- In other states there is dedicated staff to operate the barrier transfer machine. Based on the current economic climate, will SHA be able to accommodate this? It is unclear how the driver will access the barrier transfer machine. If a pedestrian bridge with stairs were built from the Ridgely Ave (MD 436) overpass into the median, how would the staffer be picked up at the end of the run? In addition, it is unclear if the Maryland State Police will be needed during the lane shifts. Historically, reversible lane systems have been installed exclusively at toll facilities. Since this is not a toll facility, there will be high reoccurring costs that cannot be recouped from the users.
- Concept 1A would require the purchase of a spare machine, in the event of a breakdown. In inclement weather, it may not be possible to shift lanes. There would need to be one key person responsible for making the decision whether to reverse the lanes or not each day.
- Crash / incident management –There is no room for the moveable barrier to deflect before it encroaches on the travel lanes in the opposite direction.
- Concept 1A would provide additional capacity in both directions. However, there is questionable confidence in the model to accurately predict driver behavior, because drivers must voluntarily move into the new lane, as they do in the model. The Concept 1A simulation demonstrates the need to start the reversible lane as soon as possible before the Rowe Boulevard Merge. A slight shift east, results in little or no benefit.
- Under Concept 1B, the queues along westbound US 50 and southbound MD 2 in the AM *are slightly increased* because of the reduced lane width across the Severn River Bridge. However, public perception is that the primary congestion problem is in the eastbound direction. Under Concept 1B, drainage modifications will be required for the bridge, because the barrier will no longer be located at the high point of the bridge cross section. However, the project team believes it can address this issue by shifting the barrier to the north, while maintaining the existing cross slopes, water will drain to the south side of the new barrier, collected by a series of scuppers and piped to the existing drainage system under the structure.

XIII. Summary

The purpose of this Feasibility Study is to develop and evaluate concepts to relieve congestion along US 50 at the Severn River Bridge in Annapolis, Maryland. The heaviest congestion occurs in the eastbound direction during the PM peak period and on summer Friday afternoons.

A number of concepts were examined and either retained or dropped; including options to install a moveable barrier. Concept 6, a parallel span of the Severn River Bridge, is the only concept that will alleviate year 2030 congestion. . Most of the concepts only improve

traffic conditions for 8 – 10 years after implementation, based on the analysis of 2007 volumes.

Concept 1 provides an additional lane across the Severn River Bridge. Option A increases capacity in both the AM and PM peak directions, while Option B only increases capacity in the eastbound direction. While Option A provides the required congestion relief, there are higher costs due to the moveable barrier system and associated annual operating and maintenance expenses. Option B provides the required congestion relief in the eastbound direction and significantly reduces eastbound merging, lane changing, and weaving. However, the capacity in the westbound direction is reduced due to the narrower lanes and shoulders.

Concept 2 provides options for a much longer reversible lane system, but the analysis indicates little, if any, additional benefit to justify the additional costs. In addition, it reduces the number of lanes across the bridge in the non-peak direction, resulting in an increase in congestion in that direction. It also includes several options for a reversible lane system without a moveable barrier, which have also been dropped. The lack of barrier protection for traffic traveling in opposite directions, however, raises safety concerns due to the increased potential for head-on collisions.

Concept 3 provides eastbound express lanes to separate recurring congestion from local trips between interchanges. While there is an overall system benefit, it does not alleviate congestion approaching the bridge. It should be considered; however, as part of a larger project to add a parallel span across the Severn River.

Concepts 4 & 5 are the least expensive concepts, but do not result in any measurable benefit to recurring congestion. Concept 5, Variable Speed Limits, could be implemented on a trial basis if it is determined that other systems throughout the country have been successful. These systems are relatively new so it's not yet known how well they perform.

Concept 6 is a parallel span across the Severn River. Since the existing span cannot accommodate 2030 volumes, even with reversible lanes, it was presented for consideration. While the costs are certainly prohibitive at this time, it is important to recognize the need for further study.

After consideration of the analysis and all of the input provided by the Stakeholders, including comments received at the Public Open House, Concepts 1A and 1B appears to be the most viable solutions to the recurring congestion.

XIV. Team Recommended Concept

Based on these findings, the project team recommends Concept 1B as the most feasible option. We recognize that Concept 1A is a new system for Maryland which could be on the cutting edge of technology; however, Concept 1A has several unknowns and risk factors due to the reversible lane system, which make it difficult to recommend this concept.

The project team is more confident that Concept 1B will deliver the intended benefits in the eastbound direction, which is the critical movement. Although Concept 1B will slightly

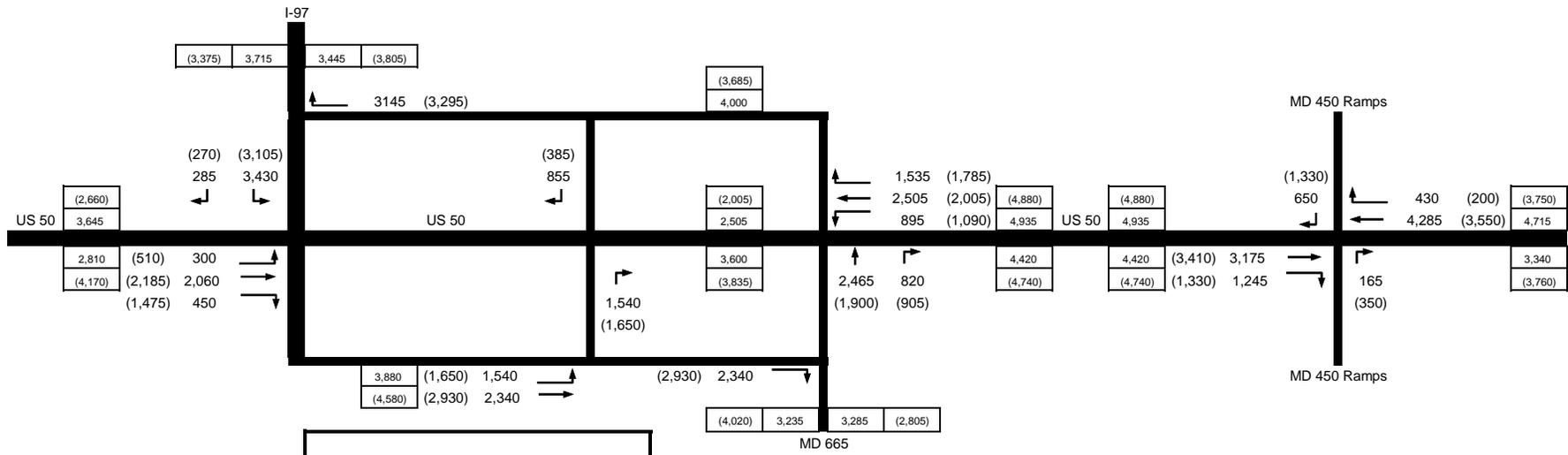
reduce capacity in the westbound direction, the project team had determined that the advantages of this option outweigh the disadvantages.

A copy of the Concurrence Memo to the SHA Administrator, approved on May 5, 2011, is included in Appendix D.

APPENDIX A

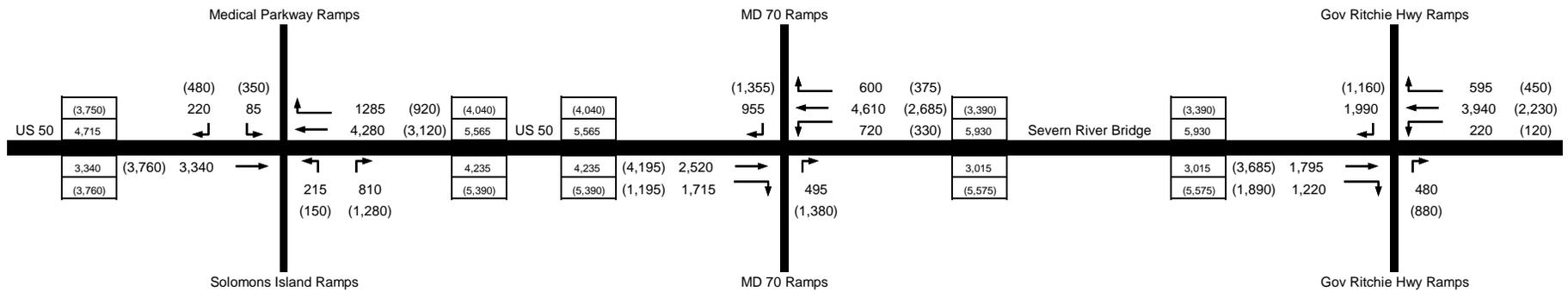
TRAFFIC DATA

SHA Travel Forecasting January 2008



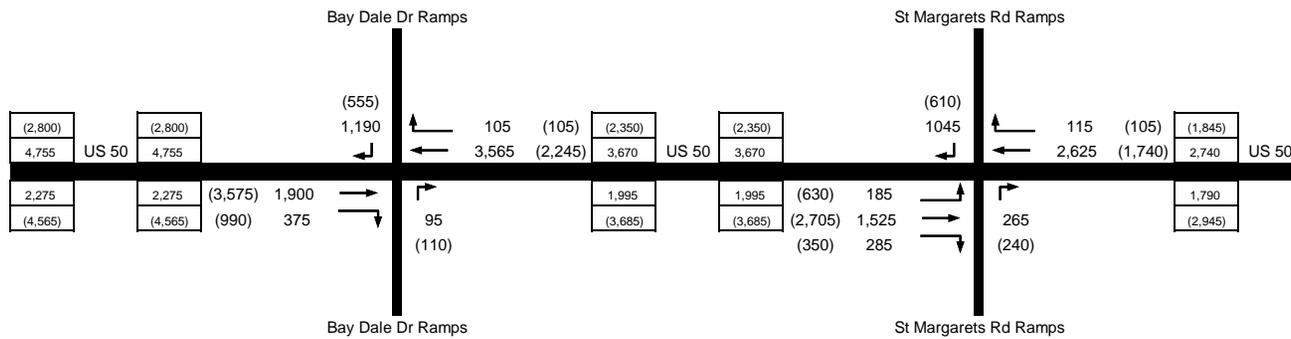
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Anne Arundel County, MD	
Conditions: Existing	Year: 2007
AM (PM) Peak Hour Volumes	

SHA Travel Forecasting
January 2008



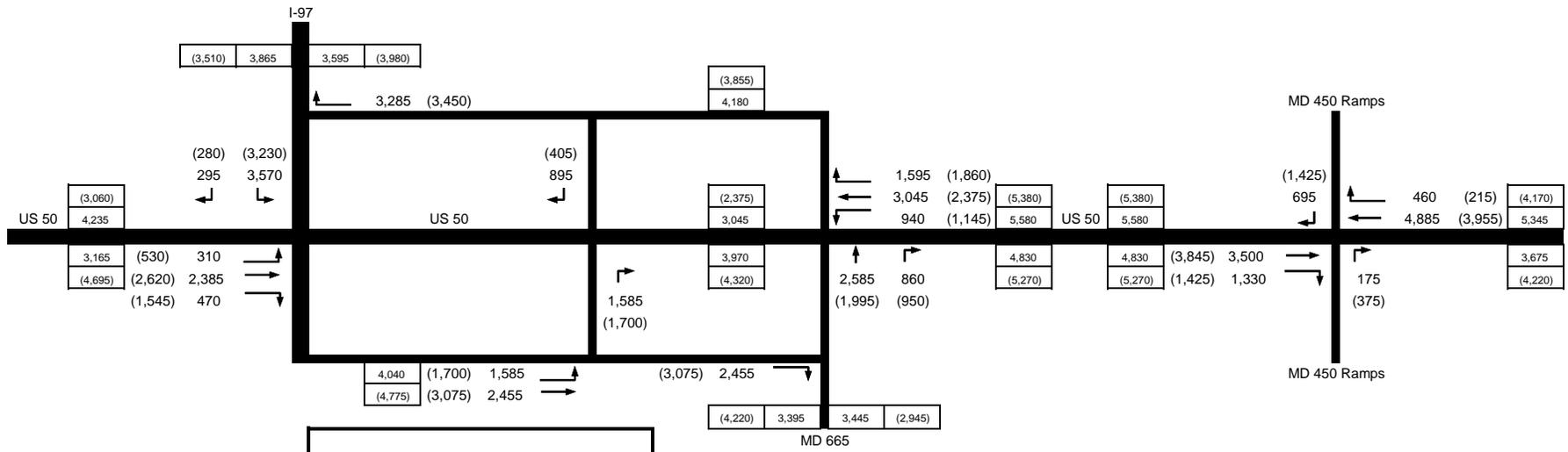
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AM (PM) Peak Hour Volumes	

SHA Travel Forecasting
January 2008



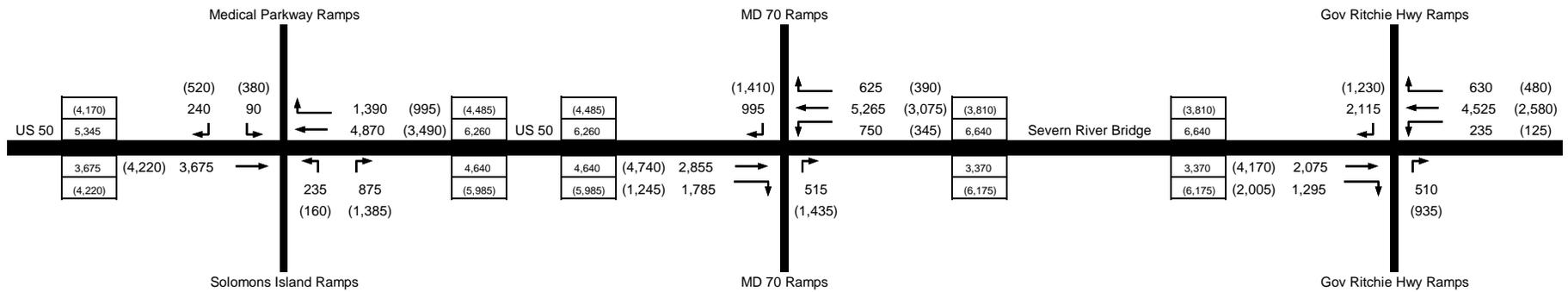
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Anne Arundel County, MD	
Conditions: Existing	Year: 2007
AM (PM) Peak Hour Volumes	

SHA Travel Forecasting January 2008



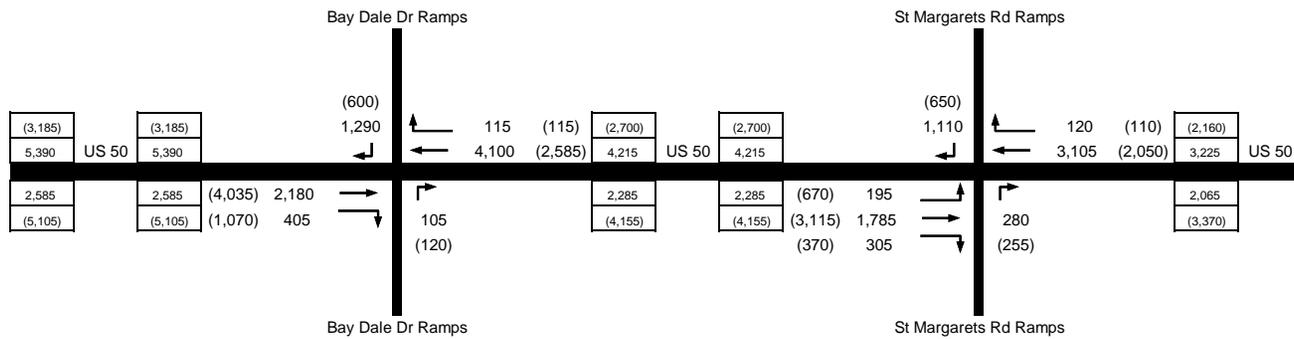
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Conditions: No Build	Year: 2015
AM (PM) Peak Hour Volumes	

SHA Travel Forecasting
January 2008



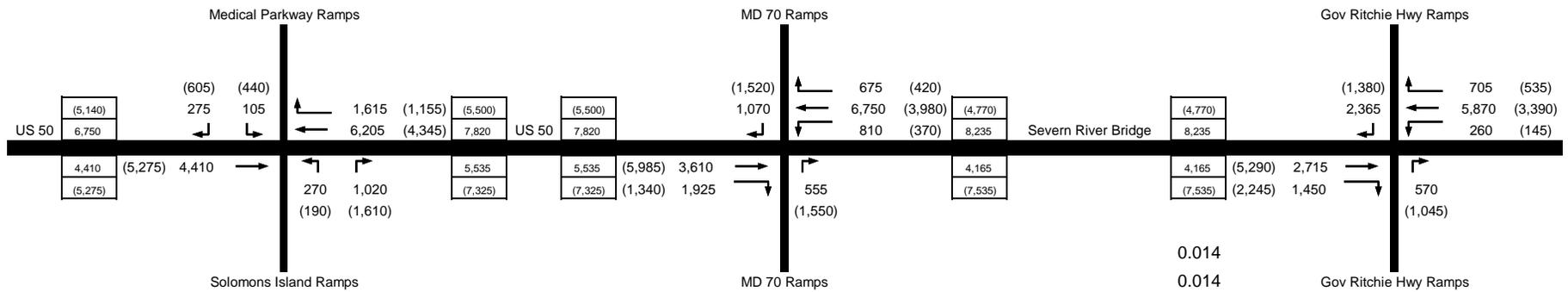
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AM (PM) Peak Hour Volumes	

SHA Travel Forecasting
January 2008



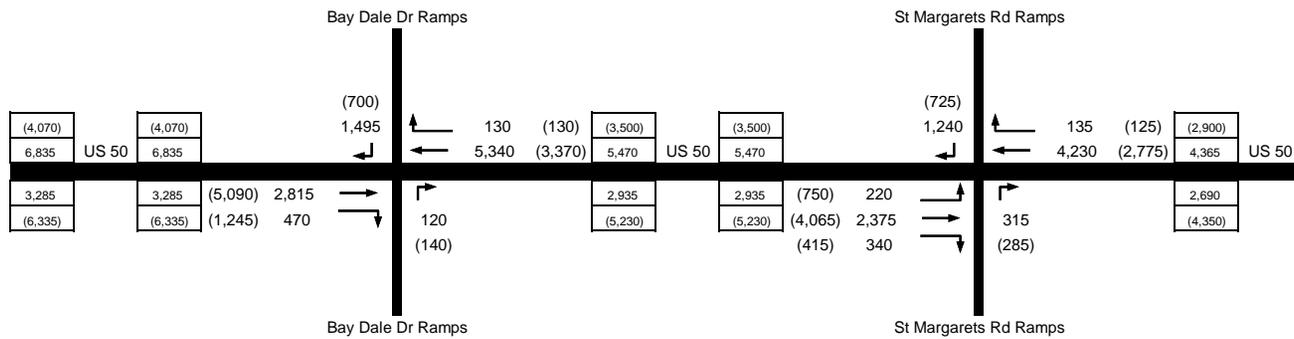
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Conditions: No Build	Year: 2015
AM (PM) Peak Hour Volumes	

SHA Travel Forecasting January 2008



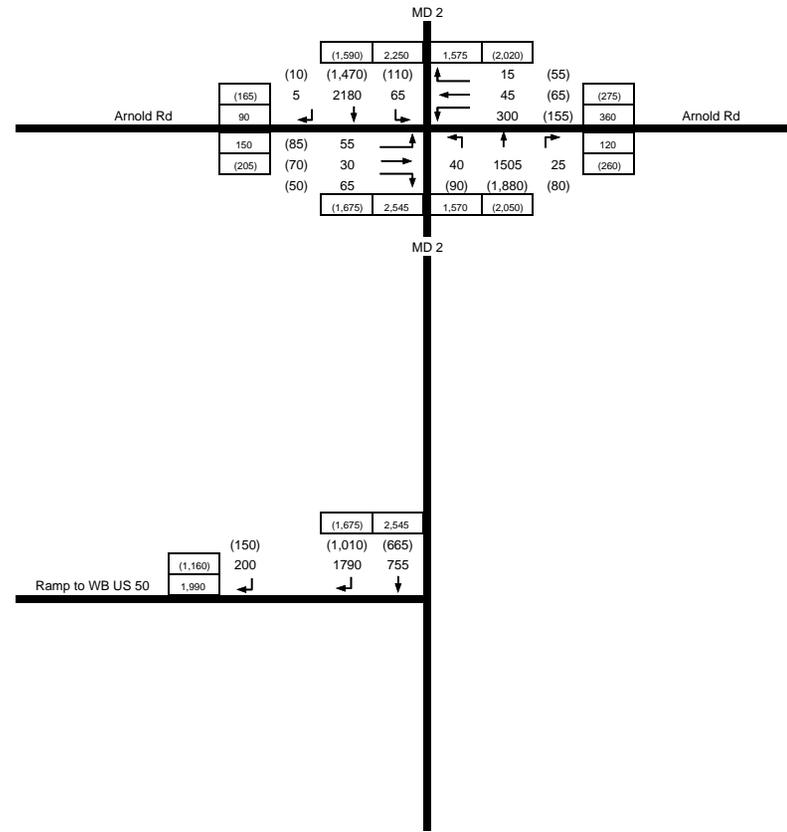
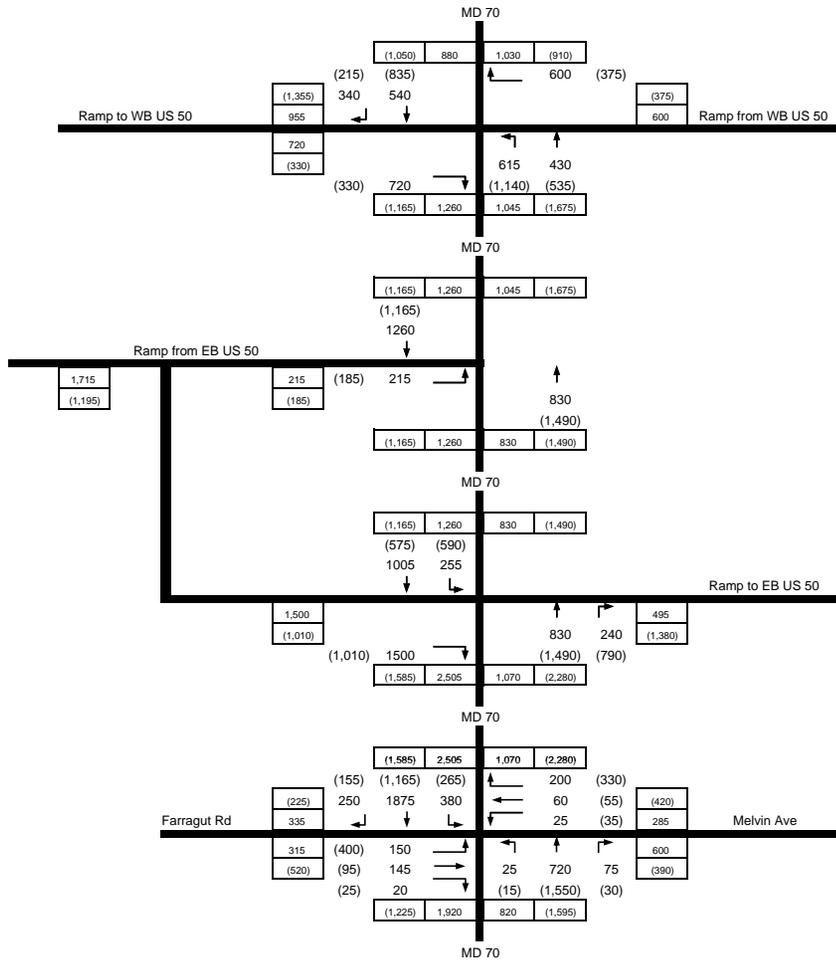
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Anne Arundel County, MD	
Conditions: No Build	Year: 2030
AM (PM) Peak Hour Volumes	

SHA Travel Forecasting
January 2008



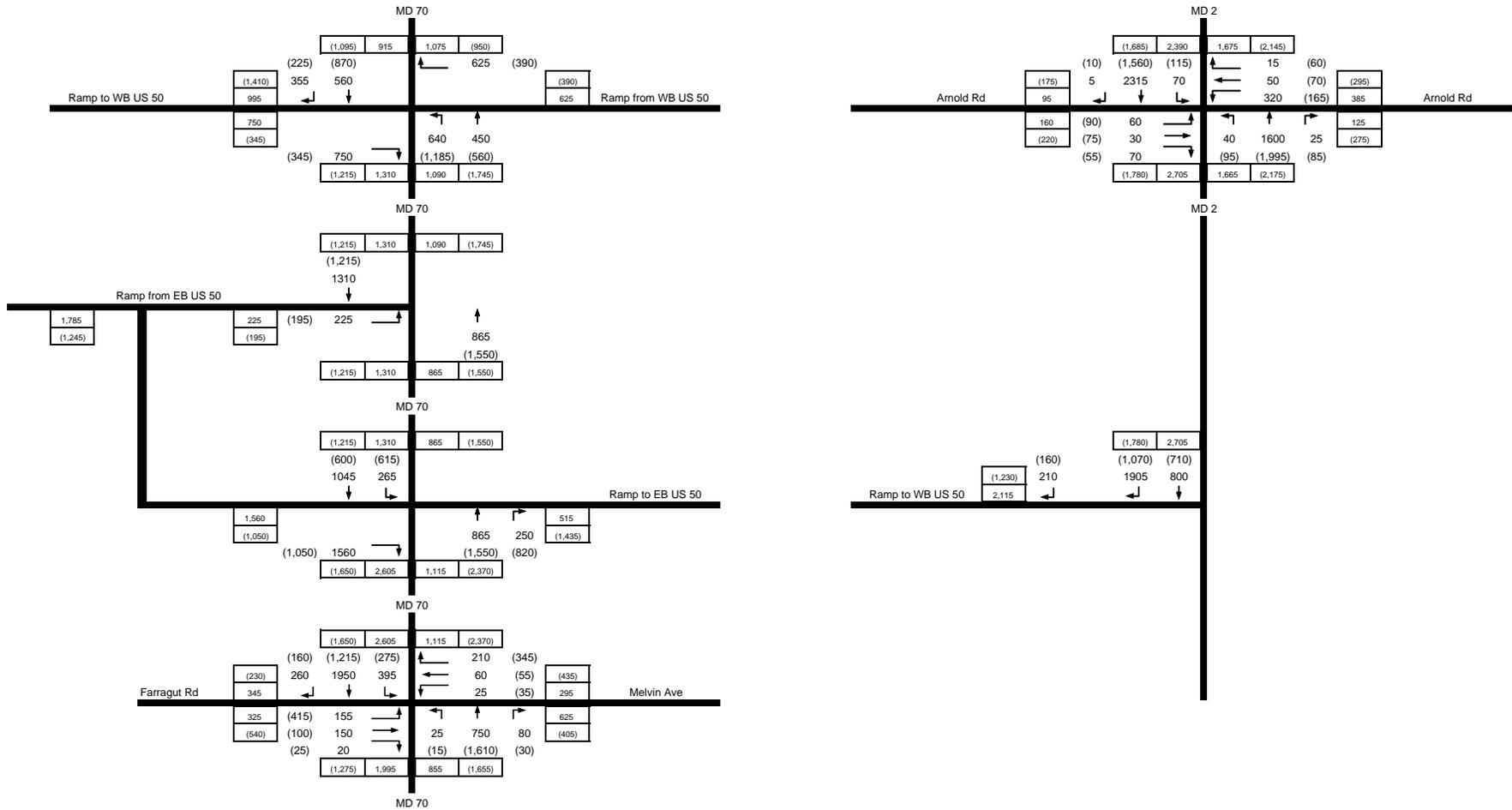
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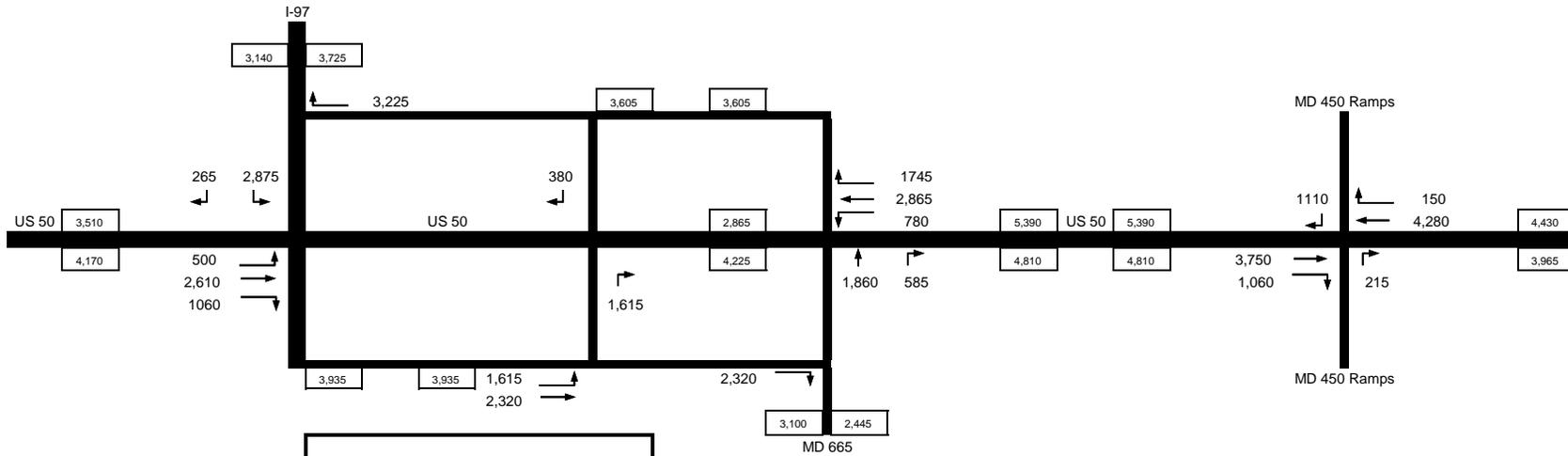
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Conditions: Existing	Year: 2007
AM (PM) Peak Hour Volumes	

SHA Travel Forecasting
January 2008



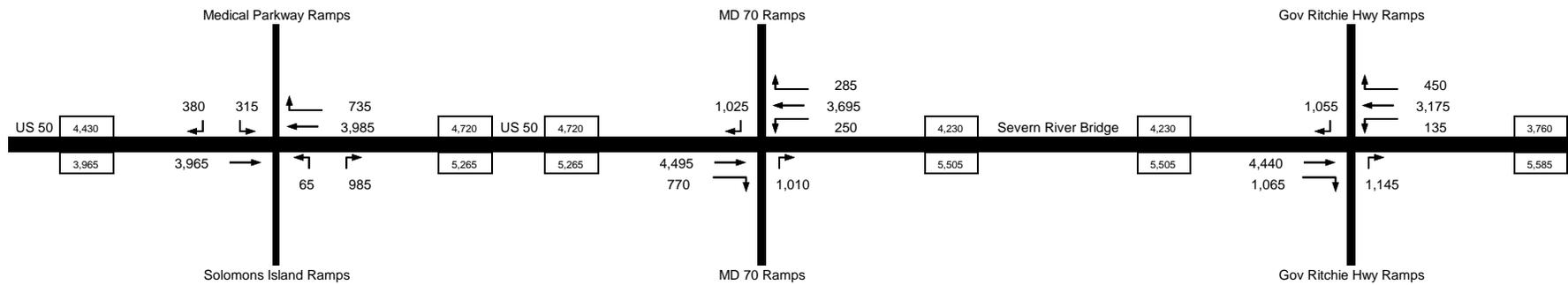
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Conditions: No Build	Year: 2015
AM (PM) Peak Hour Volumes	

SHA Travel Forecasting
January 2008



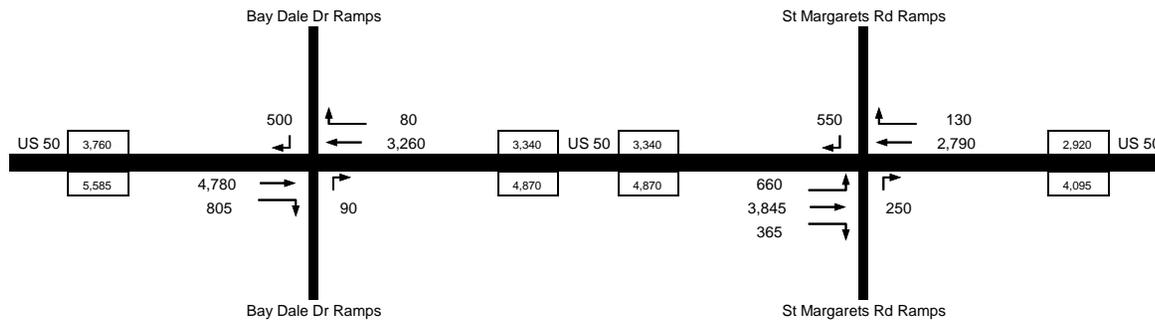
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Conditions: Existing	Year: 2007
Summer Friday Peak Hour Volumes	

SHA Travel Forecasting
January 2008



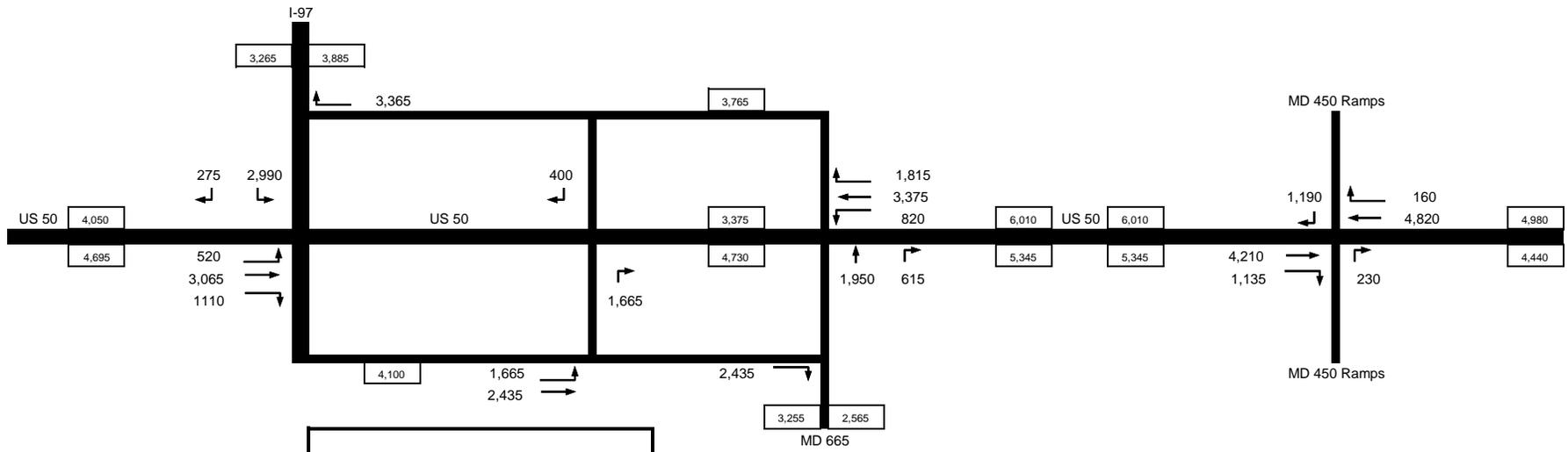
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Summer Friday Peak Hour Volumes	

SHA Travel Forecasting
January 2008



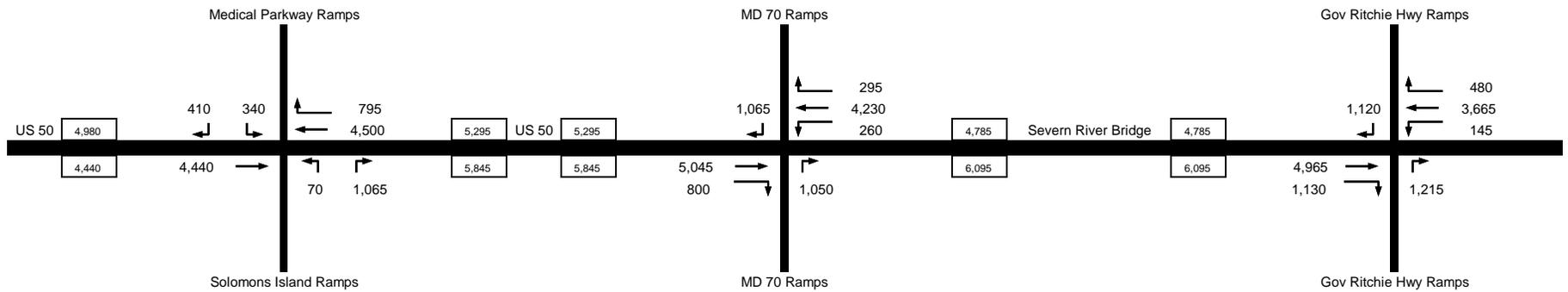
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Anne Arundel County, MD	
Conditions: Existing	Year: 2007
Summer Friday Peak Hour Volumes	

SHA Travel Forecasting
January 2008



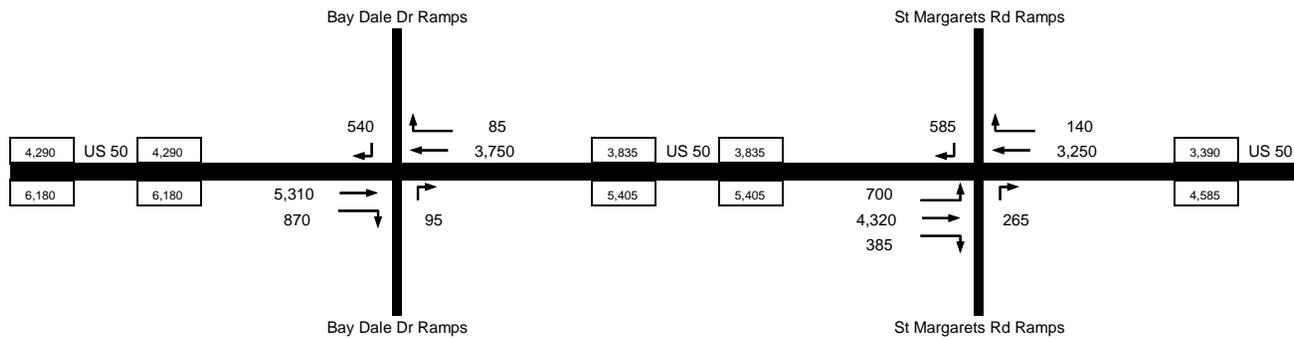
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Conditions: No Build	Year: 2015
Summer Friday Peak Hour Volumes	

SHA Travel Forecasting
January 2008



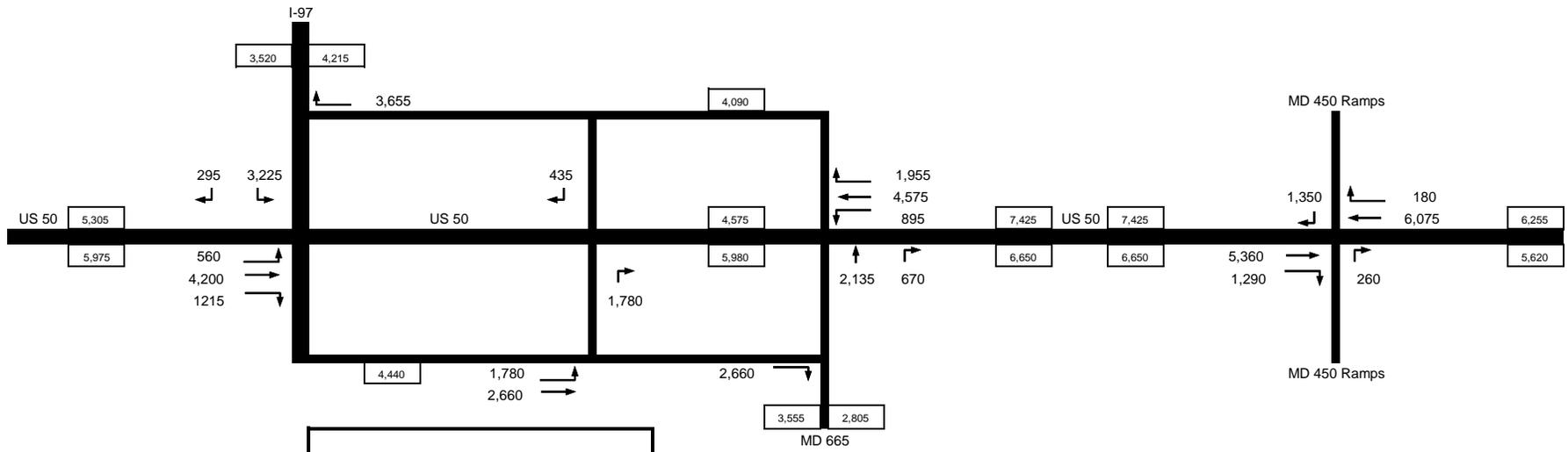
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Anne Arundel County, MD	
Conditions: No Build	Year: 2015
Summer Friday Peak Hour Volumes	↑ N

SHA Travel Forecasting
January 2008



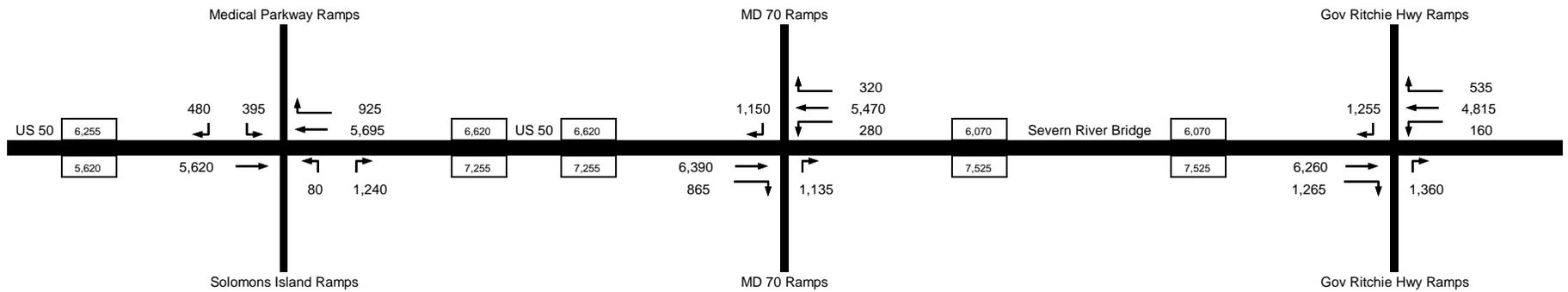
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Anne Arundel County, MD	
Conditions: No Build	Year: 2015
Summer Friday Peak Hour Volumes	

SHA Travel Forecasting
January 2008



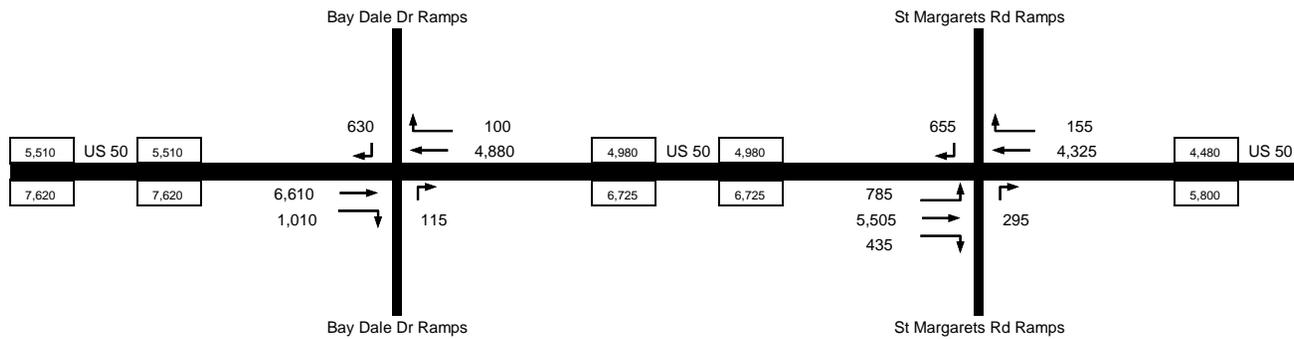
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Conditions: No Build	Year: 2030
Summer Friday Peak Hour Volumes	

SHA Travel Forecasting
January 2008



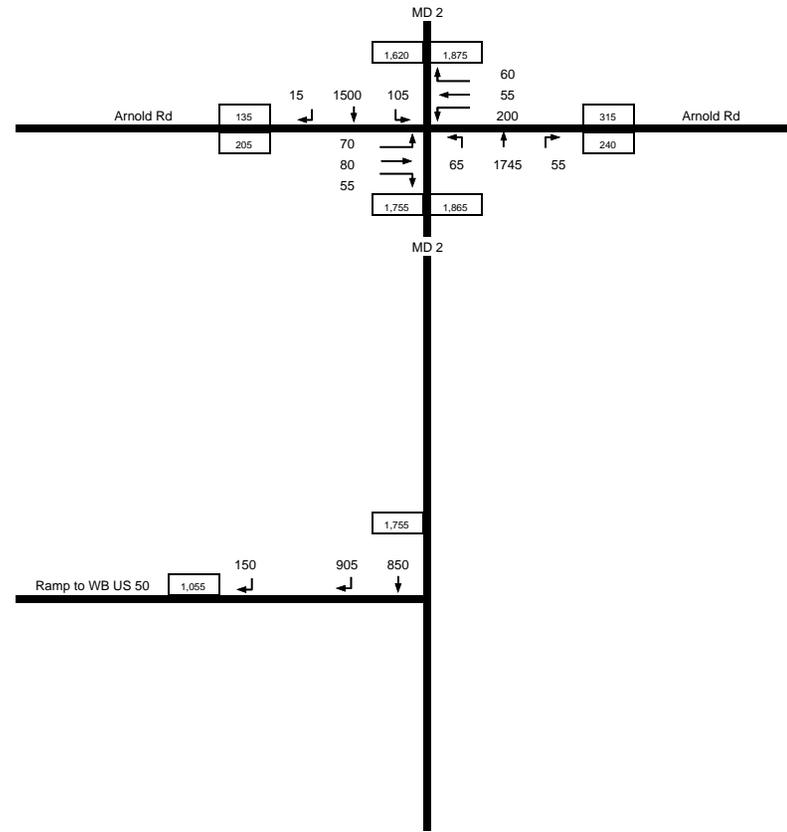
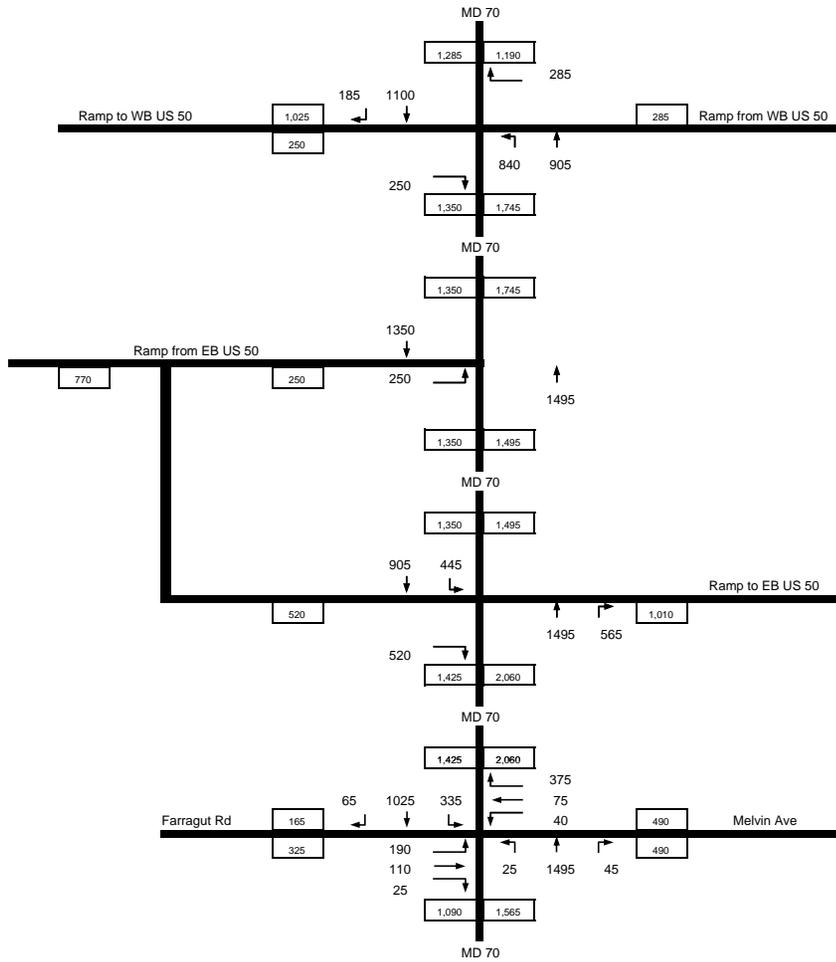
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Anne Arundel County, MD	
Conditions: No Build	Year: 2030
Summer Friday Peak Hour Volumes	↑ N

SHA Travel Forecasting
January 2008



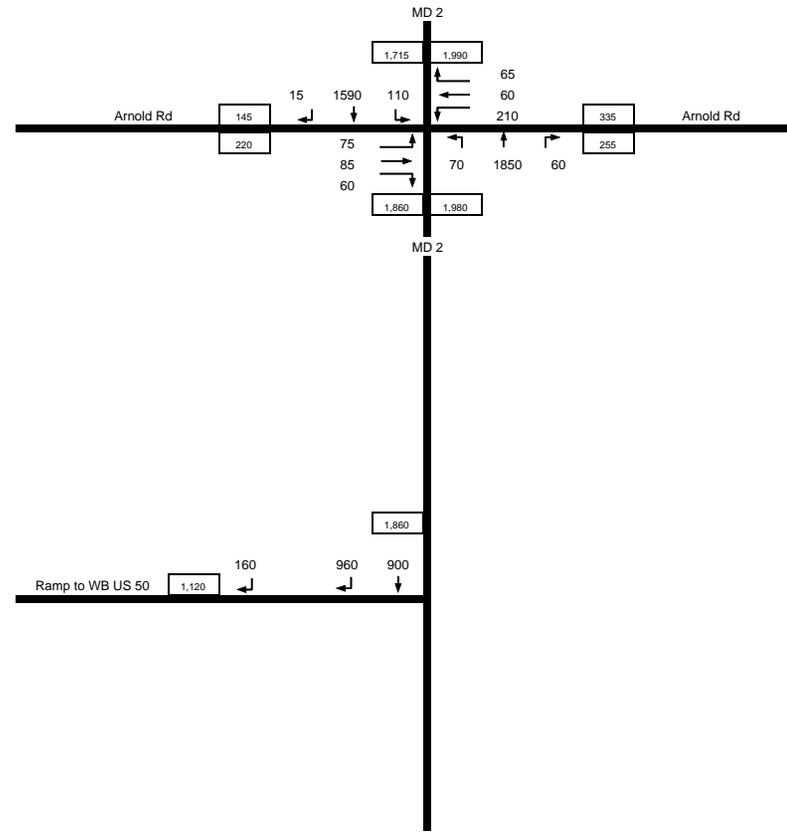
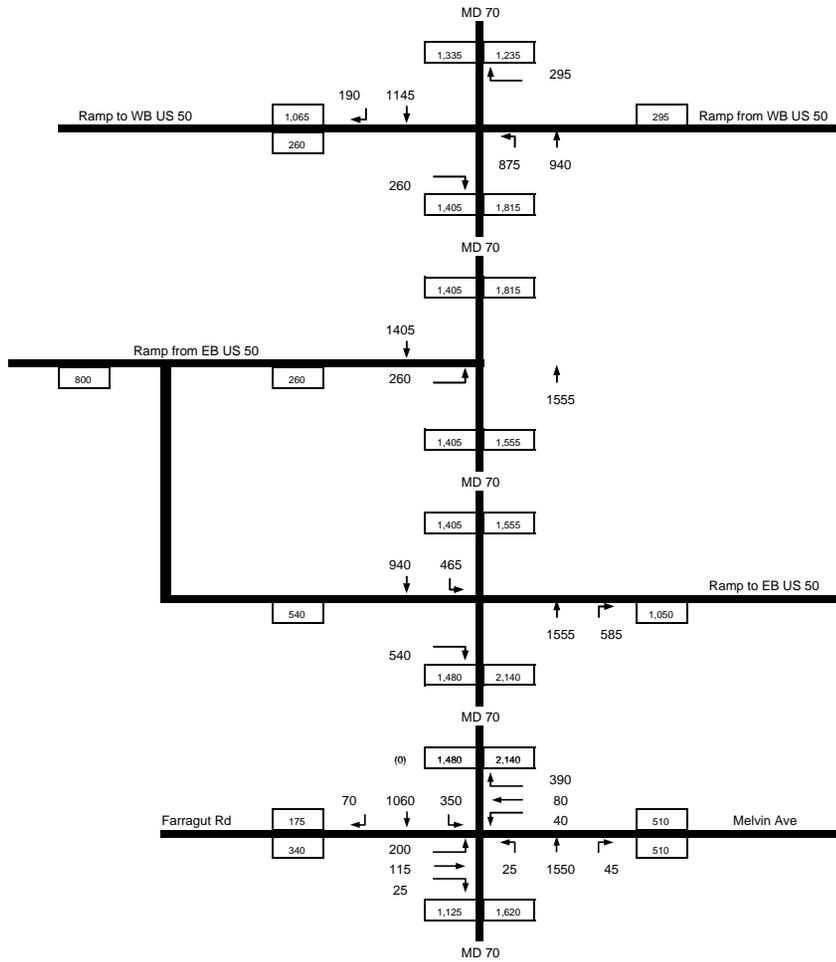
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Anne Arundel County, MD	
Conditions: No Build	Year: 2030
Summer Friday Peak Hour Volumes	

SHA Travel Forecasting
January 2008



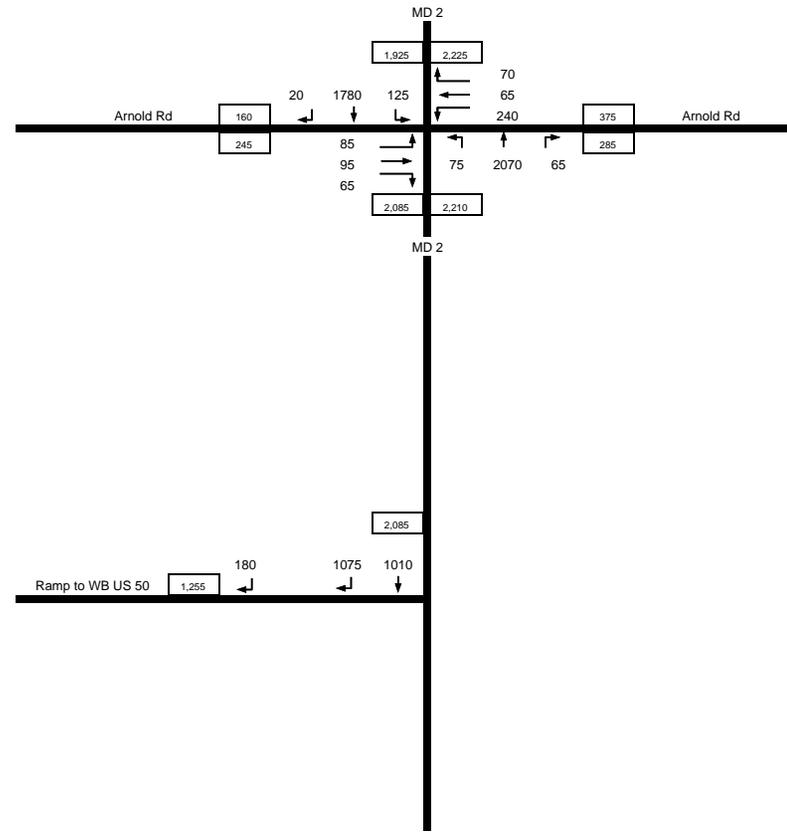
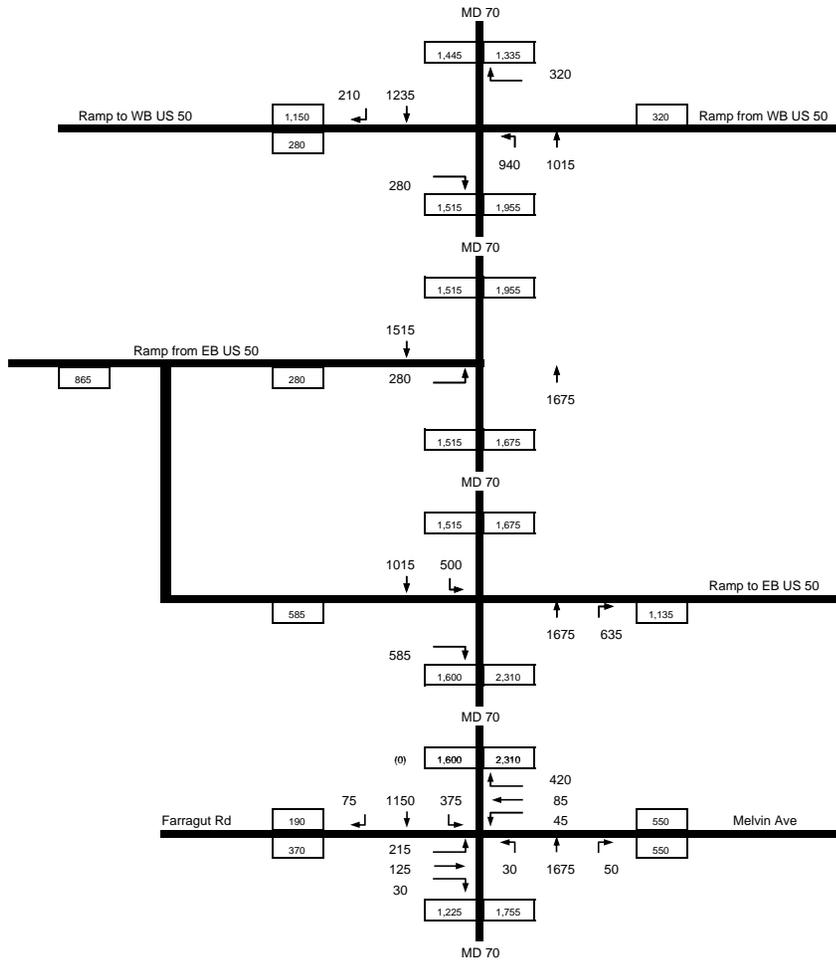
US 50 Cross Streets Volume Network	
MD 70 & Gov Ritchie Hwy (MD 2)	
Anne Arundel County, MD	
Conditions: Existing	Year: 2007
Summer Friday Peak Hour Volumes	

SHA Travel Forecasting
January 2008



US 50 Cross Streets Volume Network	
MD 70 & Gov Ritchie Hwy (MD 2)	
Anne Arundel County, MD	
Conditions: No Build	Year: 2015
Summer Friday Peak Hour Volumes	

SHA Travel Forecasting
January 2008



US 50 Cross Streets Volume Network MD 70 & Gov Ritchie Hwy (MD 2)	
Anne Arundel County, MD	
Conditions: No Build	Year: 2030
Summer Friday Peak Hour Volumes	

APPENDIX D

ENVIRONMENTAL FEASIBILITY STUDY

Environmental Feasibility Study

for the

US 50 Severn River Bridge Anne Arundel County, Maryland

Prepared for:

Maryland State Highway Administration
707 N. Calvert Street
Baltimore, MD 21202

Prepared by:



**STRAUGHAN
ENVIRONMENTAL
SERVICES, INC.**

9135 Guilford Road, Suite 100
Columbia, MD 21046

Under Contract to:

STV Inc./WBCM

July 6, 2010

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- Figure 4: Natural Resources
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1. Introduction

The Maryland State Highway Administration (SHA) is conducting a feasibility study to investigate both short-term and long-term improvements along John Hanson Highway (US 50), from I-97 to MD 179 in Anne Arundel County, Maryland, and at interchanges within the corridor, as shown on the attached figures. This report will identify the environmental resources within 200 feet of the project corridor and the environmental issues that may be associated with the proposed improvements.

The following environmental resource areas are included in this investigation:

- Demographics, including environmental justice populations;
- Parks and community facilities;
- Cultural and historic resources;
- Land Use;
- Hazardous materials;
- Surface water resources;
- Coastal resources; and
- Fish, wildlife, and plant habitats.

Environmental resources are also presented on the figures at the end of this report. The information gathered for this study is based entirely on readily available published information, and while generalized, will inform SHA of potential environmental issues and constraints associated with potential US 50 improvements.

2. Demographics and Environmental Justice

Demographics for the study area were collected using US Census 2000 block group data. In 2000, the populations of the 16 block groups that abut or intersect the study area was 27,366. The majority of the study area population was white (85 percent). African-Americans or Blacks made up the next highest racial group accounting for 11 percent of the population. Therefore, in the study area, environmental justice populations may exist where:

- A census block group's minority percentage meets or exceeds 16% or
- The percent of persons living below poverty in a census block group exceeds 6%.

Six census block groups met the criteria for a minority population, and three census block groups met the criteria for a low-income population. In all, seven census block groups are considered potential environmental justice population areas because they met either one or both of the criteria.

3. Parks and Community Facilities

Community facilities such as parks, schools, libraries, and churches are present in the study area and serve both a local and regional population. Three facilities are within the study area, as follows:

- The Baltimore and Annapolis Trail Park,
- Broadneck United Methodist Church, and
- West Annapolis Fire Department

The off road portion of the Baltimore and Annapolis Trail Park has a terminus located north of the US 50/MD 450 intersection. The Baltimore and Annapolis Trail Park continues south as an on road biking lane underneath US 50. There is a parking area south of US 50 off of MD 450 for trail users. The Baltimore and Annapolis Trail Park can be accessed from the parking area via Boulders Way by bike or foot. The Broadneck United Methodist Church is located near the US 50/Cape St. Claire Road interchange at the eastern terminus of the project. The West Annapolis Fire Department is located off of Jennifer Road west of the US 50/MD 70 interchange.

4. Cultural and Historic Resources

Within the study area, the Maryland Historic Trust indicate that one historic property, Howard's Inheritance (AN-136), is listed on the National Register of Historic Places (NRHP) and two are eligible for listing – Bridge 2081, Weems Creek Bridge (AN765) and the Annapolis Water Company (AN932). One archeological site – the Sharpe, Ridout, Boone Mill Site (18AN652) – is eligible for the NRHP.

5. Land Use

According to the existing Land Use Map from 2005, many different land uses abut US 50 in the study area. Retail and single family dwellings are the dominate land uses. Industrial, natural open space, office, townhouse, multiple family dwelling, and government/institutional uses are also present within the study area. Future land use would include 10 commercial sites, one minor residential subdivision, one major commercial development, one major residential

development, and one major federal development that are currently in various stages of planning and development.

6. Hazardous Materials

There are several sites along the study area listed under Resource Conservation and Recovery Act, as listed in the following table.

ID	SITE
1	SPECTRA-TECH APPLIED SYSTEMS 200 S Harry S Truman Pkwy Annapolis, Md 21403
2	SHELL GAS STATION 2056 West Street Annapolis, MD 21401
3	ANNAPOLIS PLATING AND POLISHING 40 Hudson Street Suite 107 Annapolis, MD 21403
4	ANNE ARUNDEL COUNTY JENNIFER RD GARAGE 133 Jennifer Road Annapolis, MD 21401
5	ANNAPOLIS ARMORY OMS 11A 18 Willow Ave (Located on Ridgely Ave) Annapolis, MD 21401

7. Surface Water

Streams and Rivers

The study area is in the Lower Severn River watershed that ultimately drains into the Chesapeake Bay. The Severn River, which bisects the study area, is tidal and located in the Western Coastal Plain physiographic province. The study area crosses several major streams and minor tributaries. From west to east, the study area crosses the following waterways: a) a tributary of Broad Creek near the western end of the study area, b) Weems Creek east of the MD 2 interchange, c) an unnamed tributary of Severn River just west of the Severn River Bridge, d) Severn River, e) Mill Creek east of the MD 648 interchange, and f) tributary to Whitehall Creek that crosses the study area in several locations west of the MD 179 interchange. US 50 bisects the 100-year floodplain in five areas. The tributary of Broad Creek has a Use I water designation (water contact recreation and protection of aquatic life). All other streams and rivers in the study area have a Use II water designation (shell fish harvesting). The Severn River is a designated State Wild and Scenic River. According the Maryland Department of Natural Resources (DNR) Environmental Review Unit, the perennial portions of the creeks and rivers in this area support spawning anadromous fish including white perch and yellow perch. The portion of the Severn River within the study area supports or is within 500 yards of areas of natural oyster bars.

Wetlands

The *National Wetlands Inventory for Anne Arundel County, Maryland* identifies multiple wetlands within the study area. The wetlands are generally located in close proximity to the streams and tributaries within the study area, in addition to a small wetland located just northeast of the MD 450 interchange. There are no wetlands of special state concern within the study area.

Chesapeake Bay Critical Areas

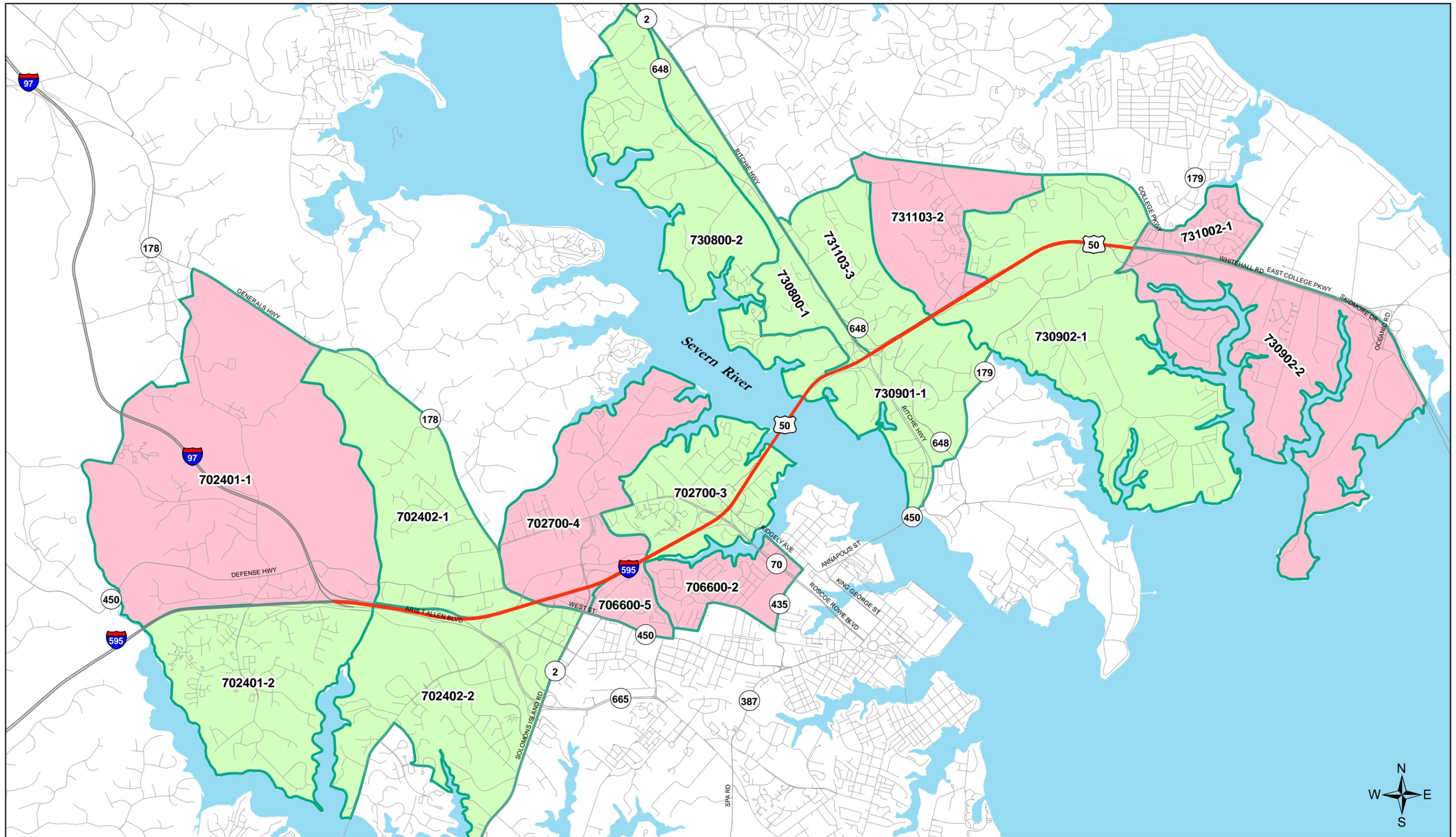
Portions of the study area are located within the Chesapeake Bay Critical Area, which is managed by the Critical Area Commission (CAC). The CAC designated three categories of land development within the Critical Area: Intense Development Area (IDA), Limited Development Area (LDA), and Resource Conservation Area (RCA). The study area passes through IDA, RCA, and LDA land. The Critical Area Act also establishes a 100-foot buffer of natural vegetation that extends 100 feet landward from the mean high water line of tidal waters or the edge of tidal wetlands and tributary streams. Within the study area, the Critical Area buffer along the shoreline is classified as “buffer exempt.”

8. Coastal Resources

Anne Arundel County is within Maryland’s Coastal Zone therefore all review requirements of Maryland’s Coastal Zone Management Plan (CZMP) must be met. Coastal Zone Consistency evaluates the proposed federal activities affecting the state’s coastal zone to ensure consistency with the enforceable policies of the CZMP.

9. Fish, Wildlife, and Plant Habitats

There are no SSPRAs or Wildlife Management Areas (WMA) in the study area. Only small areas of forest cover exist in the study area. Also, the Baltimore Annapolis Trail is designated by the Maryland Department of Natural Resources as a Greenway.



State of Maryland
 Department of Transportation
 State Highway Administration
 Highway Design Division

U.S. 50 / Severn River Bridge Figure 1 Environmental Justice Populations

Legend

- U.S. 50 / I-595 Project Corridor
- US Census 2000 Block Groups
- Environmental Justice Populations



U.S. 50 / Severn River Bridge
Figure 2
 Community Facilities and Cultural Resources

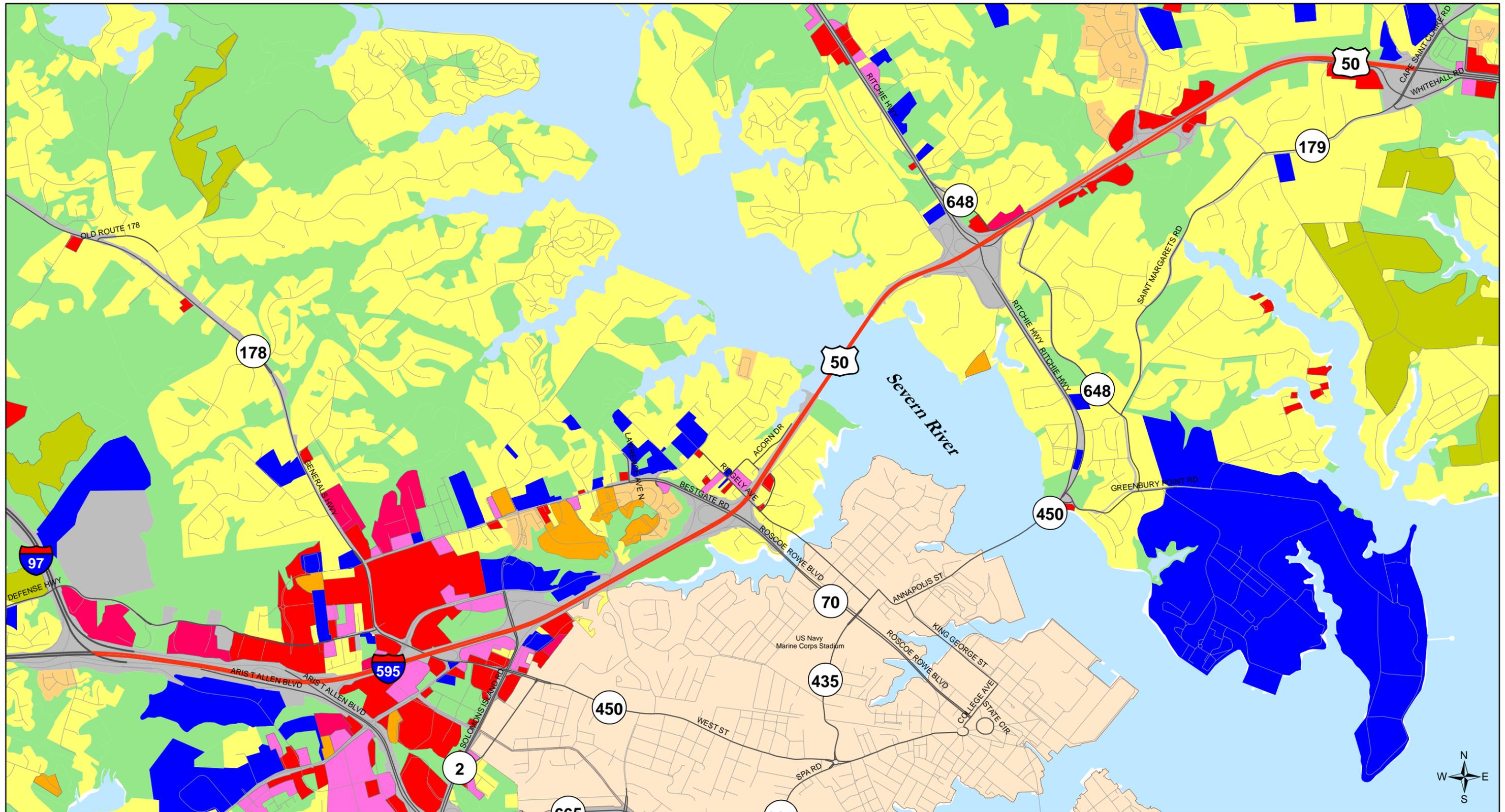


State of Maryland
 Department of Transportation
 State Highway Administration
 Highway Design Division

1 inch = 2,500 feet

Source: Maryland State Highway Administration; Anne Arundel County, Board of Education; ADC, The Map People; Anne Arundel County, Md., 2004; Field Reconnaissance.

October 1, 2008



U.S. 50 / Severn River Bridge
Figure 3
 Existing Land Use, 2005

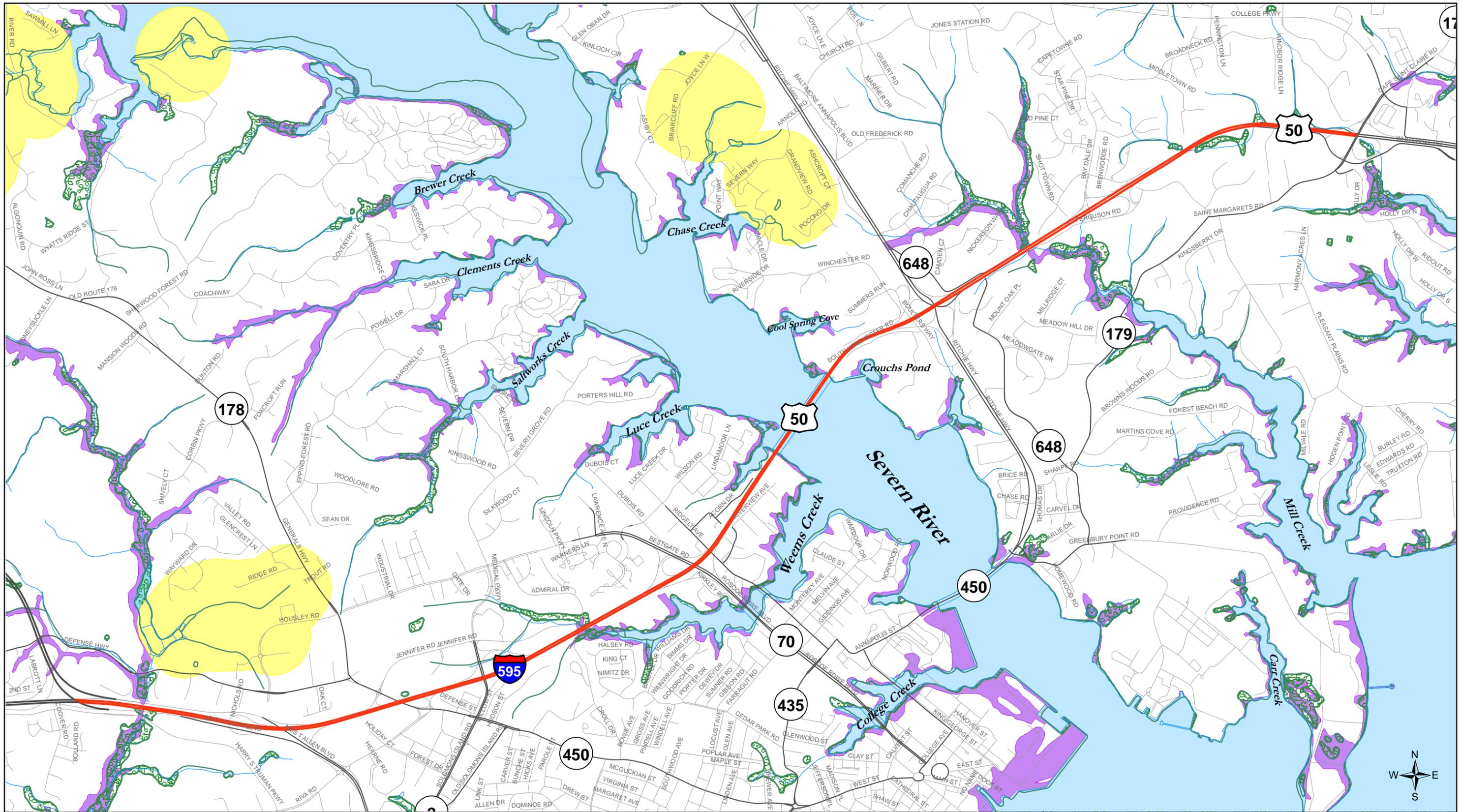
Legend		
U.S. 50 / I-595 Project Corridor	Government/Institutional	Retail
Land Use AA County	Industrial	Single Family Dwelling
Land Use Type	Multiple Family Dwelling	Townhouse
Agricultural	Natural Open Space; Recreation and Parks; Vacant	Transportation/Utility
City of Annapolis	Office	Water


 State of Maryland
 Department of Transportation
 State Highway Administration
 Highway Design Division

Source: Maryland State Highway Administration; Anne Arundel County;
 Maryland Dept. of Planning; Field Reconnaissance.

October 1, 2008

1 inch = 2,500 feet



State of Maryland
 Department of Transportation
 State Highway Administration
 Highway Design Division

U.S. 50 / Severn River Bridge Figure 4 Natural Resources

Legend

- U.S. 50 / I-595 Project Corridor
- Sensitive Species Protection Area
- 100 Year Floodplain
- Wetlands (NW1 maps)
- Wetlands

Source: Maryland State Highway Administration; U.S. Fish and Wildlife Services, FEMA, National Flood Insurance Program, Maryland Dept. of Natural Resources; Natural Resources Conservation Service; Field Reconnaissance.

October 1, 2008

1 inch = 2,500 feet



State of Maryland
 Department of Transportation
 State Highway Administration
 Highway Design Division

U.S. 50 / Severn River Bridge Figure 5 Chesapeake Bay Critical Areas

Legend

- U.S. 50 / I-595 Project Corridor
- LDA - Limited Development Area
- IDA - Intensely Developed Area
- RCA - Resource Conservation Area
- Buffer Exempt Areas

APPENDIX E

PROJECT NEWSLETTER OPEN HOUSE COMMENT CARDS



US 50 at Severn River Bridge Feasibility Study



PROJECT NEWSLETTER • FALL 2009

WHAT:

Open House for US 50 at Severn River Bridge Feasibility Study

WHEN:

**Wednesday, December 16, 2009,
5:00 - 8:00 PM
Backup Snow Date: Wednesday,
January 6, 2010
(same time/location)**

WHERE:

**Anne Arundel Community College
West Campus
(Access from MD 2, West Campus Drive)
Cade Building - Room 219
101 College Parkway, Arnold, MD 21012**

Feasibility Study Moves Forward/Public Meeting Scheduled

The Maryland State Highway Administration (SHA) initiated a Feasibility Study to investigate the issues associated with traffic congestion along US 50 (John Hanson Highway) in the vicinity of the Severn River Bridge in Anne Arundel County (west of MD 70 to east of MD 2). A feasibility study considers short-term and long-term measures to improve traffic operations. The US 50 at Severn River Bridge Feasibility Study includes the development of preliminary concepts specifically designed to reduce traffic congestion during morning and evening peak travel periods and peak summer travel periods across the US 50 bridge over the Severn River.

SHA invites you to attend an Open House to learn more about the study and the concepts being considered. Displays and maps will be available for your review, and team members will answer your questions and hear your project-related comments and concerns. There will be no formal presentation.

(continued on back)

(continued from front)

Reason for the Study

This section of US 50 has long been an area of concern for roadway users and the City of Annapolis. SHA has received letters and complaints about eastbound evening traffic congestion and the City of Annapolis has expressed concerns with cut-through traffic. Anne Arundel and Queen Anne's counties have identified improvements along US 50 in the vicinity of the bridge as a top priority. SHA has scheduled an open house to present the findings of the feasibility study, discuss concepts for roadway improvements and receive your comments.

Concepts Being Considered

Concept 1A: Reversible Lane — Removes existing median barrier and installs moveable barrier. Restripes Severn River Bridge from six lanes to seven lanes, with four lanes in the peak direction and three lanes in the non-peak direction.

Concept 1B: Added Eastbound Lane — Permanently relocates existing median barrier and restripes Severn River Bridge, with four lanes eastbound and three lanes westbound.

Concept 2A: Barrier-Separated ContraFlow Reversible Lanes — Installs two moveable barrier runs, one on each side of the existing median. The Severn River Bridge typical section would be four lanes in the peak direction and two lanes in the non-peak direction.

Concept 4: Lane Speed Control and Variable Speed Limits (VSL) — Maintains a free-flow speed across all lanes. Lane-Speed Control/VSL is in limited use in the United States.

Next Steps

- Conduct Open House – **December 16, 2009**
- Complete Feasibility Report – **Spring 2010**

Contact Us/Project Mailing List

We want to hear from you. We are committed to keeping you informed and involved during this process. To share your project-related questions and comments, add your name and address to the project mailing list, or require special assistance to attend, please contact:

Kameel Hall, Project Manager

Project Management Division
Maryland State Highway Administration
707 N Calvert Street, Mail Stop C-301
Baltimore, MD 21202

410-545-8542 or Toll-free 1-888-204-4828

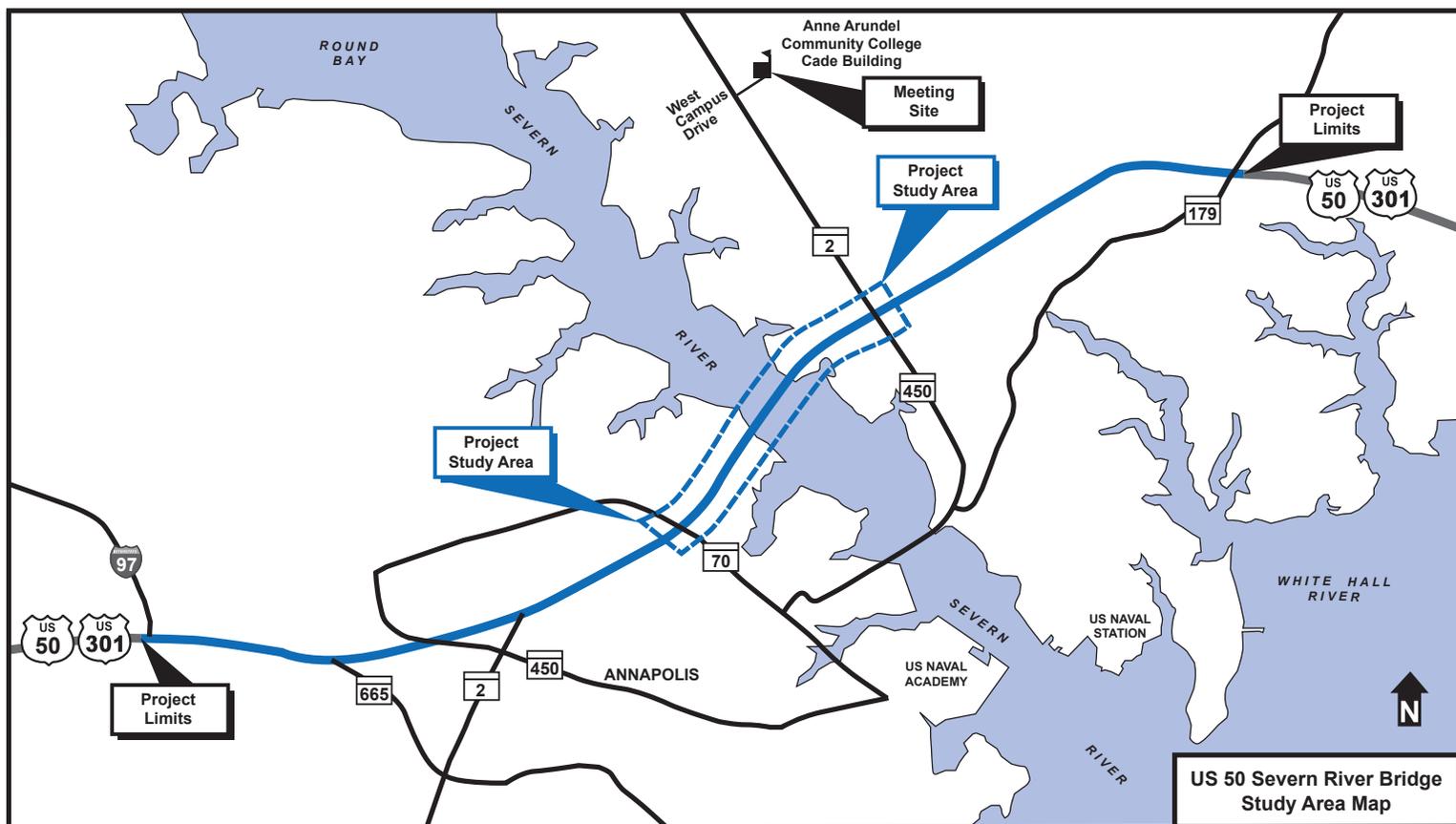
khall1@sha.state.md.us

MD Relay Service for Teletype users can be reached at 7-1-1

Information on this and other SHA projects can be obtained by logging onto our website at www.marylandroads.com and clicking on **Projects/Anne Arundel**.

Martin O'Malley, Governor
Anthony Brown, Lieutenant Governor
Beverly K. Swaim-Staley, Secretary
Neil J. Pedersen, Administrator

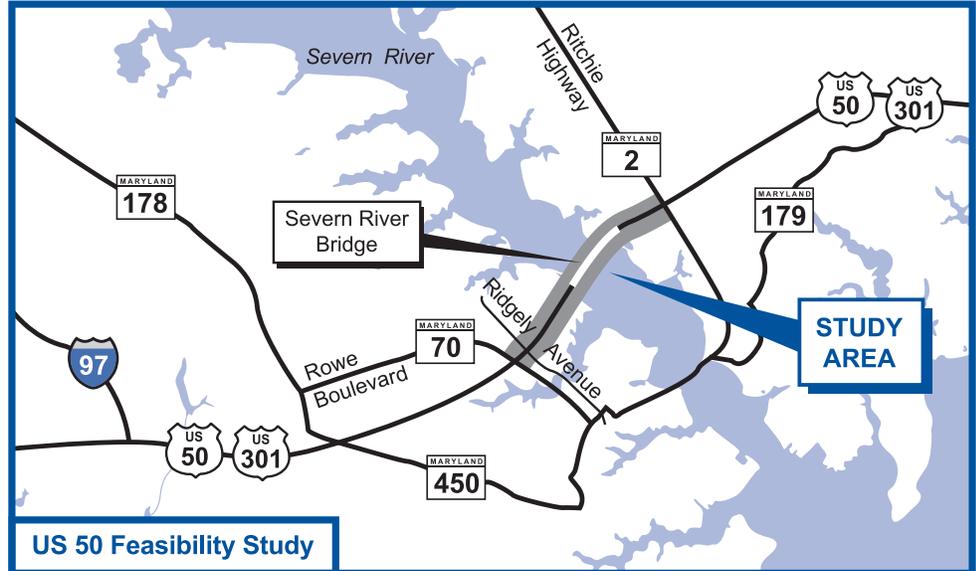
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US 50 Improvements Receive Concurrence

The Maryland State Highway Administration (SHA) has selected Concept 1B for improvements to US 50 over the Severn River Bridge, from MD 70 (Rowe Boulevard) to MD 2 (Ritchie Highway) in the Annapolis area. On May 5, 2011, the SHA Administrator granted concurrence.

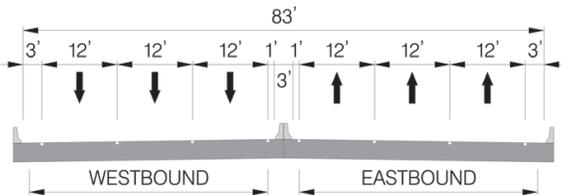
A feasibility study is an initial phase of the Highway Development Process. It precedes SHA's formal Project Planning Process and considers short-term and long-term measures to improve traffic operations. The US 50 Feasibility Study provides a preliminary concept that will alleviate traffic congestion during the morning and evening peak travel periods and the peak summer travel periods along US 50 (John Hanson Highway) and across the Severn River Bridge.



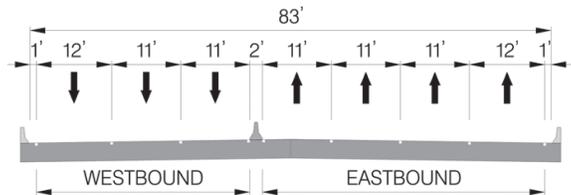
Selected Concept

The Selected Concept, Concept 1B-Additional Eastbound Lane (Shift Existing Median Barrier), includes the following features:

- Removes the existing median barrier between the Ridgely Avenue overpass and the MD 2/MD 450 Interchange
- Restripes US 50 to provide seven through lanes
- Replaces an approximate seven-foot-wide strip of the bridge deck, for the length of the bridge
- Constructs a new, permanent concrete-median traffic barrier to provide four through lanes in the eastbound direction and three through lanes in the westbound direction



Existing - Typical Section



Concept 1B - Typical Section

Next Steps

Although the project is an eligible candidate for future Project Planning activities, funding is not currently available for this phase.

Project Background

The section of US 50 from MD 70 to MD 2 has long been an area of concern for roadway users and the City of Annapolis. SHA has received numerous letters and complaints about eastbound traffic congestion during the evening peak period, and the City of Annapolis has expressed concerns about cut-through traffic resulting from congestion along US 50. In its 2009 Transportation Letter, Anne Arundel County identified improvements along US 50 in the vicinity of the bridge as a top priority.

The project team has concluded that congestion at the Severn River Bridge is caused not only by the sheer volume of traffic, but by a combination of factors, including bridge grade, truck volume, narrow shoulders, the merge from Rowe Boulevard, queue jumpers, drivers slowing to view the scenic Severn River, and other human factors. To address these issues, the project team examined a variety of options, including reversible lanes, express lanes/collector-distributor (CD) roads, ramp metering, variable speed limits, lane speed control, and even a new bridge.

Project Background *(continued from front)*

The following concepts and options were presented at the Open House on December 16, 2009:

- Concept 1A-Reversible Lane with Moveable Barrier (Remove Existing Median Barrier)
- Concept 2A-Reversible Lanes with Moveable Barrier
- Concept 1B-Additional Eastbound Lane (Shift Existing Median Barrier)
- Concept 4-Lane Speed Control/Variable Speed Limits

Summary of Public Comments

Ninety-one people attended the 2009 Open House at Anne Arundel Community College, and SHA received 57 comment cards. Concepts 1A and 1B were preferred by most attendees, with many supporting Concept 1A because it offered the greatest operational benefit for both directions. Views were mixed on the moveable barrier. Some attendees liked the adaptability to various traffic situations offered by the reversible lane, while others expressed concern about the operations of the moveable barrier (potential breakdowns, daily maintenance, associated costs, etc.). The public supported Concept 1B because it adds a continuous lane across the Severn River Bridge instead of a discontinuous lane where drivers have to shift into a new lane adjacent to the median barrier, and then merge back into their original lane after crossing the bridge. The public was not convinced that drivers would effectively use the inside added lane and then merge back out into three lanes under Concept 1A.

Some commented that SHA should address long-term bridge issues, while others expressed concern about trucks encroaching on travel lanes on the east-side curve of the bridge. Suggestions to add a visual barrier to the bridge to eliminate driver rubbernecking, along with general maintenance questions about debris, drainage, and landscaping were also provided. Several people offered traffic and operational comments, including observations that the increase in merge lanes from Rowe Boulevard to the base of the Severn River Bridge has been the major cause of traffic jams along US 50, and that narrow lanes and narrow shoulders on the bridge cause a reduction in speed (braking) and the beginning of traffic congestion along US 50.

After considering all public comments and weighing the advantages and disadvantages of each concept, the project team recommended Concept 1B as the most feasible option. Although Concept 1A would provide a system that could adapt to changing traffic needs, there would be long-term operational and maintenance costs associated with a moveable barrier system. The project team believes that the advantages of Concept 1B outweigh its disadvantages and is confident that although this concept will cause a slight reduction in westbound capacity, it will address the most critical movement by delivering the intended benefits in the eastbound direction.

Thank You

SHA and the project team thank everyone who participated in this successful feasibility study. Please direct all questions and requests for information to: **Mrs. Kameel Hall**, Project Manager, Project Management Division
Maryland State Highway Administration, Mailstop C-301, 707 N. Calvert Street, Baltimore, MD 21202
Telephone: (410) 545-8542, Toll-free within Maryland: 1-800-548-5026, Email: khall1@sha.state.md.us
The Maryland Relay Service can assist teletype users at 711. For more information on this and other SHA projects, visit www.roads.maryland.gov and click on **Projects & Studies/Anne Arundel County**.

Martin O'Malley, Governor
Anthony Brown, Lieutenant Governor
Beverly K. Swaim-Staley, Secretary
Neil J. Pedersen, Administrator

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STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME Susan Cooper DATE 12/16/09

PLEASE

ADDRESS 280 Beckworth Ct.

PRINT

CITY Severna Park STATE MD ZIP 21146

I've been doing this commute for 16 yrs.

What are your major concerns with crossing the US 50 at Severn River Bridge?

1) It can take me 45 min. to make the 11 mile trip. From my house in SP to my office north of Annapolis Mall. I've been making the trip for 16 yrs & it's getting worse. On summer weekends, I used to go shopping, etc. - to wait until traffic clears, so I can go home.

How often do use US 50 to cross the Severn River Bridge?

10 work days trips per week, often 1 weekend round-trip

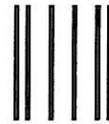
When the bridge is congested, what route do you take to cross the Severn River?

US 50 bridge - better to sit & wait it out rather than get into traffic jams in Annapolis

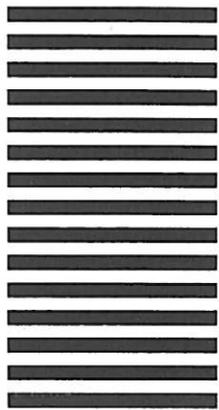
If we wish to comment or inquire about the following aspects of this project:

(this is a major problem)

- 2) One stalled car or accident can make the trip take 1-1 1/2 hours. Knowing my start & end times has helped a little. I get in trouble @ work for being late.
- 3) The lighted warning sign (Cut Road, Amber Alert) backs up traffic in the morning as people slow down to read it. Traffic speeds up as soon as I pass the sign before crossing bridge.
- 4) Kitcherburg backs up to Green Park when there is an accident @ 197 in Bowie (I listen to the radio to try to time trips).
- 5) I prefer an option with reversible lanes - it will help W bound as well as E - Bound, esp my issues with morning traffic. I would retain the 3 W bound lanes & is ^{much} less expensive than 2A which requires 2 moveable barriers. If lanes are narrowed, traffic speed should be reduced & trucks should be limited →



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UNITED STATES



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FIRST-CLASS MAIL PERMIT NO. 17715 BALTIMORE MD

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ATTN: Kameel Hall - Project Manager
MAIL STOP C-301
ENVIRONMENTAL PLANNING DIVISION
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
707 N. CALVERT STREET
BALTIMORE MD 21202



to the wider lanes. My observation is that
seems are speeding through this area without
reducing speed.

② Gridlock on Bestgate on way home - from
mall to Rt. 50 interchange can take 1/2 hr.
@ 5 - 530 PM, before I sit in the wedge
traffic!

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

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WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT
NAME Liles Creighton DATE 12/16/09
ADDRESS 100 Riverview Ave
CITY Annapolis STATE MD ZIP 21401

What are your major concerns with crossing the US 50 at Severn River Bridge?

Safety, congestion, ozone in summer; live just off
50/2/301 and can't go outside on hot day when traffic
backs up; frequent accidents.

How often do use US 50 to cross the Severn River Bridge? 2-3 times/week

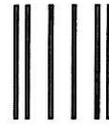
When the bridge is congested, what route do you take to cross the Severn River?

NAV Acad Brg

I/We wish to comment or inquire about the following aspects of this project:

1. Restripe to 7 lanes, 4 Eastbound, 3 westbound. Due to
number of lane changes required by 2 lane merge from
Rowe, & lane shifting to exit Rte 2 all happening @ high
speed, make permanent so people get used to the
configuration (Westbound traffic backs up on Rte 2,
east bound on 50.)

2. Traffic accidents are frequent. Slow traffic to 45 MPH
between Rte 2 access to Rte 50/301 and just past Rte 2-50/301
interchange. Traffic currently moves at about 70 MPH,
speed limit reduction should slow it down. Merge from Rte 2
(indeed from Riva Rd access) requires multiple lane changes
(as many as 4) and can be confusing. 5 or 6 lanes merge into
3 at Ridgely Ave Bridge. People use exit lanes to bypass
backups - also local traffic uses Rte 50/2/301 from Rte 2
access to Rowe Blvd access. Slowing traffic will improve flow.
(over)



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ENVIRONMENTAL PLANNING DIVISION
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
707 N. CALVERT STREET
BALTIMORE MD 21202



3. Heaviest congestion is not necessarily @ peak hours. Particularly in summer Thursday-Friday. Starts as early as 1:00pm (we watch from our house)
 4. Suggest intelligent traffic sign @ Riva Rd access to warn of speed slowdown and state dangerous stretch of road. Warn of congestion & accidents.
 5. Sign right hand lane of 4 lanes eastbound as Rte 2 exit only. Seek to separate through 50/301 ^{traffic} from Rte 2 traffic prior to bridge. Restripes from bridge to Rte 2 on east side for exit lane (add lane)
 6. Start using I-595 designation for 50/2/301 (Eastern Bypass) Tuesday nights (semi-truck traffic is extremely heavy).
- Note: Slowing traffic westbound to 45 will improve safety from the Rowe Blvd access to hospital/Rte 2 and West St/Gen'l Hwy exits to I-97 and Riva Rd exits/accesses. Very dangerous stretch w/ lots of weaving & cross-lane changes (on & off).

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

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SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT

NAME JAW STOOBS DATE 12/16/09
ADDRESS 233 Anchorage CT.
CITY Annapolis STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

1. SPEED
2. Bottle neck between 4-7 pm Daily ~~except Fri~~
3. I live over the bridge from Annapolis and wouldn't want to be in an ambulance going to AAMC!

How often do use US 50 to cross the Severn River Bridge?

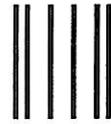
When the bridge is congested, what route do you take to cross the Severn River?

Route/Taylor Academy Bridge or - Bestgate to Taylor

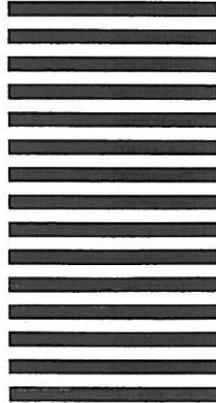
I/We wish to comment or inquire about the following aspects of this project:

I will go into Severn Park to shop/groceries or plan shopping at the mall Friday's evening between 3/4 - 7/8 pm. All Doc. apt. are avoided on Friday's as well as all scheduled appointments. (Apt)

Today's WED, I was locked off of the Severn Bridge came EAST on Rt. 50 and got on Route/Taylor to get thru. - Then I came up College Parkway from St. Margaret's to get here and avoid traffic - costly in gas & time.



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MAIL STOP C-301
ENVIRONMENTAL PLANNING DIVISION
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
707 N. CALVERT STREET
BALTIMORE MD 21202



*I think the mobile
James fix
\$MNS
be a temporary
1A or 2A*

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME Clark Thomas DATE 12/16/09

PLEASE PRINT ADDRESS P O Box 173

CITY Arnold STATE MD ZIP 21012

What are your major concerns with crossing the US 50 at Severn River Bridge?

Rear ending a car, east bound, far right lane.

How often do use US 50 to cross the Severn River Bridge? 3 times/week

When the bridge is congested, what route do you take to cross the Severn River?

I don't make the trip if I can help it, I stay home

I/We wish to comment or inquire about the following aspects of this project:

At the risk of sounding like a quack, would it make sense to use a helicopter large enough to remove wrecked vehicles from Rt. 50 - especially the Severn River Bridge. Police do not clear accidents quickly enough.

I think its a problem in other parts of the State & D.C also. The police shut down too many lanes for too long.

I think accidents create a big part of the problem.

I like 1 B the most - less labor, some effort to move the barrier

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT
NAME MILAN DATE 12-16-09
ADDRESS 77 SOUTH WINCHESTER RD
CITY ADWAPOLIS STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

NOISE and traffic

How often do use US 50 to cross the Severn River Bridge?

6x/week

When the bridge is congested, what route do you take to cross the Severn River?

Spur Academy Bridge

I/We wish to comment or inquire about the following aspects of this project:

IB

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

**PLEASE
PRINT**

NAME Joan Whiteley **DATE** 12-16-09

ADDRESS 11698 Winchester Rd.

CITY Annapolis **STATE** MD. **ZIP** 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

How often do use US 50 to cross the Severn River Bridge? _____

When the bridge is congested, what route do you take to cross the Severn River?

I/We wish to comment or inquire about the following aspects of this project:

My family has lived on the property adjacent to the bridge in Winchester, east side. We are concerned with the prospect of many more accidents since we have seen many in the past. Also, we need noise barriers, ~~and~~ the idea of a moveable barrier machine is costly.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

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SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME ROBERT P. R. HERR DATE 16 DEC 09

PLEASE PRINT

ADDRESS 1322 CATHARON DR.

CITY ARNOLD STATE MD ZIP 21012

What are your major concerns with crossing the US 50 at Severn River Bridge?

EAST BOUND TRAFFIC: ~~RUSH HOUR TIME ON~~
2:00 P.M. - 7:00 P.M. OR LATER

How often do use US 50 to cross the Severn River Bridge? 12 - 20 TIMES
A WEEK

When the bridge is congested, what route do you take to cross the Severn River?

ANNAPOLIS 450 OR I JUST DON'T HEAD INTO
ANNAPOLIS IF IM ALREADY HOME.

I/We wish to comment or inquire about the following aspects of this project:

CONCEPTS 1A, 1B, 2A, 4 ARE SIMPLY PUT A BAND AID
SOLUTION TO THIS PROBLEM. FROM ROWE BOUL. TO
RT. 2 WE HAVE TO HAVE 2 CONTINUOUS LANES
WHICH MEANS WE WOULD HAVE TO ADD ONTO THE SEVERN
RIVER BRIDGE! SOUNDS LIKE CONCEPT 6? I DON'T SEE
THE POINT OF WASTING FEDERAL STIMULAS MONEY ON
A SHORT TERM SOLUTION AND THINK LONG TERM
I HONESTLY DON'T HAVE THE SPACE HERE TO GO
THROUGH OTHER IDEAS THAT COULD MOVE THIS FORWARD
TOWARDS A LONG TERM GOAL. ONE OTHER POINT
INSTALL A VIEW BLOCKERS ALONG THE JERSEY
WALLS.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME William Herald **DATE** 12-16-09

PLEASE PRINT
ADDRESS 14 ANNAPOLIS ST

CITY ANNAPOLIS **STATE** MD **ZIP** 21401

What are your major concerns with crossing the US 50 at Severn River Bridge?

CARS ABANDON RT 50 AT ROWE + USE NEIGHBORHOOD RESIDENTIAL STREETS TO AVOID CONGESTION, RESULTING IN GRID LOCK IN WEST ANNAPOLIS

How often do use US 50 to cross the Severn River Bridge? _____

When the bridge is congested, what route do you take to cross the Severn River? _____

I/We wish to comment or inquire about the following aspects of this project:

PLEASE WORK TO KEEP THROUGH TRAFFIC ON RT 50 AND OFF CITY STREETS

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME ART TESTI DATE DEC 16, 2009

PLEASE
PRINT

ADDRESS 2016 GOV. THOMAS BLADEN WAY #304

CITY ANNAPOLIS STATE MD ZIP 21401

What are your major concerns with crossing the US 50 at Severn River Bridge?

AT THIS TIME I DO NOT COMMUTE TO WORK OR USE RT 50. AS AN OBSERVATION I NOTICE THAT BESTGATE RD BECOMES GRIDLOCKED DURING PEAK PERIODS WHEN US 50 IS AT A STANDSTILL.

How often do use US 50 to cross the Severn River Bridge? 2 to 4 times per month

When the bridge is congested, what route do you take to cross the Severn River?

I/We wish to comment or inquire about the following aspects of this project:

BEFORE ATTENDING THIS MEETING I DID NOT THINK THERE WAS A FEASIBLE SOLUTION. I WOULD THINK THAT CONCEPT 1A WOULD BE THE BEST SOLUTION AT THIS TIME. I THINK A PERMANENT CENTER BARRIER IS IMPORTANT FOR PUBLIC SAFETY.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

**PLEASE
PRINT**

NAME Kirk Gunn **DATE** 12/16/09

ADDRESS 50 Old Starbridge Rd

CITY Arnold **STATE** MD **ZIP** 21012

What are your major concerns with crossing the US 50 at Severn River Bridge?

Bottlenecks, narrow lanes on Bridge

How often do use US 50 to cross the Severn River Bridge? 25x per week

When the bridge is congested, what route do you take to cross the Severn River?

Rte 450

I/We wish to comment or inquire about the following aspects of this project:

What are the proposals for Rte 50 out to St Margarets ?

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME Susan Gross DATE 12-16-09

PLEASE ADDRESS 175 Southwood Ave.

PRINT CITY Annapolis STATE MD ZIP 21401

What are your major concerns with crossing the US 50 at Severn River Bridge?

I usually travel in the direction opposite the heavy congestion, so my main concerns are traffic moving too fast and unsafe lane changes - especially cars trying to get off at Rt. 2 toward Baltimore - some cross 3 lanes to get to the exit.

How often do use US 50 to cross the Severn River Bridge? Daily - I travel against the heavy traffic (eastbound a.m.; westbound p.m.)

When the bridge is congested, what route do you take to cross the Severn River? I go over the Naval Academy Bridge to Taylor Avenue to Westgate Circle down West Street to my house on West Street - very peaceful; not much traffic.

I/We wish to comment or inquire about the following aspects of this project:

1) Of the options presented, I prefer Concept 1A, but I don't like the narrower lanes. Big trucks and SUVs take up most of the current 12-foot lanes now; narrowing lanes reduces margin of error if someone has to avoid something in the road or if a driver swerves to avoid another car. I would like to see data on increase in accidents with narrow lanes before doing this.

Better than any of the options { 2) I think the state needs to begin planning some sort of light rail that would connect to Washington + Baltimore, mass transit - 1 leg up Ritchie Highway from Annapolis, * 1 leg up I-97 to connect with the Great Burnie + for BWI stations + 1 leg up Rt. 50 to connect to New Carrollton. Another idea is to separate local from thru traffic - perhaps with service roads as are along Rt. 50 closer to the Bay Bridge.

3) According to SHA's own stats + data, Concept 1B would not help Westbound traffic in a.m. and Concept 4 would have minimal help. Concept 2A would have only two lanes in non-peak, slowing traffic immensely and creating huge backups if cars break down or have accidents.

Thank you for this opportunity to give my opinion.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT NAME _____ DATE _____ ADDRESS _____ CITY _____ STATE _____ ZIP _____

What are your major concerns with crossing the US 50 at Severn River Bridge?

ANGLE OF APPROACH - TOO STEEP FOR 95% OF DRIVERS - THEY TAKE FOOT OF GAS PEDAL, WHICH SLOWS THEM DOWN - CAUSES PEOPLE BEHIND TO HIT BRAKES - BACKUP BEGINS

LANES ALREADY TOO NARROW DUE TO LACK OF SHOULDERS FOR 95% OF DRIVERS

How often do use US 50 to cross the Severn River Bridge? 6-7 DAY / WEEK

When the bridge is congested, what route do you take to cross the Severn River?

NONE - NOT WORTH TRYING

We wish to comment or inquire about the following aspects of this project:

SPENDING TAX DOLLARS TO ADD MORE LANES IN A GIVEN DIRECTION IS SILLY AS LANES WILL BECOME NARROWER. SEE COMMENTS ABOVE -

MONEY IS BETTER SPENT BY FULLY DUALIZING 40% FROM Rte 50 TO DELAWARE LINE.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME Dan Wataf DATE 12-16

PLEASE

ADDRESS 157 BERRYWOOD DR

PRINT

CITY SAR PK STATE MD ZIP 21146

What are your major concerns with crossing the US 50 at Severn River Bridge?

See below

How often do use US 50 to cross the Severn River Bridge? 2-4x a week
always off-peak

When the bridge is congested, what route do you take to cross the Severn River?

Don't cross the bridge at peak hours - so as to avoid
the problem you are trying to solve!

I/We wish to comment or inquire about the following aspects of this project:

This project creates a temporary respite from traffic that is a product of 'sprawl' - excessive housing development on the eastern shore with accompanying jobs. By alleviating traffic, it perpetuates the sprawl, inducing more people to locate far from jobs. Ten years from now, SHA will be faced with the same problem - and thus face pressures to build another bridge - both over the Severn River AND over the Ch. Bay itself.

IF another lane is created, it should be dedicated as an HOV lane ONLY. We cannot approach 'solutions' to 'micro' problems while going to Copenhagen and promising huge CO2 reductions that will never be achieved by inducing more sprawl.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT
NAME Christina Macey DATE 12/16/09
ADDRESS 228 Old Mill Bottom Rd South
CITY Annapolis STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

Traffic Build up in ~~evening~~
late afternoon to evening
time commute

How often do use US 50 to cross the Severn River Bridge?

7 days a week

When the bridge is congested, what route do you take to cross the Severn River?

get off Rowe exit turn right & get back
on, or west Annapolis to Naval Acad Bridge

I/We wish to comment or inquire about the following aspects of this project:

I have lived at this address for over
20 years and the problem has never
been as bad as within the last 5-10 yrs.
At times I feel that using the
alternative routes are inappropriate
but have experienced Bay Bridge
traffic on my local roads & I
understand their pain. Something
MUST be done. Concept 1A is
my preferred method. I avoid driving
along the West bound 50 Severn bridge
if I know I will be out past 4pm
& trying to return to my house. Commute
time bacil ups, definitely feel LOWER
than 8 minutes. Thank you for taking the time to read

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT
NAME Doug Deskyne DATE 12-16-09
ADDRESS 1210 Driftwood Ct.
CITY Arnold STATE MD ZIP 21012

What are your major concerns with crossing the US 50 at Severn River Bridge?

Eastbound backup at Rowe Blvd.

How often do use US 50 to cross the Severn River Bridge?

When the bridge is congested, what route do you take to cross the Severn River?

I/We wish to comment or inquire about the following aspects of this project:

Concept 1B, but maintain 5 lanes at Rowe Blvd. and taper to 4 lanes approaching bridge. This would require pavement widening on the eastbound lane.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT

NAME RICHARD Cronin DATE 12/22/09
ADDRESS 244 Kiekeley Road
CITY Annapolis STATE MD ZIP 21401

What are your major concerns with crossing the US 50 at Severn River Bridge?

I am a resident ~~that~~ who resides very close to the location. Over the years our community has experienced increased noise. We have been measured for readings and quality for sound barriers; but have

How often do use US 50 to cross the Severn River Bridge?

on average twice daily

When the bridge is congested, what route do you take to cross the Severn River?

naval academy bridge

I/We wish to comment or inquire about the following aspects of this project:

Including sound barriers in the solution

Thank you
Richard Cronin
Kiekeley road community

yet to receive funding

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME BILL ANSELM DATE 12-16-09

PLEASE

ADDRESS 7 CHAUTAUGUA RD

PRINT

CITY ARNOLD STATE MD ZIP 21012

What are your major concerns with crossing the US 50 at Severn River Bridge?

^(SINGLE DRIVER)
TOO MANY VEHICLES FAILURE TO MAINTAIN SPEED UPHILL
MADDENING HIGH DENSITY MERGE AT BRIDGE ENTRY: W & E

How often do use US 50 to cross the Severn River Bridge? 2x / DAY
16x / WK

When the bridge is congested, what route do you take to cross the Severn River?
BESTGATE / W. ANNAPOLIS / NAVAL ACADEMY BRIDGE

I/We wish to comment or inquire about the following aspects of this project:

IS IT CLASSIFIED AS AN EMERGENCY EVACUATION ROUTE FOR D.C. & ANNAPOLIS?
(GAS LEAK ~10 YRS AGO BACKED UP TRAFFIC 7 MILES N, S, E & W) = HIGHER PRIORITY?
COULD EZ-PASS SENSORS BE USED TO REWARD CAR POOLS? = LESS CONGESTION

THE MOVABLE BARRIER APPROACH REQUIRES A FULLY FUNCTIONAL BARRIER BUS (BB)
OR YOU LOSE THE MIDDLE LANE. (UNIQUE & EXPENSIVE THINGS TEND TO BREAK)
HAS THE FAILURE/MAINTENANCE FEATURES OF THE BB BEEN TAKEN INTO ACCOUNT.

- WHERE WILL IT BE KEPT?

- CAN IT BE MAINTAINED AT THAT LOCATION?

- BY STATE WORKERS

- ON-CALL CONTRACTORS

- ARE PARTS ALWAYS AVAILABLE

- HOW DO YOU GET IT OFF THE BRIDGE IF IT BREAKS DOWN.

PUT A \$5/GAL TAX ON GAS AND YOUR TRAFFIC PROBLEMS WILL EVAPORATE.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT NAME Pat Lynch DATE 12-16-09
ADDRESS 1148 Homewood Rd
CITY Annapolis STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?
Congestion, traffic overload @ peak hours, erratic speeds

How often do use US 50 to cross the Severn River Bridge? Daily

When the bridge is congested, what route do you take to cross the Severn River?
Naval Academy bridge

I/We wish to comment or inquire about the following aspects of this project:
I have driven the N.Y.S. Tappan Zee bridge for many years experiencing the successful movement of the portable barriers. It works almost without a problem, and drivers can schedule their trip across the bridge to avoid barrier movement if they choose. I recommend only A as a solution. Option 2A would limit movement in middle lane and contribute to Accidents.

Suggest planning A second Severn River Bridge in the near future to prepare for BRAC.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME Jacob Miller **DATE** 12/16/09

PLEASE

ADDRESS 428 Kings College Dr

PRINT

CITY Arnold **STATE** MD **ZIP** 21012

What are your major concerns with crossing the US 50 at Severn River Bridge?

The merge @ Rowe, the rubber neckers looking @ boats and water and the long delays in the evening.

How often do use US 50 to cross the Severn River Bridge? everyday

When the bridge is congested, what route do you take to cross the Severn River?

430 bridge

I/We wish to comment or inquire about the following aspects of this project:

I feel like concept 1B is the only viable solution. The majority of traffic that enters 50 at Rowe and exits at 2 North. I've been driving the R+50 bridge for 7 years from various entry points on both sides. I believe your traffic data is right on, and while the delay in concept 1B may increase the delay slightly, the duration of that delay will not be nearly as long as what is experienced in the E-bound direction daily.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE
PRINT

NAME Tom Waprowski DATE 12-16-2009
ADDRESS 220 MEADOWGATE
CITY Annapolis STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

Traffic

How often do use US 50 to cross the Severn River Bridge? 2-3 x day

When the bridge is congested, what route do you take to cross the Severn River?

Stay on or thru Annapolis - Rowe Blvd.

I/We wish to comment or inquire about the following aspects of this project:

Place Barriers to prevent re access to E-B 50
at Rowe Blvd. ONE IN EXIT LANES for ROWE

Limit Rowe Blvd Ramp onto EB 50 to
1 Lane BEFORE it gets to 50

DENY access to EB 50 from Rowe during
Peak times - send traffic over Navy
Bridge - re time associated traffic lights
to Navy Bridge - i.e. Gate 8 - restripe Navy
Bridge to 4 lanes

Build a 3rd B-Bridge span - physically widen
SEVERN Bridge - it's all relative - you will
Always say the money's not there. Just DO IT!

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT

NAME Michelle Buckley DATE 12/22/09

ADDRESS 54 Beacon Reef Ct

CITY Annapolis STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

Major slowdown backups - particularly on
Fri in summer - & in general - weather -
Weeks on the bridge 5pm

How often do use US 50 to cross the Severn River Bridge? 5 to 6 days per week

When the bridge is congested, what route do you take to cross the Severn River?

Rouse Blvd to 50 East (homebound Bound)

I/We wish to comment or inquire about the following aspects of this project:

I think it is advisable to add a lane with
the option of moveable center barrier to allow
for more lanes when needed in the Backup

I do like the designated Rouse Blvd ramp on, but
in the long run - the ability to control which
side E/W has an extra lane is the
smartest way to go for versatility.

I did attend open house - Thank you for
all your help with this Bridge & traffic
I have driven this bridge daily to work since 1998 January

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT
NAME STEVE HOCKING DATE 12/17/09
ADDRESS 601 TRUXTON RD
CITY ANNAPOLIS STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

BACKUPS ON BRIDGE - EVERYDAY

How often do use US 50 to cross the Severn River Bridge? AT LEAST
25 TIMES EACH WEEK

When the bridge is congested, what route do you take to cross the Severn River?

I GO THROUGH THE CITY OF ANNAPOLIS

I/We wish to comment or inquire about the following aspects of this project:

→ I DRIVE TO DC FOR WORK EVERYDAY AND THIS IS THE WORST TRAFFIC JAM (THE SEVERN RIVER BRIDGE) ON MY ENTIRE DC COMMUTE.

→ PLEASE IMPLEMENT CONCEPT 1A ASAP - WE REALLY NEED SOME IMPROVEMENTS.

THANKS!

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS
101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME _____ DATE 12/16/09

PLEASE PRINT ADDRESS _____

CITY Annapolis STATE MD ZIP 21403

What are your major concerns with crossing the US 50 at Severn River Bridge?

Extreme, regular traffic congestion. Most concerning is access for emergency vehicles and during emergency evacuations.

How often do use US 50 to cross the Severn River Bridge? 3-4x per month

When the bridge is congested, what route do you take to cross the Severn River?

to detour, wait until less congested, unless no option and then just stay on US 50.

I/We wish to comment or inquire about the following aspects of this project:

It seems like the best solution for fixing this issue based on traffic concerns/timed day congestion. Restriping and reducing lane width will ~~reduce~~ reduce capacity to point of diminished returns.

-Concerned mass evacuation not been considered in scenarios. I expected to see Alvin Morgan here to address that issue.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME LYLE MILLAN **DATE** 12/16/2009

**PLEASE
PRINT**

ADDRESS 77 SOUTH WINCHESTER ROAD

CITY ANNAPOLIS **STATE** MD **ZIP** 21409-5809

What are your major concerns with crossing the US 50 at Severn River Bridge?

NOISE & THE TAKING OF PROPERTY

How often do use US 50 to cross the Severn River Bridge? DAILY - Two or Three Times

When the bridge is congested, what route do you take to cross the Severn River?
Sometimes take the 450 NAVAL ACADEMY BRIDGE

I/We wish to comment or inquire about the following aspects of this project:
LIKE CONCEPT 1A THE BEST

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT

NAME Diane Rey DATE 12/16/09

ADDRESS 1322 Windsor Ridge Ln

CITY Annapolis STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

PM rush hour
Fri Bridge (Bay Bridge) backup n summer

How often do use US 50 to cross the Severn River Bridge? Daily

When the bridge is congested, what route do you take to cross the Severn River?

Naval Academy Bridge or 97 to Rt. 2
South

I/We wish to comment or inquire about the following aspects of this project:

- 1) Merge lanes to Rouse Blvd. are part of problem. Eliminate one lane?
- 2) Had about trying concept 4 until funding / construction can begin on permanent solution
- 3) I seem to favor 1A as best option

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME Richard Schoenfeld DATE 16 Dec 09

PLEASE

ADDRESS 1806 River Watch Lane

PRINT

CITY Annapolis STATE MD ZIP 21401

What are your major concerns with crossing the US 50 at Severn River Bridge?

Safety

How often do use US 50 to cross the Severn River Bridge? 3x/wk

When the bridge is congested, what route do you take to cross the Severn River?

Naval Academy Bridge

I/We wish to comment or inquire about the following aspects of this project:

Suggest restricting Eastbound exit ramps at
Dove/Rockgate to "exit only" using a solid
line to prevent Eastbound US traffic
from using the two exit lanes and then
merging into travel lanes at last minute
causing back-ups and safety issues.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME W Gordon Fink DATE 16 Dec 2009

PLEASE

ADDRESS 1510 Knollwood Rd

PRINT

CITY Annapolis STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

Congestion / Aggressive Drivers

How often do use US 50 to cross the Severn River Bridge? Take a day / 6 days a week

When the bridge is congested, what route do you take to cross the Severn River?

Naval Academy Bridge

I/We wish to comment or inquire about the following aspects of this project:

Speaking for Winchester on Severn (Community) we need immediate response to our concerns. VSL can be done immediately. I gave a presentation to the trucks on US 50. Wide use of VSL. Second, consider reversible lanes like the Rosemont Bridge in WDC. Third, consider expansion bridge to 4+ lanes each way if build.

I disagree with VSL summary points - provides biased feelings if voted from attendees - BE MORE OPEN Minded

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

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SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME Draine Nicholson DATE 12/16/09

PLEASE PRINT ADDRESS 101 Chautauqua Rd

CITY Arnold STATE MD ZIP 21012

What are your major concerns with crossing the US 50 at Severn River Bridge?

safety

How often do use US 50 to cross the Severn River Bridge? 4+ times per day

When the bridge is congested, what route do you take to cross the Severn River?

The "old" Severn River Bridge

I/We wish to comment or inquire about the following aspects of this project:

I am concerned about reversible lanes & moveable barriers. My observation is that they create confusion & result in accidents. I would like to see fixed barriers & a greater number of lanes leading east if it is not possible to increase the lanes in both directions. I like the idea of beginning more lanes sooner than the bridge - sometimes the eastbound lanes are backed up to Park!

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT
NAME Greg Stewart DATE 12-16-9
ADDRESS 203 Meadowgate Drive
CITY Annapolis STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

Reduction of lanes from 5 to 3 at bridge
NO shoulders - for breakdowns or safety margin
shoulders exist before after bridge

How often do use US 50 to cross the Severn River Bridge? daily

When the bridge is congested, what route do you take to cross the Severn River?

MD 450 or Rt 50

If/We wish to comment or inquire about the following aspects of this project:

Build what is needed now to meet the projected 20 year
ADT. Makes no sense to spend \$ 20 M on concept IA
(only one that improves operation) and then have to spend
significantly more in the future to do the right thing.

Suggestion for future bridge - consider adding a bike
lane on the north side to connect WBA trail to BA
trail. These bike trails are part of the national
north-south and east-west trail. Build to 20 yr ADT

Some of the options being considered use a reduced lane - 11'
width which slows traffic down -

Movable barrier seems to work in other areas - With all the truck
traffic - is it safe ?

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

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SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME KNOPP, CHARLES S DATE 12/16/09

PLEASE PRINT ADDRESS 2016 GOV THOMAS BLADEN WAY #304

CITY ANNAPOLIS STATE MD ZIP 21401

What are your major concerns with crossing the US 50 at Severn River Bridge?

I LIVE OFF OF ROWE BLVD, BERTGATE RD.
NOT ALWAYS, BUT SOME EVENINGS TRAFFIC
TRYING TO ACCESS RT. 50 EASTBOUND WILL
TIE UP THE ENTRANCE TO COMMUNITY.

How often do use US 50 to cross the Severn River Bridge?

3 x A WEEK

When the bridge is congested, what route do you take to cross the Severn River?

USUALLY 450

I/We wish to comment or inquire about the following aspects of this project:

I AM LIKING CONCEPT 1A. BOTH, WELL ALL
ASPECTS; PRICE, ENVIRONMENTAL IMPACT
AND STUDY RESULTS. I THINK IN THE TERMS
OF WHAT I HAVE SEEN TO NIGHT, WITH THE
NO CONSTRUCTION OF NEW BRIDGE POSS-
IBLE, THIS WOULD BE A WISE CHOICE.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

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WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

**PLEASE
PRINT**

NAME SUE BRINGEN **DATE** 12/16/09

ADDRESS 450 KNOTTWOOD CT

CITY ARNOLD **STATE** MD **ZIP** 2102

What are your major concerns with crossing the US 50 at Severn River Bridge?

TRAFFIC BACK-UP

How often do use US 50 to cross the Severn River Bridge?

DAILY

When the bridge is congested, what route do you take to cross the Severn River?

IF WHEELS ARE TURNING I TROUGH IT OUT OR GO INTO
ANNAPOLIS & LATER USE 450 BRIDGE

I/We wish to comment or inquire about the following aspects of this project:

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

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SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT

NAME David Rey DATE 12-16-09

ADDRESS B22 Windsor Ridge Ln

CITY Annapolis STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?
congestion get going to the bridge East Bound in Evening.

How often do use US 50 to cross the Severn River Bridge? 2 times daily

When the bridge is congested, what route do you take to cross the Severn River?
stay on rt. 50 East Bound

I/We wish to comment or inquire about the following aspects of this project:
Having driven this route for 25 yrs daily, the extension of more lanes have increased the Back up going East. Many many people will use merge lane to move ahead of traffic then cut back in before exit to Rowe and before BRIDGE. It has had a significant impact for delays during peak hours.
Feel free to call me: 410-757-6874

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME Jennifer Zick DATE 12/16/09

PLEASE PRINT ADDRESS 679 Genessee Street

CITY Annapolis STATE MD ZIP 21401

What are your major concerns with crossing the US 50 at Severn River Bridge?

Traffic from the bridge creates major traffic delays throughout all of Annapolis.

How often do use US 50 to cross the Severn River Bridge? weekly, travel

to Rowe Blvd via 50 EB daily

When the bridge is congested, what route do you take to cross the Severn River?

typically stay on 50

I/We wish to comment or inquire about the following aspects of this project:

Concept 1B or 1A seem to have best improvements for the dollar amount and improvement. Ultimately a new bridge is needed if the short term does not work. Ideally a bridge with a lower crest vertical curve so there is better sight distance. It seems like cars slow down b/c of limited sight distance over the vertical curve which creates a residual bottleneck.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

**PLEASE
PRINT**

NAME Linda Ferrara **DATE** 12-16-09

ADDRESS 902 Ravelston Terrace

CITY Arnold, **STATE** MD **ZIP** 21012

What are your major concerns with crossing the US 50 at Severn River Bridge?

Congestion during rush hour

How often do use US 50 to cross the Severn River Bridge? every day

When the bridge is congested, what route do you take to cross the Severn River?

Take Rowe Blvd through West Annapolis
over Naval Academy Bridge

I/We wish to comment or inquire about the following aspects of this project:

Excellent concepts - in favor of I A -

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME Ross Gertz **DATE** _____

**PLEASE
PRINT**

ADDRESS 623 Kimberly Way

CITY Stevensville **STATE** MD **ZIP** 21666

What are your major concerns with crossing the US 50 at Severn River Bridge?

How often do use US 50 to cross the Severn River Bridge? _____

When the bridge is congested, what route do you take to cross the Severn River?

I/We wish to comment or inquire about the following aspects of this project:

rossgertz@gmail.com

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME ALAN SWITZMAN DATE 12/16/2009

PLEASE

ADDRESS 1939 HIGHT RIDGE ROAD

PRINT

CITY ANNAPOLIS STATE MD ZIP 21409

What are your major concerns with crossing the US 50 at Severn River Bridge?

- ① EXISTING HAZARDS @ EXITS ① WEST ST. ② ROWE BLVD
- ② BACK-UP THAT DUMPS TRAFFIC INTO ANNAPOLIS (CITY)
- ③ SPEED LANES UNTIL ROWE BLVD CUT BACK INTO TRAFFIC.
- ④ ROUTE ② SOUTHBOUND UNTIL BRIDGE

How often do use US 50 to cross the Severn River Bridge? 4x A DAY

When the bridge is congested, what route do you take to cross the Severn River?

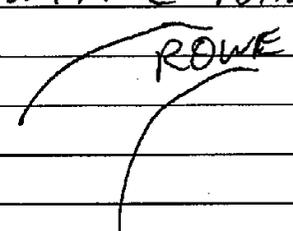
BRIDGE / ROWE BLVD / ~~ROUTE~~ 650 ART. ALLEN

I/We wish to comment or inquire about the following aspects of this project:



CONCEPT 1B (PERMANENT EAST BOUND LANE HAS THE MOST POSITIVE POINTS & LEAST NEGATIVES.)

ELIMINATE



STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

NAME Ross Sorci DATE 16 Dec '09

PLEASE

ADDRESS 1326 Jones Station Rd

PRINT

CITY Arnold STATE MD ZIP 21012

What are your major concerns with crossing the US 50 at Severn River Bridge?

The traffic is backed-up/stopped every day past RT-97 during evening rush hour. Holiday + Bad weather makes for huge waste of time. The slightest perturbation causes stopped traffic to the River or beyond

How often do use US 50 to cross the Severn River Bridge? Twice a day - WB in morning, EB evenings

When the bridge is congested, what route do you take to cross the Severn River?

wait in traffic or travel through Annapolis to Academy Bridge. Sometimes travel North on RT-3 to E-W highway to ^{Nitchie Hwy}

I/We wish to comment or inquire about the following aspects of this project:

The issue w/ the bridge is too much traffic. There is no alternate E-W route available. The traffic volume coupled w/ merging, exiting, jockeying for position causes the traffic to STOP. Holiday, and bad weather or an accident causes HUGE tie-ups. Traffic is completely stopped past RT-97.

I don't feel that any of the concepts shown will have any appreciable impact. What is needed is an alternate route or a way to lessen the traffic volume. The concepts are all band-aids not a solution.

I do not believe the User Delay data shown. Summer Fridays are much longer than 8 minutes. Holidays are even worse. The whole city of Annapolis is gridlocked on Fridays in the summer. I've waited more than 8 minutes at a traffic light trying to get on RT-50

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

**PLEASE
PRINT**

NAME Sally Hornor DATE 12/16/09
ADDRESS _____
CITY Arnold STATE MD ZIP _____

What are your major concerns with crossing the US 50 at Severn River Bridge?

How often do use US 50 to cross the Severn River Bridge? 2-3 times/wk

When the bridge is congested, what route do you take to cross the Severn River?

I/We wish to comment or inquire about the following aspects of this project:

It seems like the best plan - it should not cause more accidents + might improve delays.

Traffic merging on to the ERB bridge is problematic. Don't allow merge lane to invade 50

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS

101 COLLEGE PARKWAY, ARNOLD, MD 21012

**PLEASE
PRINT**

NAME Tom Caperna **DATE** 12-16-09

ADDRESS 787 Mago Vista Rd

CITY Arnold **STATE** _____ **ZIP** 21012

What are your major concerns with crossing the US 50 at Severn River Bridge?

How often do use US 50 to cross the Severn River Bridge? morning and evening during work commute

When the bridge is congested, what route do you take to cross the Severn River?
stay on 50

I/We wish to comment or inquire about the following aspects of this project:

Concept 1A appears to alleviate most of the existing problems -

The long on-ramps from parake to Rowe Blvd heading East needs to be reconfigured.

STATE HIGHWAY ADMINISTRATION QUESTIONS AND/OR COMMENTS

AA221A11 - OPEN HOUSE

US 50 AT SEVERN RIVER BRIDGE FEASIBILITY STUDY

WEDNESDAY, DECEMBER 16, 2009, 5:00 PM to 8:00 PM

SNOW DATE: JANUARY 6, 2010

ANNE ARUNDEL COMMUNITY COLLEGE - WEST CAMPUS
101 COLLEGE PARKWAY, ARNOLD, MD 21012

PLEASE PRINT
NAME _____ DATE _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

What are your major concerns with crossing the US 50 at Severn River Bridge?

* ANGLE OF APPROACH - TOO STEEP FOR 95% OF DRIVERS - THEY TAKE FOOT OF GAS PEDAL, WHICH SLOWS THEM DOWN - CAUSES PEOPLE BEHIND TO HIT BRAKES - BACKUP BEGINS

* LANES ALREADY TOO NARROW DUE TO LACK OF SHOULDERS FOR 95% OF DRIVERS

How often do use US 50 to cross the Severn River Bridge? 6-7 DAY / WEEK

When the bridge is congested, what route do you take to cross the Severn River?

NONE - NOT WORTH TRYING

I/We wish to comment or inquire about the following aspects of this project:

SPENDING TAX DOLLARS TO ADD MORE LANES IN A GIVEN DIRECTION IS SILLY AS LANES WILL BECOME NARROWER. SEE COMMENTS ABOVE -

MONEY IS BETTER SPENT BY FULLY DUALIZING 405 FROM RE 50 TO DELAWARE LINE.

APPENDIX F

CONCURRENCE MEMO



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

Beverley K. Swaim-Staley, *Secretary*
Neil J. Pedersen, *Administrator*

Maryland Department of Transportation

MEMORANDUM

TO: Mr. Neil Pedersen
Administrator
State Highway Administration

THROUGH: Douglas H. Simmons
Deputy Administrator/Chief Engineer
for Planning, Engineering Real Estate
and Environment

FROM: Gregory I. Slater
Director
Office of Planning and
Preliminary Engineering

DATE: May 3, 2011

SUBJECT: US 50 over Severn River Bridge
Feasibility Study
Project No: AA221A11

RE: Selected Concept - Administrator Concurrence

The goal of this memorandum is to seek concurrence from the State Highway Administrator on the Recommended Concept for the US 50 over Severn River Bridge Feasibility Study. This section of US 50 has long been an area of concern for the traveling public and the City of Annapolis. SHA has received numerous letters and complaints about eastbound traffic congestion during the PM peak period. In addition, the City of Annapolis has expressed concerns with neighborhood cut through traffic as a result of congestion along US 50. Anne Arundel County has identified improvements along US 50 (in the vicinity of the Severn River Bridge) as a top priority in their Transportation Letter in 2009.

Purpose of the Feasibility Study

The purpose of this feasibility study is to provide a preliminary concept that will alleviate traffic congestion during the morning and evening peak periods, as well as during the summer travel period along US 50 (John Hanson Highway) over the Severn River Bridge, located in Annapolis, Maryland. The study identifies both short-term and long-term traffic improvements along US 50. The project study limits extend from MD 70 (Rowe Blvd) to MD 2 (Ritchie Hwy).

Project Overview and Background

In early 2007, SHA Travel Forecasting completed a brief, preliminary analysis of a potential reversible lane system on the Severn River Bridge. The results of the preliminary study were inconclusive and a more-comprehensive feasibility study was recommended to study potential improvements along the US 50 corridor. Extensive data collection was conducted in the summer and fall of 2007 to support the study and a Project Scoping Meeting was held on November 27, 2007. During the course of the study, the project team concluded that the congestion at the Severn River Bridge was caused not only by sheer traffic volume, but by a combination of factors including the vertical profile at the bridge, truck volume, narrow shoulders, the merge from Rowe Boulevard, queue jumpers, and other human factors. Therefore, the project team examined a variety of options, including reversible lanes, express lanes/CD roads, ramp metering, variable speed limits, lane speed control, and even a new bridge concept.

The preliminary Environmental Assessment noted that there are wetlands along the north and south shorelines of the Severn River. A majority of the project is within the Chesapeake Bay Critical Area (CBCA) and the Severn River is entirely within the 100-year floodplain.

SHA representatives met with the 40th Delegation Elected Officials in October 2009 to explain the concepts under consideration. The project team completed public involvement in December 2009. The team presented the feasibility study to Senior Management at the P E R E Meeting on August 19, 2010 at which time the team recommended two concepts for the feasibility study. Mr. Pedersen asked that the project team come back with one recommendation for the US 50 over Severn River Feasibility Study. The project team met with the District Office, County Staff, Office of Structures and Office of Highway Development on October 5, 2010 to determine a final recommendation for the US 50 over Severn River Bridge Feasibility Study.

Traffic Overview

The SHA Travel Forecasting & Analysis Division developed the traffic forecasts and conducted the operational analysis for the feasibility study. Three primary peak periods were chosen for analyses: typical AM peak, typical PM peak, and summer Friday peak. A VISSIM simulation model was created for the study area to test the effectiveness of each improvement concept. VISSIM software was chosen as the analysis tool because it had enough flexibility to accurately replicate the unique driver behavior at the base of the Severn River Bridge. A base VISSIM network was calibrated to match observed traffic conditions and each of the Build concepts were coded into VISSIM. The operational analyses compared several Measures of Effectiveness (MOE's) including maximum queue length, vehicle throughput, travel time, and overall system delay. The Build concepts are described in the following section, along with the analyses results.

It should be noted that the design year 2030 volumes far exceed the capacity of the existing bridge, as well as most of the Build concepts. Therefore, the operational analyses were based on existing (year 2007) volume levels. Otherwise, it would have been difficult to compare the operational benefits between concepts.

Concepts Under Consideration

Six primary concepts and several options were presented at the Public Open House. The following concepts and options were presented:

Concept 1A – Reversible Lane with Moveable Barrier (Remove Existing Median Barrier):

This will remove the existing concrete median traffic barrier between the Ridgely Avenue overpass and the MD 2/MD 450 interchange; a total length of approximately 1.6 miles. US 50 will be re-striped to provide seven (7) through lanes. By removing the concrete median traffic barrier on the Severn River Bridge, the 1 inch open joint will be exposed to traffic. Therefore, approximately 7 feet of the deck will need to be replaced. Beyond the bridge, the median will be reconstructed with traffic bearing full depth hot mix asphalt (HMA) pavement. A single run of moveable barrier will be positioned to allow for four (4) through lanes in the peak direction while maintaining three (3) through lanes in the non-peak direction. All lanes will be narrowed to 11 feet. A single barrier transfer machine will manage the reversible lane by moving the barrier twice a day; once prior to the A.M. peak period and once prior to the P.M. peak period. Traffic will be able to enter and exit the reversible lane at any point along its length. Overhead lane use signals and variable message signs will be used to manage traffic and warn drivers prior to the end of the additional lane. Based on the VISSIM simulation model, this concept is projected to reduce congestion during all peak periods.

Concept 1B – Additional Eastbound Lane (Shift Existing Median Barrier):

Option B is similar to Option A in that the existing median barrier will be removed between the Ridgely Avenue overpass and the MD 2/MD 450 interchange, along with US 50 being re-striped to provide seven (7) through lanes. Similarly, approximately 7 feet of the deck will need to be replaced. Instead of a moveable barrier, however, a new permanent concrete median traffic barrier will be constructed to provide four (4) through lanes in the eastbound direction and three (3) through lanes in the westbound direction at all times. The results of the VISSIM analysis indicates that Concept 1, Option B would be projected to provide similar benefits as Concept 1, Option A during the PM peak period and the summer Friday peak period. However, during the westbound AM peak period this option does not provide any benefits to the system.

Mr. Neil Pedersen
US 50 over Severn River Bridge
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In fact, total vehicle delay and queue lengths are projected to increase compared to existing conditions during the AM peak hour, because lanes and shoulders have to be narrowed to accommodate the additional eastbound lane. This operational disadvantage needs to be weighed against the cost savings of eliminating the capital, operating and maintenance cost of the moveable barrier system required under Option A.

Concept 2 Options A through D – Reversible Lane with Moveable Barrier
(Maintain Existing Median Barrier):

These Concepts will maintain the existing concrete median traffic barrier except in transition areas where traffic will shift from one side of the median barrier to the other. The median pavement will need to be reconstructed in these transition areas with traffic bearing full depth HMA pavement. Two runs of moveable barrier will be placed adjacent to the existing concrete median traffic barrier; one run on the eastbound side and one run on the westbound side. Two barrier transfer machines will manage the reversible lanes by moving each barrier twice a day; once just prior to and once just after the A.M. peak period on the westbound side as well as once just prior to and once just after the P.M. peak period on the eastbound side. During off peak hours, three (3) through lanes will be maintained in both directions. During the peak hours, the peak direction will have four (4) through lanes and the non-peak direction will only have two (2) through lanes. The VISSIM simulation results indicate that reducing the off-peak direction to two lanes would introduce congestion in the off-peak direction, particularly during the Summer Friday peak. To accommodate the space needed for the moveable barriers across the Severn River Bridge, the bridge's shoulders will be narrowed to 1 foot and the outer most lanes will be narrowed to 11 feet wide. Traffic will only be able to enter and exit the reversible fourth lane at the transition areas located at the beginning and end of each option. In order for traffic to safely cross from one side of the existing median barrier to the other, the required 2000 foot long transition areas are proposed within long tangent sections. The following options were considered as the limits of the reversible lanes:

- Option A – 600 feet east of the Weems Creek Bridge to 2,100 feet west of the Bay Dale Drive Overpass (3.0 miles),
- Option B – 1,500 feet east of the I-97 Overpass to 600 feet west of the MD179 (St. Margaret's Road) Overpass (7.4 miles),
- Option C – 600 feet east of the Weems Creek Bridge to 600 feet west of the MD 179 (St. Margaret's Road) Overpass (4.8 miles),
- Option D – 1,500 feet east of the I-97 Overpass to 2,100 feet west of the Bay Dale Drive Overpass (5.6 miles).

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US 50 over Severn River Bridge
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Concept 2 Options E through H – Reversible Lane without Moveable Barrier
(Maintain Existing Median Barrier):

These Options are similar to Concept 2 - Options A through D, except moveable barriers are not utilized. Instead, traffic is shifted to use one lane of traffic on the opposite side of the existing median barrier; similar to the two-way configuration used across the Bay Bridge during peak times. Overhead lane use signals and variable message signs will be used to manage traffic. The operations of Concept 2, Options E through H would be similar to Concept 2, Options A through D. Therefore, these options were not modeled separately.

Concept 3 Option A – CD Road / Express Lanes:

This Concept will extend the eastbound CD Road at I-97 from its current terminal prior to the MD 665 (Aris Allen Boulevard) interchange to the MD 70 (Rowe Blvd) interchange, providing local access to MD 665, MD 450, MD 2, and MD 70. It will effectively split through trips from local trips, keeping local trips out of the recurring congestion approaching the Severn River Bridge. The CD Road will be separated from the mainline by a concrete median traffic barrier since a painted buffer will be ineffective during periods of heavy congestion. Since the CD Road volumes exceed the mainline volumes, this Concept will function more as an Express Lane/Local Lane system rather than a CD Road. In order to accommodate the traffic split, an additional eastbound travel lane, along with the space required for the traffic barrier and associated shoulders, is required. As a result, acquisition of additional right of way will be necessary, full depth HMA roadway widening will have to occur and six (6) bridges will be impacted (four on US 50 need to be widened and two over US 50 need to be lengthened). Vehicles from I-97 are precluded from entering the Express Lanes under this option. It should be noted that while Concept 3 results in an overall system benefit, especially by accommodating local access, it would have no impact on the congestion caused at the Severn River Bridge unless a parallel span were constructed. The VISSIM simulation results indicated that this concept would not relieve congestion at the bridge.

Concept 3 Option B – CD Road / Express Lanes:

Concept 3 Option B is similar to Concept 3 Option A in that it will extend the eastbound CD Road at I-97 from the MD 665 interchange to the MD 70 interchange and provide local access to MD 665, MD 450, MD 2, and MD 70. It will also result in similar right of way acquisitions, full depth HMA roadway widening, and impacts to existing bridges. However, instead of separating the traffic from the US 50 mainline for the CD Road's entire length between I-97 and MD 70, a slip ramp will be proposed to allow I-97 traffic an opportunity to enter the Express Lanes. The slip ramp will be a single lane and will be located in the vicinity of the MD 665 interchange.

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The VISSIM simulation results indicated that this concept would not relieve congestion at the bridge.

Concept 4 – Lane Speed Control / Variable Speed Limit:

A concept that considers varying speed limits in each lane, known as Lane Speed Control (LSC), was evaluated. This concept is new in the United States. In fact, there are no known examples of such a system in the country. LSC systems are used in Europe, however, require strict adherence to posted speed limits to be effective. The VISSIM simulation model did not show any operational benefits for this concept, although it could be considered on a trial basis.

Concept 5 – Ramp Metering / Signal Timing:

Concept 5 examined potential operational changes to mitigate the impacts of the merge from MD 70 (Rowe Boulevard) to US 50. Ramp metering was considered at this on-ramp to try to eliminate the platooning effect. Field observations indicated that the platooning contributed to the congestion. The project team also tried modifying the signal timing along MD 70 to reduce the platooning effect for vehicles accessing US 50 eastbound. The VISSIM simulation results indicated that this concept would not relieve congestion at the bridge.

Concept 6

This Concept considers the construction of a new span over the Severn River, constructed parallel and adjacent to the north side of the existing bridge. The new span would need to accommodate at least five (5) lanes of traffic with 10 foot shoulders for westbound US 50. For estimating purposes, however, we have assumed a 6 lane bridge to match the typical section across the existing bridge. The existing bridge would remain in place, but would be modified to accommodate eastbound US 50. A new and reconstructed roadway, approaching each end of the bridge, would be required as well as the reconfiguration and reconstruction of both the MD 70 (Rowe Boulevard) and MD 2/MD 450 interchanges. A significant amount of right-of-way acquisition would be required. This is the only option that would be able to accommodate projected year 2030 traffic volumes.

Summary of Public Feedback

A Public Open House was held at Anne Arundel Community College on December 16, 2009. There were 91 people in attendance and 57 comment cards were received. The purpose of this meeting was to provide information on the Feasibility Study and to solicit feedback from citizens and elected officials.

Views were mixed on the movable barrier. Some attendees supported the flexibility that a reversible lane provided to adapt to different traffic situations. There were concerns regarding the operations of the movable barrier (potential breakdowns, daily maintenance and associated costs, etc). There were comments that SHA should address the long term issues with the bridge rather than provide band-aid solutions. Long term solutions are not currently addressed in the concepts. Others were concerned about trucks encroaching into their lanes as they travel around the curve on the east side of the bridge. It was suggested that a visual barrier be added to solve the rubbernecking across the bridge. This suggestion was included in a written letter/article. Several people had general maintenance questions about such items as debris, drainage, and landscaping. There were several traffic and operational comments including a comment that the increase in merge lanes from Rowe Boulevard to the base of Severn River Bridge has been the major culprit for the traffic jams. The comment was made that narrow lanes on the bridge and lack of shoulders causes the reduction in speed, which in turn causes the beginning of the traffic congestion experienced along Route 50.

There were several comments about the concepts including:

- Concepts 1A and 1B were generally preferred over the others with Concept 1A getting the most feedback of the two.
- Many people supported Concept 1A, because it had the greatest operational benefit for all directions. Compelling arguments for Concept 1B included:
 - Having the EB lane added at Rowe Boulevard and dropped at Ritchie Highway. There was a concern that not enough vehicles will voluntarily move into the extra lane under Concept 1A. There were also concerns regarding the merge from 4 lanes to 3 lanes under Concept 1A.
 - It was noted that the duration of the AM peak congestion is typically shorter than the PM peak congestion. Comments indicated that the AM congestion generally cleared within a half hour, while the PM and summer congestion can last for hours. Based on this, some comments did not support the need to improve westbound conditions; Concept 1B was supported.
- There was some support for Concept 6 (new bridge). The attendees understood that this concept should be dropped as a short-term solution, but wanted to be sure that it was still considered in the future because it is the only concept that addresses long-term needs.

Mr. Neil Pedersen
US 50 over Severn River Bridge
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Page Eight

Studies Conducted Subsequent to the Public Meeting

Following the public meeting, the project team met and reduced the Concepts Under Consideration to include the following:

- Concept 1A – Reversible Lane
- Concept 1B – Added Eastbound Lane
- Concept 2A – Barrier Separated ContraFlow Reversible Lanes
- Concept 4 – Lane Speed Control and Variable Speed Limits

Based on the public comments and a review of the advantages and disadvantages of each concept, the project team determined that Concept 2A should be dropped from further consideration. In addition to being the most costly, peak direction traffic operations were no better than under Concepts 1A and 1B. In addition, other significant disadvantages include: requiring 2 runs of moveable barrier and 2 moveable barrier transfer machines and all associated operating and maintenance costs, and eliminating one lane in the non-peak direction, resulting in significant congestion and queuing in that direction, particularly during the Summer peak.

However the team noted that Concept 1A and Concept 1B were the preferred concepts under consideration. Additionally, Concept 4 could be combined with any concept and/or implemented on a trial basis to determine if there would be a benefit, since the modeling efforts did not offer a significant benefit to the system. In order to determine which of the concepts would be preferred for this feasibility study, the project team met to discuss and develop an advantages and disadvantages list for both Concepts 1A and Concept 1B (see appendix).

Key Issues

The first draft of the Feasibility Report presented both Concept 1A and Concept 1B as the preferred concepts. Concepts 1A and Concept 1B each provide a viable solution to the recurring congestion based on the analysis, along with both being supported by the public. However, the project team was directed to select one preferred concept following a meeting with Neil Pedersen on August 19, 2010. A review of the following key issues and unknown factors helped the project team to reach a conclusion.

- Human factors contribute to driver behavior and existing congestion on the bridge. This leads the project team to conclude that there may be motorists who will shy away from using the additional lane because of the open joint. This is more critical under Concept 1A, which requires motorists to voluntarily move into the reversible lane to be effective.
- In other states there is dedicated staff to operate the barrier transfer machine. Based on the current economic climate, will SHA be able to accommodate this? It is unclear how the driver will access the barrier transfer machine. If a pedestrian bridge with stairs were built from the Ridgely Ave (MD 436) overpass into the median, how would the staffer be picked

up at the end of the run? In addition, it is unclear if the Maryland State Police will be needed during the lane shifts. Historically, reversible lane systems have been installed exclusively at toll facilities. Since this is not a toll facility, there will be high reoccurring costs that cannot be recouped from the users.

- Concept 1A would require the purchase of a spare machine, in the event of a breakdown. In inclement weather, it may not be possible to shift lanes. There would need to be one key person responsible for making the decision whether to reverse the lanes or not each day.
- Crash / incident management –There is no room for the barrier to deflect before it encroaches on the travel lanes in the opposite direction.
- Concept 1A would provide additional capacity in both directions. However, there is questionable confidence in the model to accurately predict driver behavior, because drivers must voluntarily move into the new lane, as they do in the model. The Concept 1A simulation demonstrates the need to start the reversible lane as soon as possible before the Rowe Boulevard Merge. A slight shift east, results in little or no benefit.
- Under Concept 1B, the queues along westbound US 50 and southbound MD 2 in the AM *are slightly increased* because of the reduced lane width across the Severn River Bridge. However, public perception is that the primary congestion problem is in the eastbound direction. Under Concept 1B, drainage modifications will be required for the bridge, because the barrier will no longer be located at the high point of the bridge cross section. However, the project team believes it can address this issue by shifting the barrier to the north, while maintaining the existing cross slopes, water will drain to the south side of the new barrier, collected by a series of scuppers and piped to the existing drainage system under the structure.

Team Recommended Alternative

Based on these findings, the project team recommends Concept 1B as the most feasible option. We recognize that Concept 1A is a new system for Maryland which could be on the cutting edge of technology; however, Concept 1A has several unknowns and risk factors due to the reversible lane system, which make it more difficult to recommend this concept.

The project team is more confident that Concept 1B will deliver the intended benefits in the eastbound direction, which is the critical movement. Although Concept 1B will slightly reduce capacity in the westbound direction, the project team had determined that the advantages of this option outweigh the disadvantages.

If you have any questions, please feel free to contact Ms. Kameel Hall, Project Manager, at 410-545-8542 or via e-mail at khall1@sha.state.md.us.

Mr. Neil Pedersen
US 50 over Severn River Bridge
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I concur that the above statements accurately represent agreement by the Administrator at the conclusion of the US 50 over Severn River Bridge Feasibility Study.

Concurrence:

Neil J. Pedersen

Neil Pedersen, Administrator
State Highway Administration

5/5/11

Date

Attachments

cc: File

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Appendix A: Advantages and Disadvantages of Concept 1A and Concept 1B
Advantages and Disadvantages - CONCEPT 1A

Reversible Lane with Moveable Barrier / Remove Existing Median Barrier

• **Advantages**

- Projected to improve traffic operations at the Severn River Bridge during all peak periods:
 - Eliminates Existing Queuing in the Peak Direction
 - Reduces Existing Delay and Increases Throughput in the Peak Direction:
- Reduces Annual User Costs by \$8M.
- SHA may be able to partner with the MDTA if they consider using a moveable barrier system across the Bay Bridge.

• **Disadvantages**

- Requires a moveable barrier transfer machine and all associated operating and maintenance costs (approx. \$200,000 per year)
- Requires a spare moveable barrier transfer machine
- Slight reduction in capacity in the non-peak direction due to reduced lane and shoulder widths
- Overhead sign structures need to be replaced with cantilever sign structures
- Traffic impacts during the barrier relocation process. May need to close the left lane to drop-off and pick-up the barrier transfer machine operator.
- The simulation model predictions are very sensitive to a slight shift in the location of the lane addition. The simulation demonstrates the need to start the reversible lane as soon as possible before the Rowe Boulevard merge. A slight shift east, results in little or no benefit.
- The operational improvement associated with Concept 1A is dependent on through vehicles voluntarily moving over into the new lane adjacent to the median barrier prior to the Rowe Boulevard on-ramp and then merging back into their original lane after crossing the bridge. This driver behavior occurs in the simulation model, but may not occur in actual practice. Therefore, the associated with Concept 1A is that it may not achieve its intended operational benefit.
- Reversible lane systems have historically been installed at toll facilities. Since this is not a toll facility, there will be high reoccurring costs, or carrying costs, that cannot be recouped from the users.
- If the moveable barrier is hit, there is not an adequate shoulder on either side of the barrier based typical section for it to deflect before it encroaches on the travel lanes in the opposite direction.
- Fuel should not be stored on site, but delivered as necessary. This may require a lane closure.
- A machine operator will have to be on-call at all times to respond to any incidents.

Advantages and Disadvantages - Concept 1B

Additional Eastbound Lane / Shift Existing Median Barrier)

• **Advantages**

- Projected to improve Eastbound traffic operations at the Severn River Bridge during PM and Summer peak periods:
 - Eliminates Existing Eastbound Queuing in the Peak Direction
 - Reduces Existing Delay and Increases Eastbound Throughput
- Reduces Annual User Costs by \$4.5M.
- Eliminates the eastbound merge at Rowe Boulevard by providing a continuous lane from Rowe Blvd. on-ramp to the MD 2/MD 450 exit ramp.
- Does not require a moveable barrier transfer machine, spare machine or any of the associated operating and maintenance costs
- Higher level of confidence in the simulation model's predictions of an eastbound benefit, due to the lane shift. It does not rely on the driver's decision to change lanes at the beginning of the reversible lane, or the exact location of the beginning of the additional lane.

• **Disadvantages**

- Projected to adversely impact Westbound traffic operations at the Severn River Bridge during AM peak period due to permanently reducing the lane widths in the westbound direction:
 - Increases Existing Westbound Queuing
 - Increases Existing AM Delay and Decreases Westbound Throughput:
- The reduced capacity westbound may make it more difficult to access the Anne Arundel Medical Center and/or to cross the bridge during an evacuation.

Both Concepts:

- Reduce Annual User Costs
- Require that a portion of the deck across the bridge to be replaced
- Require that the median be reconstructed
- Require lanes to be restriped
- Require that traffic cross the longitudinal bridge deck joint, primarily impacting motorcycles
- Require containing and redirecting drainage through the longitudinal bridge deck
- May require a latex overlay to cover the existing lane lines.
- Were generally well received by the stakeholders.

Neither Concept:

Accommodates design year volumes. Traffic operations will improve for a period of 8 to 10 years after implementation. Under Concept 1A, traffic operations will improve in both directions. Under Concept 1B, traffic operations improve only in the eastbound direction. While the model predicts that both concepts result in an improvement for the same 8 to 10 year period, it is reasonable to assume that eastbound traffic operations under Concept 1B will last slightly longer after implementation due to the reduction in the volume of merging traffic.