CHESAPEAKE
BAY CROSSING STUDY
TIER 1 NEPA

TRAFFIC ANALYSIS TECHNICAL REPORT

MDTA
Maryland Transportation Authority

JANUARY 2021

Table of Contents

List of Tables

List of Figures

1.0 INTRODUCTION

1.1 Project Description

The Maryland Transportation Authority (MDTA), in coordination with the Federal Highway Administration (FHWA) is preparing a Tier 1 Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA) for the Chesapeake Bay Crossing Study: Tier 1 NEPA (Bay Crossing Study). The purpose of the Bay Crossing Study is to consider corridors for providing additional traffic capacity and access across the Chesapeake Bay in order to improve mobility, travel reliability and safety at the existing Governor William Preston Lane Jr. Memorial (Bay) Bridge. Evaluation of any potential new crossing corridor will include an assessment of existing and potentially expanded transportation infrastructure needed to support additional capacity, improve travel times, and accommodate maintenance activities, while considering financial viability and environmental responsibility. The Tier 1 study initiates the NEPA process with the goal of narrowing the scale and scope of this complex project prior to more detailed analysis in a future Tier 2 NEPA analysis. The Tier 1 study area includes the entire length of the Chesapeake Bay in Maryland, extending nearly 100 miles from the northern part of the Chesapeake Bay near Havre de Grace, Maryland south to near Point Lookout, Maryland (**Figure 1-1**).

The purpose of this technical study report is to provide an overview of the traffic analyses conducted for the Bay Crossing Study.

1.2 Purpose and Need

Evaluation of the Corridor Alternatives Retained for Analysis (CARA) included an assessment of existing and potentially expanded transportation infrastructure needed to support additional capacity, improve travel times, and accommodate maintenance activities, while considering financial viability and environmental responsibility. The Tier 1 NEPA analysis considers a "No-Build" alternative and addresses the following needs listed under **Section 1.2.1** through **1.2.4**.

1.2.1 Adequate Capacity

The existing two spans of the Bay Bridge, which are part of US 50/US 301 between Anne Arundel and Queen Anne's counties, Maryland, carry increasing volumes of travelers. Congestion resulting from high regional travel demand by weekday commuter and summer weekend recreation trips is expected to worsen by the planning horizon year of 2040 due to planned growth in population and employment. Additional capacity is needed to address existing congestion, future congestion, and related safety concerns, all resulting from increasing travel volume on the Bay Bridge and approach transportation network.

Figure 1-1: Chesapeake Bay Study Area

1.2.1 Dependable and Reliable Travel Times

The anticipated population increase in communities on both sides of the Chesapeake Bay and associated increase in commuter travel, as well as expected increased tourism and recreational travel, will continue to stress mobility across and around the Bay. Marylanders and visitors need dependable Chesapeake Bay crossing options with reliable operating speeds and travel times that provide access to employment and recreation areas, as well as facilitate emergency services and evacuation events.

1.2.2 Flexibility to Support Maintenance and Incident Management in a Safe Manner

Maintenance and rehabilitation activities will increase and exacerbate congestion as the Bay Bridge ages. Additional capacity is needed to maintain flexible options for safe travel during maintenance and for management of other incidents on the Bay Bridge. Safety of travelers, maintenance workers and incident responders will also be considered during corridor alternative development.

1.2.3 Additional Considerations

Additional capacity across the Chesapeake Bay and/or improvements to existing facilities must be financially viable. In order to assess potential additional Bay crossings, it is necessary to consider the means to pay for the development, operation and maintenance of such facilities.

The Chesapeake Bay is a critical environmental resource in Maryland; therefore, any Bay Crossing improvements must take into account the sensitivity of the Bay, including existing environmental conditions and the potential for any new capacity to adversely impact the Bay and the important natural, recreational, socio-economic and cultural resources it supports.

1.3 Organization of This Document

This Traffic Analysis Technical Report uses the following format: In Chapter 2, each of the alternatives considered to address the project's Purpose and Need is discussed; in Chapter 3, the methodologies which were utilized to perform the traffic analyses are presented; in Chapter 4, those methodologies are applied to existing conditions and the results of those analyses are discussed; in Chapter 5, those methodologies are applied to conditions expected in 2040, under both No-Build and Build Conditions, and the results of those analyses are discussed; and, the contents of the document are summarized in Chapter 6.

2.0 ALTERNATIVES CONSIDERED

MDTA conducted a comprehensive screening of 14 corridors throughout the extent of the Chesapeake Bay in Maryland, along with four Modal and Operational Alternatives (MOA) and the No-Build Alternative. The screening resulted in the identification of three CARA; none of the MOA were carried forward for further Tier 1 Analysis as standalone alternatives.

The alternatives assessed in this technical study include three CARA and the No-Build Alternative.

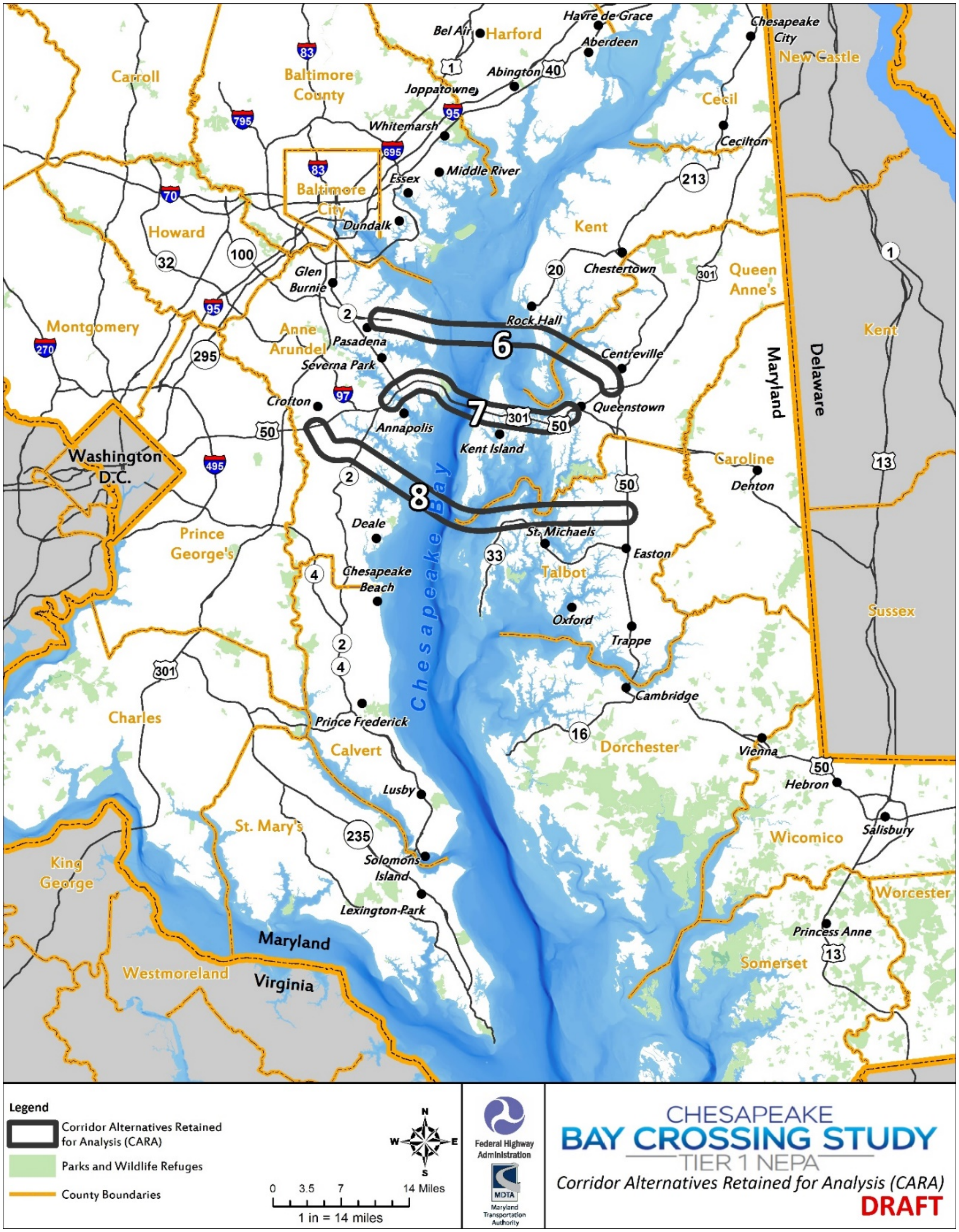
2.1 No-Build Alternative

The No-Build Alternative is included as a baseline for comparison to the CARA described below. The No-Build Alternative includes all currently planned and programmed infrastructure projects. The No-Build Alternative includes regular maintenance at the existing Bay Bridge, existing transportation systems management/travel demand management (TSM/TDM) measures including contraflow lanes on the existing bridge, as well as any planned and funded TSM/TDM measures such as automated contraflow lanes.

2.2 Corridor Alternatives Retained for Analysis

The screening process resulted in the identification of three CARA known as Corridor 6, Corridor 7, and Corridor 8 (**Figure 2-1)**. Each CARA is a two-mile wide corridor extending far enough on each shore to connect to existing major roadway infrastructure of 4 lanes or greater. Specific roadway alignments are not identified in this Tier 1 Study; identification of alternative alignments would occur if a Preferred Corridor is selected and carried forward into Tier 2.

Figure 2-1: Corridor Alternatives Retained for Analysis



2.2.1 Corridor 6

From west to east, the Corridor 6 begins with a tie-in at MD 100 and follows MD 177, with the crossing located north of Gibson Island. After crossing the Chesapeake Bay, Corridor 6 would return to land on the Eastern Shore north of the Eastern Neck National Wildlife Refuge, roughly perpendicular to MD 445. From there, the corridor turns southeast to cross the Chester River and does not follow existing roadway network until the tie-in with US 301 south of Centreville.

2.2.2 Corridor 7

Corridor 7 follows existing infrastructure along the location of the existing Bay Bridge. From west to east, the corridor begins just west of the US 50/301 crossing of the Severn River. The corridor continues to follow US 50/301 over he Severn River, crossing the Chesapeake Bay and returning to land on Kent Island near Stevensville. The corridor continues to follow US 50/301 over Kent Narrows, ending at the US 50/301 split near Queenstown. While this corridor follows the existing crossing along its centerline, a new crossing and the associated infrastructure could potentially be located anywhere within the two-mile wide corridor.

2.2.3 Corridor 8

From west to east, Corridor 8 begins with a tie-in at US 50/301 at the interchange with MD 424. From there, the corridor roughly follows MD 424 and MD 214. The crossing would begin near Mayo on the Western Shore, passing just south of the southern tip of Kent Island, then curving northeast. The corridor returns to land on the Eastern Shore near MD 33, west of St. Michaels. From there, Corridor 8 crosses the Miles River, and does not follow the existing roadway network until it ties in with MD 50 north of Easton.

3.0 TRAFFIC ANALYSIS METHODOLOGIES

3.1 Study Area Limits for Traffic Analyses

The traffic analyses for a Tier 1 NEPA Study are performed at a more general level of detail than those performed for a Tier 2 Study. For the BCS, the initial traffic analyses focused on the existing Bay Bridge and its ability to accommodate current and future traffic demand. All corridor alternatives were analyzed similarly. The traffic analyses focused on a new Bay crossing and the effect of that new crossing on traffic volumes at the existing Bay Bridge.

The existing Bay Bridge connects to US 50/US 301 in Anne Arundel County at its western end and to US 50/US 301 in Queen Anne's County at its eastern end. Any other Bay crossing would also need to connect, at some point, into the existing roadway network. Logical connections to the existing highway network were identified for each corridor alternative, on each side of the Bay.

For each crossing location, the transportation network tie-in locations were identified based on the considerations below:

Eastern Shore Tie-Ins:

- All corridors ended at US 50, US 301, or US 13.
- Corridors followed existing state routes where possible.
- Corridors followed a relatively straight alignment from the Chesapeake Bay crossing to the tie-in with US 50, US 301, or US 13.

Western Shore Tie-Ins:

- Corridors ended at a limited-access highway where possible.
- Corridors in southern Maryland, where there are no limited-access highways, ended at the nearest major regional routes (e.g., MD 2/4 or MD 235).

As noted above, the analyses performed for the BCS focused on the crossings themselves, and not on the approach and departure roadways. If a Tier 2 Study is conducted after the BCS Tier 1 Study, the traffic analyses for Tier 2 will include specific assessments of the performance of these approach and departure roadways in the project area.

3.2 Traffic Analysis Methodologies for Existing Conditions

3.2.1 Capacity Analysis

The Bay Bridge (US 50/US 301) is classified as an urban freeway/expressway with three lanes in each direction on both approaches to the Bay Bridge.

Traffic analyses of existing conditions were performed using peak hour volumes and traditional capacity analysis techniques. The capacity analyses were performed using the Highway Capacity Software 2010 (HCS), version 6.41. HCS uses the methodologies found in the Fifth Edition of the Highway Capacity Manual (HCM 2010), a 2010 publication of the Transportation Research Board of the National Academy of Sciences. The HCM, and computations based on it, are the profession-wide standard for conducting capacity analyses. The multi-lane highway module in the HCS was used for evaluation of existing conditions at the existing Bay Bridge, including contra-flow operation.

All-electronic tolling (AET) eliminating the physical toll plazas and the option to pay cash at those facilities, was not included in the network updates; as it was not in operation at that time. Tolls were collected at a traditional toll plaza on US 50 on the eastbound approach to the existing Bay Bridge. Tolls are not collected in the westbound direction. At the toll plaza, tolls could be paid either in cash or via electronic means, with both E-ZPass and video tolling being available. In 2019, Governor Hogan announced that AET would be implemented at the existing Bay Bridge, and MDTA anticipated that AET would be in operation by Summer 2020. AET is now operational. Since the Draft EIS was nearing completion at the time that AET became operational, it will not be feasible to incorporate AET in the Draft EIS.

Following completion of the Draft Tier 1 EIS, and prior to the preparation of the Final Tier 1 EIS, additional data collection will be performed to determine the effects of AET on eastbound operations. In addition, if a Tier 2 Study is performed, the capacity analyses performed at that time for then-existing conditions would reflect updated volumes resulting from full use of AET.

The HCM evaluates traffic operations in terms of level of service (LOS). LOS as defined by the HCM is a quantitative stratification of a performance measure or measures that represents quality of service, measured on an A through F scale, with LOS A representing the best operating conditions from the traveler's perspective and LOS F the worst. At LOS D, flow is still stable, and travel times are relatively predictable. At LOS E, flow is unstable, and travel times can vary widely. Accepted transportation planning and traffic engineering expertise and practice suggest that achieving at least a LOS D is preferred. The HCM thresholds used for analyses of multi-lane highway segments are shown in **Table 3-1**.

Table 3-1: Multi-Lane Highway LOS

LOS	Multi-Lane Highway Mainline Density, in passenger cars per mile per lane (pc/mi/ln)
A	<=11
B	>11 – 18
C	>18 – 26
D	>26 – 35
E	>35 – 45
F	>45

Use of the HCS for analyses of a multi-lane highway requires identification of a number of parameters. The parameters used in the BCS are shown in **Table 3-2**.

Table 3-2: Multi-Lane Highway Parameters for the Existing Bay Bridge

Parameter	Existing Conditions Analyses
Peak Hour Volumes	Field Counts
Peak Hour Factor (PHF)	Field Counts
Heavy Vehicle %	Field Counts
Number of Lanes	Varies (2-3 per Direction)
Median Type	Divided
Terrain	Grade 3.50% &1.50 mi (EB) 3.00% & 2.50 mi (WB)
Base Free-Flow Speed (mph)	Varies (46.7-50)
Lane Width (ft)	12
Lateral Clearance (ft)	Varies (0.5-0.8)
Access Points (A/mi)	0
Driver Population Adjustment	1.00

LOS, as determined by HCS, is defined as a measure of effectiveness that applies to a single point along a roadway. It is a useful metric but does not explicitly account for conditions either upstream or downstream of the single point being analyzed. In the case of the Bay Bridge, for instance, when traffic volumes approach or exceed capacity, queues begin to develop, and can affect traffic operations on US 50 upstream of the Bridge. Since HCS does not account for such upstream (or downstream) effects, additional types of analysis were considered including queuing on the existing Bay Bridge approaches for both the length and duration of those queues.

3.3 Queuing Analysis

Queue lengths for existing conditions were estimated based upon an analysis of 2017 volume data and 2016 speed data (2017 speed data was not available at the time the analyses were performed). The speed data was obtained from the Regional Transportation Information System (RITIS). The speed information in RITIS was provided by INRIX, a private firm which maintains a database of transportation system data. INRIX speed data was separated into summer and school-year datasets corresponding to the summer and non-summer conditions in this study. The speed data was then further separated into three parts of a week: Monday to Thursday, Friday, and Saturday to Sunday. The reasoning behind this separation of the data is explained in detail in Chapter 4. Speeds for each hour from those categories were obtained for each direction of travel on US 50, for a segment stretching from I-97 on the Western Shore to the US 50/US 301 split on the Eastern Shore.

A study of the speed data revealed that queues would begin to form at an average travel speed of 25 mph or less. In general, these speeds corresponded with the times when traffic volumes were so high that they reached or exceeded the LOS E/LOS F threshold. The queue lengths were then estimated by calculating the “unmet demand”; that is, the number of vehicles that exceeded the LOS E/LOS F threshold volume in each hour. Those vehicles which comprised the unmet demand would still be in the queue at the start of the next hour. (Any vehicles arriving during that next hour would have to wait until the unmet demand from the previous hour was processed.) The queue length was then computed by multiplying the total unmet demand by an average vehicle length of 28 feet[1], and dividing that length by the number of lanes that were available for vehicles to queue, including the contra-flow[2] lane where applicable. The queue lengths obtained from these computations were then compared to the field data. The threshold value used by the computations to determine the point at which queuing began to occur was then adjusted, to ensure that the computations reproduced the existing longest queue lengths observed for both the Average Non-Summer Weekday and Average Summer Weekend. For the purposes of this document, "weekdays" are defined to be Mondays – Thursdays, and "weekends" are defined to be Fridays – Sundays. The reasoning behind this is explained in detail in Chapter 4.

3.4 Traffic Analysis Methodologies for Future Conditions

3.4.1 Traffic Volume Forecasting

Traffic volume forecasts were developed for conditions anticipated in the Year 2040, for a "No Build" scenario. These forecasts were developed using the Maryland Statewide Transportation Model (MSTM), a tool developed by the Maryland Department of Transportation-State Highway Administration (MDOT SHA) and customized for use in this study.

The No Build scenario assumes that no new crossings of the Bay are constructed, and that the existing Bay Bridge remains as it is today, providing five lanes of traffic. For the purposes of capacity analyses, the existing Bay Bridge in 2040 was analyzed in the same manner it was for existing conditions—as a multi-lane highway.

Forecasts were also developed for a number of "Build" scenarios where the existing Bay Bridge is expected to remain as it is today, but a new crossing of the Bay is also constructed. New crossings were analyzed as freeways, divided highways with full access control; the existing contra-flow operation of the existing Bay Bridge would not be expected on a new crossing. A new crossing would have somewhat greater capacity per lane than the existing Bay Bridge because capacity with contra-flow operation is lower than capacity with divided operation due to the lack of separation between the two directions of flow. It should also be noted that, in the HCM, a freeway is defined as "a fully access-controlled, divided highway with a minimum of two lanes (and frequently more) in each direction." The term "freeway" does not mean that the

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[1] *190 vehicles per mile per lane were assumed for jam density, which translates to 27.79 feet per vehicle. Jam density is defined as the density when traffic is so heavy that it is at a complete standstill.*

[1] *The contra-flow lane is the left-most westbound lane on the north span that is reversed to allow use by traffic going eastbound, during select times, to relieve congestion during peak eastbound travel.*

roadway is toll-free. Freeways can and often do have tolls. For the purposes of this Tier 1 study, it was assumed that any new potential crossing would be tolled.

In addition, any potential new crossing was assumed to provide four travel lanes in each direction to ensure that no congestion or queuing would occur at that crossing. (One of the parameters used in travel demand forecasting is congestion. A facility experiencing congestion can accommodate less traffic than an uncongested facility, all other factors being equal.) This assumption does not mean that a new crossing would actually have four lanes in each direction. Additional traffic analyses will be performed on the CARA, to identify the appropriate number of lanes to be provided on both the crossing itself and on the approach and departure roadways.

3.4.2 Capacity Analysis for the Existing Bay Bridge

The parameters used in the HCM analyses of the existing Bay Bridge in 2040 are shown in **Table 3-3**. For comparison purposes, the parameters used for existing conditions are repeated from **Table 3-2**. Examination of **Table 3-3** shows that, with the exception of the peak hour volumes and the peak hour factor, each of the parameters was the same for the future analyses as they were for the existing conditions analyses. (The peak hour volumes were changed, since traffic is expected to increase between now and 2040. The peak hour factor in 2040 will not necessarily be the same as the existing peak hour factor; 0.90 is a value typically used when the peak hour factor is unknown.)

Because AET at the Bay Bridge was not included in MDTA's program when the Bay Crossing Study was initiated, AET was not included in the future conditions evaluation. (As noted above, in Section 3.2.1, following completion of the Draft Tier 1 EIS and implementation of AET, and prior to the preparation of the Final Tier 1 EIS, additional data collection will be performed to determine the effects of AET on eastbound operations.)

AET was considered within the Transportation Systems Management/Travel Demand Management (TSM/TDM) Alternative. TSM/TDM improvements are operational improvements to existing roadway networks which include no major new capacity. The BCS Study Team concluded that TSM/TDM alone would not meet the project need to provide adequate capacity at the existing bridge. With specific regard to AET, it is not anticipated that AET would alter future conditions for the following reasons:

- AET would not influence traffic operations in the westbound direction, because tolls are not currently collected in that direction of travel. Delays occur today in the westbound direction, and because those delays are expected to worsen by 2040, additional improvements would be needed. The existing delays in the westbound direction demonstrate that the capacity of the bridge is lower than the peak traffic demand.

- Existing peak period traffic flows are similar, though not identical, for eastbound and westbound traffic. The peaks occur at different times of day for the two directions, but the volumes found in the peak periods are similar. These traffic flows are expected to continue after the implementation of AET. Thus, even with AET, with the eastbound direction providing similar capacity to that found in the westbound direction, delays in the eastbound direction are anticipated.

It is important to note that, while TSM/TDM alone would not meet the project need to provide adequate capacity at the existing bridge, those strategies would be studied in combination with alignment alternatives in Tier 2 NEPA. In addition, as noted above in Section 3.2.1, a Tier 2 Study would commence after AET had been implemented at the existing Bay Bridge. Thus, AET would be included as part of then-existing conditions.

Table 3-3: Multi-Lane Highway Parameters Assumptions for the Existing Bay Bridge

Parameter	Existing	2040 Alternatives (Both No-Build and Build)
Peak Hour Volumes	Field Counts	Per MSTM Model
Peak Hour Factor (PHF)	Field Counts	0.90
Heavy Vehicle %	Field Counts	Field Counts
Number of Lanes	Varies (2-3 per Direction)	Varies (2-3 per Direction)
Median Type	Divided	Divided
Terrain	Grade 3.50% &1.50 mi (EB) 3.00% & 2.50 mi (WB)	Grade 3.50% & 1.50 mi (EB) 3.00% & 2.50 mi (WB)
Base Free-Flow Speed (mph)	Varies (46.7-50)	Varies (46.7-50)
Lane Width (ft)	12	12
Lateral Clearance (ft)	Varies (0.5-0.8)	Varies (0.5-0.8)
Access Points (A/mi)	0	0
Driver Population Adjustment	1.00	1.00

3.4.3 Capacity Analysis for Other Potential Crossings

In addition to being used for analysis of the existing Bay Bridge, HCS Version 6.41 was used to evaluate freeway operations for other potential crossings, as well as to determine freeway travel speeds. (As noted above, new crossings were analyzed as freeways, divided highways with full access control. For the purpose of the analyses conducted for this Tier 1 Study, it was assumed that the existing contra-flow operation of the existing Bay Bridge would not be used on a new crossing.) **Table 3-4** lists all parameters and inputs for the freeway basic segment analysis that were used in the evaluation of traffic operations on any new crossing. The basic parameters and inputs for the new crossing were assumed to be similar to the existing Bay Bridge; however, there were two differences:

1. The number of lanes on the new crossing was assumed to be four in each direction. (The existing Bay Bridge provides two or three lanes in each direction, depending upon contraflow operations.)
2. The free-flow speed was assumed to be greater on a new crossing (55 mph) in the absence of contraflow operations than on the existing Bay Bridge (46.7 -50 mph).

Table 3-4: Freeway Operations Parameters for New Crossing

Parameter	2040 Alternatives (New Crossings)
Peak Hour Volumes	Per MSTM Model
Peak Hour Factor (PHF)	0.90
Heavy Vehicle %	Varies
Number of Lanes	4 per direction
Terrain	Rolling
Free-Flow Speed (mph)	55
Driver Population Adjustment	1.00

In addition, the densities shown in **Table 3-1** for the various levels of service apply to freeways as well.

3.4.4 Queuing Analysis

Queue lengths for future conditions were determined in the same manner as they were for existing conditions.

3.4.5 Diversion Analysis

As the Purpose and Need Statement for the BCS indicates, "flexibility to support maintenance and incident management in a safe manner" is an important consideration in the study. For a potential new crossing of the Bay, this criterion was analyzed by examining a scenario in which the existing Bay Bridge was assumed to be completely closed to traffic for a period of time long enough so that traffic would need to divert to another crossing. In these Tier 1 analyses, the following parameters/assumptions were used:

1. To provide a common starting point, all eastbound vehicles changing their travel paths would divert at the US 50/US 301 junction in Bowie.
2. To provide a common ending point, the destination for all diverted eastbound traffic would be the US 50/US 301 split on the Eastern Shore.
3. Diverted vehicles would travel on major highways to reach the new crossing and would travel at the posted speed limit throughout their trips.
4. Westbound vehicles would follow the same path as eastbound vehicles, but in reverse.

4.0 TRAFFIC ANALYSIS OF EXISTING CONDITIONS

4.1 Development of Traffic Volumes

A review of traffic data available from Maryland Department of Transportation—State Highway Administration (MDOT-SHA) and MDTA files provided substantial data for the Bay Bridge and the major approach roadways to the Bridge on the Western Shore. Less data was available for the major approach ways to the Bridge from the Eastern Shore. As a result, new data collection efforts were focused primarily on Eastern Shore locations.

15-minute vehicle-classification counts[3] were performed at 13 locations on the Bay Bridge and its adjoining roadways as shown in **Table 4-1**. These locations were chosen based on the key routing points for movements across the Bay Bridge. (A routing point is a location at which a driver makes a major decision as to his/her direction of travel. For example, a driver who started a trip on the Eastern Shore would decide at a routing point to either travel toward the Bay Bridge or to travel in another direction.)

Table 4-1: 2017 Traffic Count Locations

Location #	Shore	County	Route	Location	New- Station ID	Count Duration	# of Lanes
1	East	Queen Anne's	US 50	at Bay Bridge	22-01	7 Days	6
2	East	Queen Anne's	US 301	Between MD 456 and MD 213	22-02	"	4
3	East	Queen Anne's	US50	Between MD 213 and MD 404	22-03	"	4
4	East	Queen Anne's	MD 404	BetweenUS50 and MD 309	22-04	"	2
5	East	Queen Anne's	MD 213	Between US 50 and MD 309	22-05	3 Days	2
6	East	Queen Anne's	US 301	Between MD 300 and MD 302	-	7 Days	4
7	West	Anne Arundel	US 50	at Seven River Bridge	IS-50-AA -01	"	6
8	East	Kent	US 301	North of MD 544	21-10	7 Days	4
9	East	Queen Anne's	US 301	North of 405	21-04	"	4
10	East	Kent	MD 213	South of MD 19	21-09	3 Days	2
11	East	Kent	MD 300	East of MD 290	21-11	"	2
12	East	Talbot	US 50	South of MD 322	23-04	7 Days	4
13	East	Dorchester	US 50	Between MD 16 (West) and MD 16 (East)	24-03	"	6

Traffic counts were collected for both the summer and non-summer months in 2017. Existing Bay Bridge data was collected in late April and early August 2017. Data for the other traffic count locations was

[3] *Traffic counts that separate number of vehicles by pre-determined vehicle classes.*

collected in late April/early May and early August 2017. The data collection was performed during non-holiday periods, so that typical traffic conditions would be captured.[4]

The data showed that the summer traffic is higher than non-summer traffic, with distinguishable weekend traffic patterns for most of the locations. With specific regard to the Bay Bridge, **Table 4-2** shows the Average Daily Traffic (ADT) for both scenarios. Average Summer Weekend traffic is approximately 72% greater than Average Non-Summer Weekday traffic at the Bay Bridge.

Table 4-2: 2017 Average Daily Traffic

	Vehicles per Day Crossing the Bay Bridge
Average Non-Summer Weekday	68,600
Average Summer Weekend Day	118,600

Figure 4-2 shows the Average Non-Summer Weekday traffic flow, by direction, in 15-minute increments. Examination of **Figure 4-2** shows a traditional volume distribution, with a peak in one direction (westbound, in this case) during the morning commuting period and a peak in the opposite direction (eastbound, in this case) during the evening commuting period. On an Average Non-Summer Weekday, the westbound peak period begins around 5:00 AM and ends around 10:00 AM. Traffic stays above 500 vehicles each fifteen minutes (which equates to 2,000 vehicles per hour) for a little more than 4 hours from 5:30 AM to 9:45 AM. The eastbound peak period starts at about 1:30 PM and ends at about 8:00 PM, with hourly volumes in excess of 500 vehicles in each fifteen minutes (2,000 vehicles per hour) for about 6 hours, from 1:45 PM to 7:45 PM.

[4] *The discussion of existing operating conditions at the Bay Bridge is based on average conditions during both Non-Summer Weekdays and Summer Weekends in 2017. Holiday weekends, when volumes and queues are known to be greater than average, were explicitly avoided during the data collection, so that typical conditions could be assessed. The collected data was reviewed for unusual volumes, which could have been indicative of atypical conditions such as major crashes, incidents, construction operations, or extreme weather. No unusual volumes were found. The future volume forecasts are also representative of average, typical conditions.*

Figure 4-2: Bay Bridge 2017 Average Non-Summer-Weekday Traffic Profile

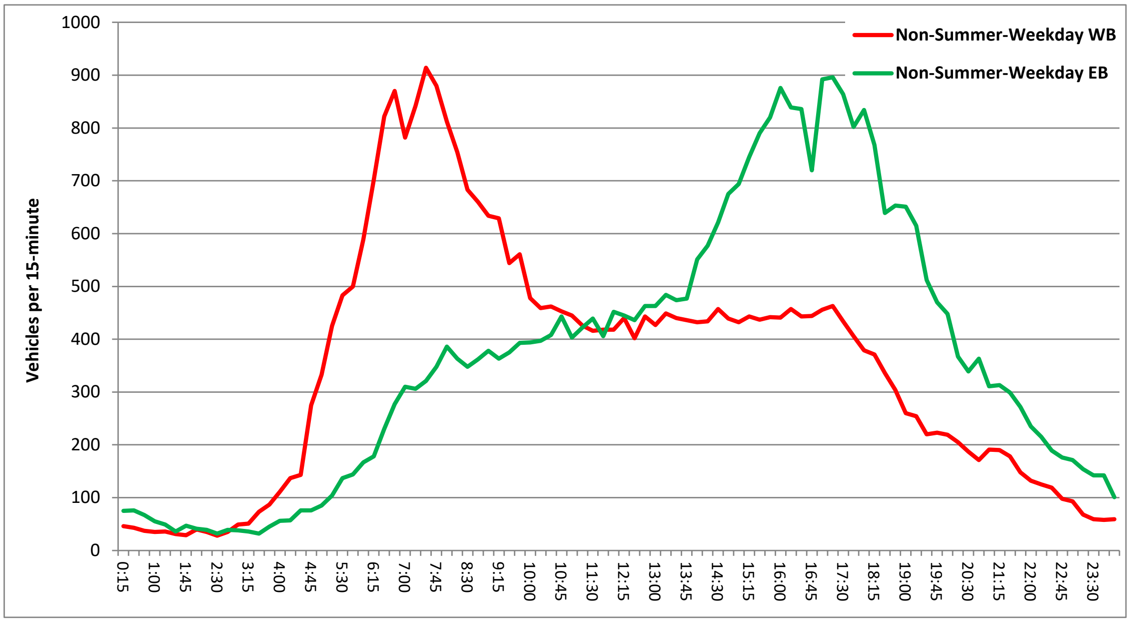
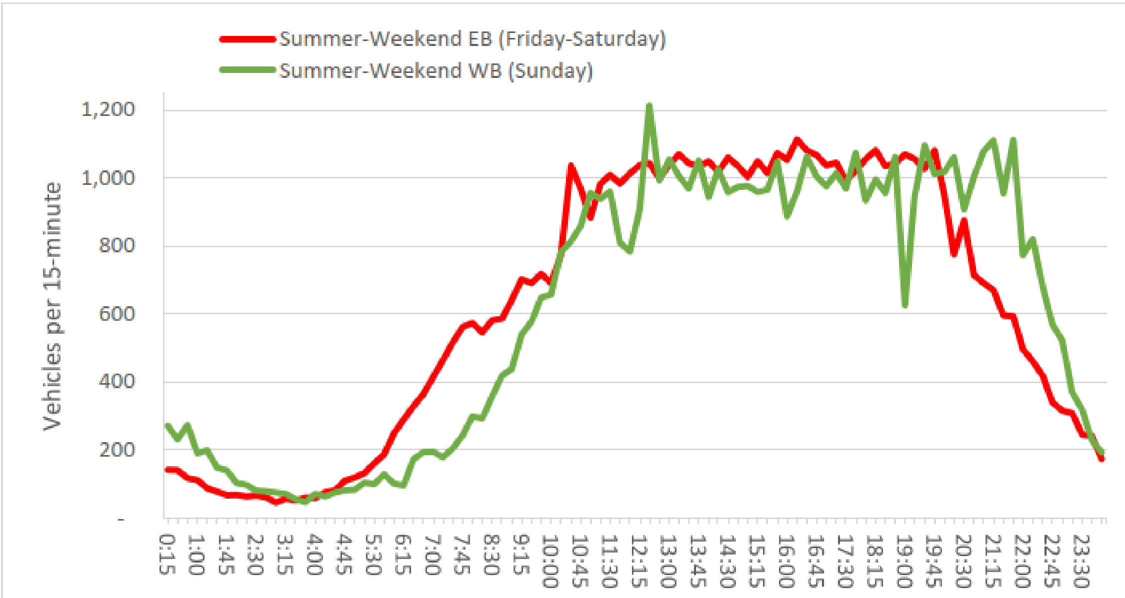


Figure 4-3 depicts Average Summer Weekend traffic in 15-minute increments. The Average Summer Weekend volumes are a composite of Friday, Saturday and Sunday volumes, and represent the highest volume in each hour during that three-day period. Eastbound volumes are highest on Friday evening and through the day on Saturday; westbound volumes are highest on Sundays. On a Summer Weekend, eastbound traffic starts to build around 9:00 AM and volume exceeds 1,000 vehicles in each fifteen--minute period (which equates to 4,000 vehicles per hour) around 10:30 AM. Traffic stays above 1,000 vehicles in each fifteen-minute period (4,000 vehicles per hour) for about 9.5 hours from 10:30 AM to 8:00 PM. The eastbound peak hour occurs at 4:15 PM to 5:15 PM. Westbound volumes are similar to eastbound volumes in that they peak around mid-day and maintain high levels through the mid-evening. However, the westbound volumes are somewhat more variable within individual fifteen minute periods. Westbound volumes generally reach approximately 1,000 vehicles in each fifteen-minute period (which equates to 4,000 vehicles per hour) for about 9.5 hours from 12:30 PM to 10:00 PM. Comparison of **Figures 4-2 and 4-3** demonstrates that volumes are higher and the duration of the peak periods are longer on Summer Weekends than on Non-Summer Weekdays.

Figure 4-3: Bay Bridge 2017 Average Summer Weekend Traffic Profile



4.2 Capacity Analysis

The capacity analysis focused on the existing Bay Bridge, utilizing the HCS and the volumes shown above. **Table 4-3** summarizes LOS results for Non-Summer Weekdays and Summer Weekends and reveals the following:

1. On an Average Non-Summer Weekday, the eastbound Bay Bridge has LOS E for 3 hours. The westbound Bay Bridge operates at LOS D or better throughout the day.
2. On an Average Summer Weekend, the eastbound Bay Bridge has LOS E for 9 hours and LOS F for 1 hour. In the westbound direction, the Bay Bridge experiences LOS E for 9 hours.

Table 4-3: Existing LOS at the Bay Bridge

	Average Non-Summer Weekday				Average Summer Weekend			
	Eastbound		Westbound		Eastbound		Westbound**	
Time	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
12-1AM	4.7	A	1.7	A	8.2	A	9.1	A
1-2AM	3.0	A	1.5	A	5.1	A	6.6	A
2-3AM	2.4	A	1.8	A	3.8	A	3.2	A
3-4AM	3.4	A	4.1	A	3.4	A	2.3	A
4-5AM	5.2	A	12.3	B	6.8	A	2.7	A
5-6AM	10.1	A	21.8	C	14.4	B	4.3	A
6-7AM	19.0	C	32.4	D	24	C	6.4	A
7-8AM	23.6	C	34.3	D	33.4	D	9.9	A
8-9AM	23.1	C	27.8	D	24.6	C*	14.5	B
9-10AM	24.0	C	23.3	C	27.5	D*	21.8	C
10-11AM	27.1	D	17.0	B	42	E*	31.8	D
11AM-12PM	27.6	D	15.8	B	40.8	E*	31.9	D
12-1PM	28.2	D	16.5	B	42	E*	42.2	E
1-2PM	34.1	D	16.6	B	43.6	E*	35.6	E
2-3PM	28.4	D*	25.5	C*	43.1	E*	34.3	D
3-4PM	36.5	E*	24.4	C*	43.5	E*	35.3	E
4-5PM	37.2	E*	25.2	C*	-	F*	35.9	E
5-6PM	37.2	E*	25.7	C*	43.1	E*	36.3	E
6-7PM	31.4	D*	20.5	C*	44	E*	35.7	E
7-8PM	25.1	C*	14.1	B*	44.3	E*	37.2	E
8-9PM	22.4	C	7.6	A	34.1	D*	36.4	E
9-10PM	19.2	C	7.0	A	25.8	C*	37.8	E
10-11PM	13.2	B	4.6	A	26.7	D	27.2	D
11PM-12AM	9.4	A	2.5	A	17.9	B	12.3	B

(green)	Light to Moderate Traffic (LOS A-C)
(yellow)	Heavy Traffic (LOS D)
(orange)	High Congestion (LOS E)
(red)	Severe Congestion (LOS F)
-	Density Not Computed Due to Overcapacity
*	Assuming Contra-Flow Operation on the Westbound Bridge
**	Assuming 3 Lanes in the Westbound Peak-Flow Direction (This Never Overlaps the Eastbound Contra-Flow Operation)

It should be noted that, in **Table 4-3**, for the Average Summer Weekend analyses, the Eastbound column refers to Friday-Saturday conditions, when either two or three lanes are provided, depending upon traffic volumes. The single asterisk (*) identifies those hours when contra-flow operation is in effect. The entire

Westbound column, which is noted with a double asterisk (**), refers to Sunday conditions, when three lanes are provided at all times. The tables below which show LOS utilize the same approach.

4.3 Queuing Analysis

Queue lengths for existing conditions were estimated for each hour of the day, using the procedure described in Chapter 3 of this document. These hourly queue lengths are shown in **Table 4-4**. Examination of **Table 4-4** reveals the following:

1. On an Average Non-Summer Weekday, the eastbound Bay Bridge experienced queues during the four hours from 3:00 PM to 7:00 PM. The queues peaked during the 5:00 to 6:00 hour, at approximately 1.0 mile. Westbound traffic did not reach the queuing threshold described in Chapter 3; thus, no appreciable queue was formed throughout the day in the westbound direction.
2. On an Average Summer Weekend, queues were substantially longer. In the eastbound direction, queues were noted for the 10 hours from 11:00 AM to 9:00 PM, with the longest queue of approximately 4.0 miles being noted from 7:00 PM to 8:00 PM. Westbound queuing was also significant, with 11 hours of queues, extending from 12:00 Noon to 11:00 PM; the longest queue was approximately 2.5 miles, from 9:00 to 10:00 PM.

Table 4-4: Existing Queues at the Bay Bridge (In Miles)

	Average Non-Summer Weekday		Average Summer Weekend	
Time	Eastbound (1)	Westbound (2)	Eastbound (1)	Westbound (2)
12-1AM				
1-2AM				
2-3AM				
3-4AM				
4-5AM				
5-6AM				
6-7AM				
7-8AM				
8-9AM				
9-10AM				
10-11AM				
11AM-12PM			0.2	
12-1PM			0.5	0.6
1-2PM			1.1	0.9
2-3PM			1.4	1.1
3-4PM	0.2		1.9	1.1
4-5PM	0.5		2.6	1.5
5-6PM	1.0		3.0	1.8
6-7PM	0.3		3.6	1.4
7-8PM			4.0	1.9
8-9PM			2.5	2.3
9-10PM				2.5
10-11PM				0.4
11PM-12AM				
Max. Queue	1.0	0.0	4.0	2.5

(1)	Assuming Contra-Flow Operation on the Westbound Bridge
(2)	Assuming 3 Lanes in the Westbound Direction
	Longest queue in this direction

5.0 TRAFFIC ANALYSIS OF FUTURE (2040) CONDITIONS

5.1 2040 No-Build Conditions

5.1.1 Development of Traffic Volumes

As noted in Chapter 3, the MSTM was used to develop 2040 traffic volume forecasts for No-Build conditions, for both Average Non-Summer Weekday conditions and Average Summer Weekend conditions. The volumes obtained from these efforts were used in the analyses and are summarized in **Table 5-1**.

Table 5-1: 2040 No-Build Traffic Volume Forecasts (vehicles per day)

Year	2017	2040	Percentage Growth
Average Non-Summer Weekday	68,600	84,300	22.9
Average Summer Weekend Day	118, 600	135,300	14.1

Comparison of the Existing Volumes to the 2040 No Build Volumes shows that, on a daily basis, volumes are forecast to increase by about 22.9 percent on Average Non-Summer Weekdays, and by about 14.1 percent on Average Summer Weekends. Over the 23 years between 2017 and 2040, this is an annual growth rate of approximately 0.9% for Average Non-Summer Weekdays, and an annual growth rate of approximately 0.6% for summer weekends. These forecasts are within the range of annual growth that is typical for this region.

5.1.2 Capacity Analysis

When the BCS was initiated in 2017, tolls were collected at a traditional toll plaza on US 50 on the eastbound approach to the existing Bay Bridge but not in the westbound direction. At the toll plaza, tolls could be paid either in cash or via electronic means, with both E-ZPass and video tolling being available. **Table 5-2** shows the LOS for Average Non-Summer Weekdays in the 2040 No-Build scenario. The eastbound direction is expected to be either LOS E (high congestion) or LOS F (severe congestion) from 2:00 PM to 7:00 PM due to the commuter traffic on a typical weekday evening. The westbound direction is expected to be LOS E or F from 6:00 AM to 9:00 AM due to the morning commuter traffic, and also at LOS E for one hour during the afternoon commuter peak. **Table 5-2** also shows LOS for Average Summer Weekend conditions. Congestion during an Average Summer Weekend day is expected to be much more extensive than on an Average Non-Summer Weekday. The eastbound direction would have LOS E or F for 11 hours from 10:00 AM to 9:00 PM, and the westbound direction would have LOS E or F for 11 hours from 11:00 AM to 10:00 PM.

For ease of comparison, the data from **Table 4-3** and **Table 5-2** are combined in **Table 5-3**. It should again be noted that, in **Tables 5-2 and 5-3**, for the Average Summer Weekend analyses, the Eastbound column refers to Friday-Saturday conditions, when either two or three lanes are provided, depending upon traffic volumes. The single asterisk (*) identifies those hours when contra-flow operation is in effect. The entire

Westbound column, which is noted with a double asterisk (**), refers to Sunday conditions, when three lanes are provided at all times.

Table 5-2: 2040 LOS at the Existing Structure of Bay Bridge (No-Build)

	Non-Summer Weekday				Summer Weekend			
	Eastbound		Westbound		Eastbound		Westbound**	
Time	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/ hr)	LOS
12-1AM	5.7	A	2.1	A	9.8	A	10.1	A
1-2AM	3.6	A	1.8	A	5.8	A	6.2	A
2-3AM	3.1	A	1.9	A	4.5	A	3.4	A
3-4AM	3.5	A	4.2	A	4.3	A	2.5	A
4-5AM	6.1	A	11.6	B	7.4	A	3.1	A
5-6AM	11.5	B	26.1	D	13.9	B	4.5	A
6-7AM	20.8	C	41.5	E	28	D	7.3	A
7-8AM	30.5	D	-	F	29.4	D*	10.7	A
8-9AM	32.6	D	32.8	D	32.8	D*	17.4	B
9-10AM	33.4	D	27	D	36.3	E*	25.6	C
10-11AM	23.4	C*	34.5	D*	-	F*	33.5	D
11AM-12PM	24.3	C*	31.5	D*	-	F*	34.4	D
12-1PM	25.6	C*	32.2	D*	-	F*	42.8	E
1-2PM	28.1	D*	33.2	D*	-	F*	40.3	E
2-3PM	37.2	E*	33.3	D*	-	F*	39.8	E
3-4PM	-	F*	33.6	D*	-	F*	41.3	E
4-5PM	-	F*	34.7	D*	-	F*	-	F
5-6PM	-	F*	32.1	D*	-	F*	-	F
6-7PM	38.2	E*	24.5	C*	-	F*	40.1	E
7-8PM	28.4	D*	18	B*	-	F*	-	F
8-9PM	28.8	D	9.8	A	40.7	E*	-	F
9-10PM	23.4	C	8.4	A	30.1	D*	-	F
10-11PM	15.7	B	5.7	A	29.4	D	27.1	D
11PM-12AM	11.2	B	3.2	A	18.5	C	11.6	B

(green)	Light to Moderate Traffic (LOS A-C)
(yellow)	Heavy Traffic (LOS D)
(orange)	High Congestion (LOS E)
(red)	Severe Congestion (LOS F)
-	Density Not Computed Due to Overcapacity
*	Assuming Contra-Flow Operation on the Westbound Bridge
**	Assuming 3 Lanes in the Westbound Peak-Flow Direction (This Never Overlaps the Eastbound Contra-Flow Operation)

Table 5-3: LOS at the Bay Bridge (Existing and 2040)

	Average Non-Summer Weekday								Average Summer Weekend							
	2017 Eastbound		2040 Eastbound		2017 Westbound		2040 Westbound		2017 Eastbound		2040 Eastbound		2017 Westbound**		2040 Westbound**	
Time	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/ hr)	LOS	Density (pc/mi/ hr)	LOS
12-1AM	4.7	A	5.7	A	1.7	A	2.1	A	8.2	A	9.8	A	9.1	A	10.1	A
1-2AM	3	A	3.6	A	1.5	A	1.8	A	5.1	A	5.8	A	6.6	A	6.2	A
2-3AM	2.4	A	3.1	A	1.8	A	1.9	A	3.8	A	4.5	A	3.2	A	3.4	A
3-4AM	3.4	A	3.5	A	4.1	A	4.2	A	3.4	A	4.3	A	2.3	A	2.5	A
4-5AM	5.2	A	6.1	A	12.3	B	11.6	B	6.8	A	7.4	A	2.7	A	3.1	A
5-6AM	10.1	A	11.5	B	21.8	C	26.1	D	14.4	B	13.9	B	4.3	A	4.5	A
6-7AM	19	C	20.8	C	32.4	D	41.5	E	24	C	28.0	D	6.4	A	7.3	A
7-8AM	23.6	C	30.5	D	34.3	D	-	F	33.4	D	29.4	D*	9.9	A	10.7	A
8-9AM	23.1	C	32.6	D	27.8	D	32.8	D	24.6	C*	32.8	D*	14.5	B	17.4	B
9-10AM	24	C	33.4	D	23.3	C	27	D	27.5	D*	36.3	E*	21.8	C	25.6	C
10-11AM	27.1	D	23.4	C*	17	B	34.5	D*	42	E*	-	F*	31.8	D	33.5	D
11AM-12PM	27.6	D	24.3	C*	15.8	B	31.5	D*	40.8	E*	-	F*	31.9	D	34.4	D

Table 5-3 continued: LOS at the Bay Bridge (Existing and 2040)

	Average Non-Summer Weekday								Average Summer Weekend							
	2017 Eastbound		2040 Eastbound		2017 Westbound		2040 Westbound		2017 Eastbound		2040 Eastbound		2017 Westbound**		2040 Westbound**	
Time	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/hr)	LOS	Density (pc/mi/ hr)	LOS	Density (pc/mi/ hr)	LOS
12-1PM	28.2	D	25.6	C*	16.5	B	32.2	D*	42	E*	-	F*	42.2	E	42.8	E
1-2PM	34.1	D	28.1	D*	16.6	B	33.2	D*	43.6	E*	-	F*	35.6	E	40.3	E
2-3PM	28.4	D*	37.2	E*	25.5	C*	33.3	D*	43.1	E*	-	F*	34.3	D	39.8	E
3-4PM	36.5	E*	-	F*	24.4	C*	33.6	D*	43.5	E*	-	F*	35.3	E	41.3	E
4-5PM	37.2	E*	-	F*	25.2	C*	34.7	D*	-	F*	-	F*	35.9	E	-	F
5-6PM	37.2	E*	-	F*	25.7	C*	32.1	D*	43.1	E*	-	F*	36.3	E	-	F
6-7PM	31.4	D*	38.2	E*	20.5	C*	24.5	C*	44	E*	-	F*	35.7	E	40.1	E
7-8PM	25.1	C*	28.4	D*	14.1	B*	18.0	B*	44.3	E*	-	F*	37.2	E	-	F
8-9PM	22.4	C	28.8	D	7.6	A	9.8	A	34.1	D*	40.7	E*	36.4	E	-	F
9-10PM	19.2	C	23.4	C	7	A	8.4	A	25.8	C*	30.1	D*	37.8	E	-	F
10-11PM	13.2	B	15.7	B	4.6	A	5.7	A	26.7	D	29.4	D	27.2	D	27.1	D
11PM-12AM	9.4	A	11.2	B	2.5	A	3.2	A	17.9	B	18.5	C	12.3	B	11.6	B

Light to Moderate Traffic (LOS A-C)
Heavy Traffic (LOS D)
High Congestion (LOS E)
Severe Congestion (LOS F)
- Density Not Computed Due to Overcapacity
* Assuming Contra-Flow Operation on the Westbound Bridge
** Assuming 3 Lanes in the Westbound Peak-Flow Direction (This Never Overlaps the Eastbound Contra-Flow Operation)

5.1.3 Queuing Analysis

The results of the queuing analyses for both 2017 and 2040 No-Build conditions are shown in **Table 5-4**. Examination of **Table 5-4** shows that in 2040, when compared to existing conditions, the maximum queues would be longer and the duration of queueing would be greater for both directions and for both Average Non-Summer Weekdays and Average Summer Weekends.

Table 5-4: Queues at the Bay Bridge (In Miles): 2017 and 2040 No-Build Conditions

	2017				2040			
	Average Non-Summer Weekday		Average Summer Weekend Day		Average Non-Summer Weekday		Average Summer Weekend Day	
Time	EB (1)	WB (2)	EB (1)	WB (2)	EB (1)	WB (2)	EB (1)	WB (2)
12-1AM								
1-2AM								
2-3AM								
3-4AM								
4-5AM								
5-6AM								
6-7AM						1.0		
7-8AM						2.6		
8-9AM						2.6		
9-10AM						1.4		
10-11AM								
11AM-12PM			0.2				0.5	
12-1PM			0.5	0.6			1.2	1.3
1-2PM			1.1	0.9			2.1	2.2
2-3PM			1.4	1.1	0.0		2.9	3.1
3-4PM	0.2		1.9	1.1	1.4		4.2	4.1
4-5PM	0.5		2.6	1.5	2.7		6.1	5.9
5-6PM	1.0		3.0	1.8	4.3		7.7	7.6
6-7PM	0.3		3.6	1.4	4.5		9.5	8.5
7-8PM			4.0	1.9	3.3		11.1	10.1
8-9PM			2.5	2.3	2.0		10.5	11.8
9-10PM				2.5	0.1		8.5	13.2
10-11PM				0.4			7.4	11.8
11PM-12AM							5.2	7.4
Max. Queue	1.0	0.0	4.0	2.5	4.5	2.6	11.1	13.2

(1) Assuming Contra-Flow Operation on the Westbound Bridge

(2) Assuming 3 Lanes in the Westbound Direction

Longest queue in this direction

EB: Eastbound

WB: Westbound

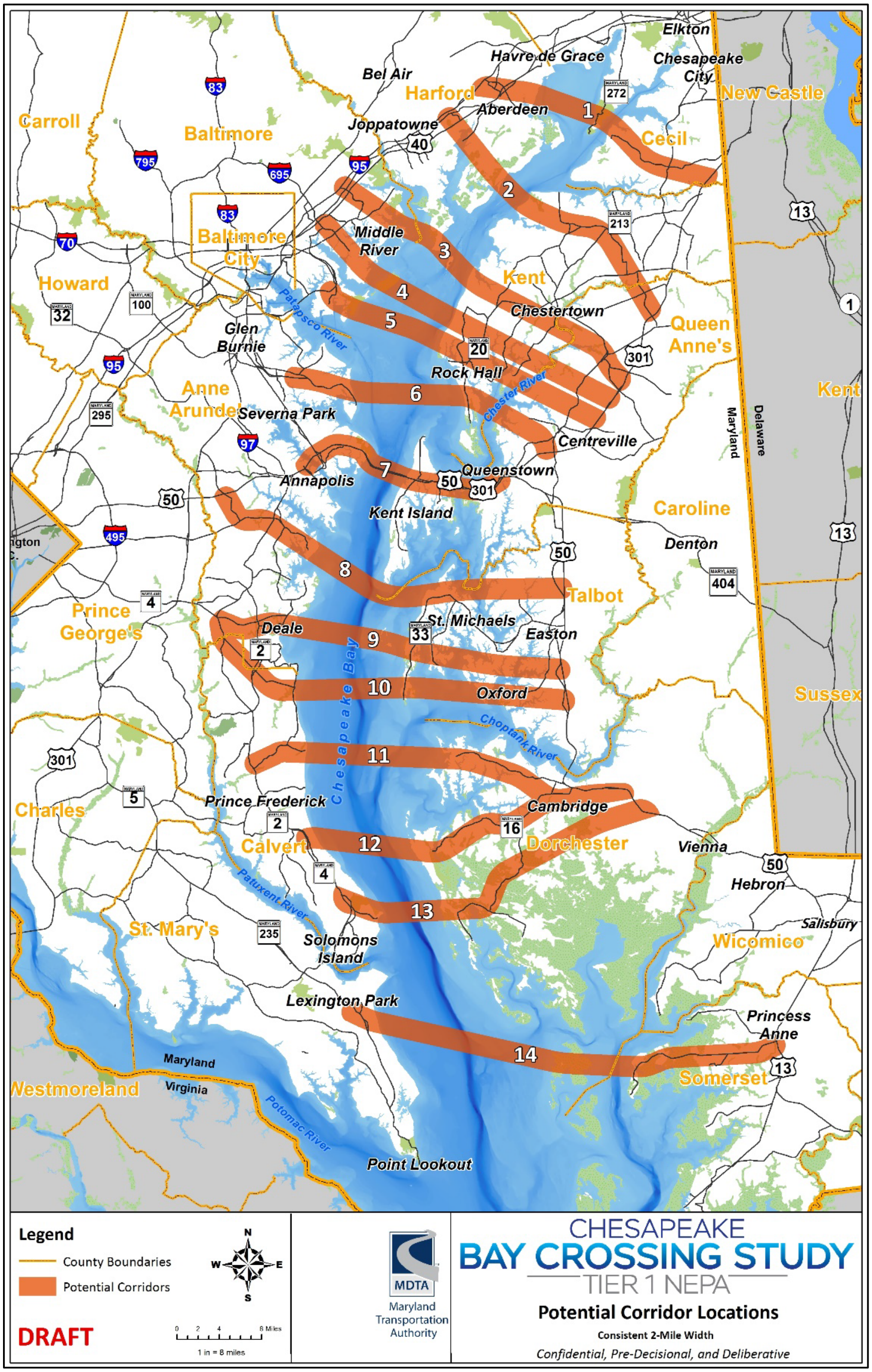
5.2 2040 Build Conditions

5.2.1 Corridor Alternatives

A total of 14 corridor alternatives were initially considered and evaluated in this study. A detailed description of the process through which the corridor alternatives were developed and refined is provided in the "Alternatives Concurrence Report." **Figure 5-1** shows the approximate locations of the corridor alternatives, which covers approximately 100 miles from north to south and the entire Chesapeake Bay in the state of Maryland. The corridor alternatives were numbered one through fourteen, working from north to south in sequence. The existing Bay Bridge is located in Corridor 7.

In addition to the potential new crossings of the Bay, **Figure 5-1** also shows roadway connection improvements on both sides of the Chesapeake Bay. The parameters involved in determining the endpoints of those improvements is discussed in Chapter 3, Section 3.1 of this document, found on Page 7.

Figure 5-1: Proposed Alternative Corridor Locations



5.2.2 Development of Traffic Volumes

Using the MSTM, both Average Non-Summer Weekday and Average Summer Weekend forecasts were developed for each of the fourteen corridor alternatives. Each corridor alternative was modeled on its own, with only the existing Bay Bridge providing another means of crossing the Bay. For example, when forecasts for Corridor 3 were developed, Corridors 1 and 2 to the north of Corridor 3, and Corridors 4 through 14 to the south of Corridor 3, were assumed to have no new crossings. Using this approach, two categories of traffic volumes were identified: volumes likely to use the new crossing and volumes likely to use the existing Bay Bridge even in the presence of a new crossing. The resulting forecasts for both the existing Bay Bridge and each potential new crossing are shown in **Table 5-5**. For purposes of comparison, the 2017 ADT on the existing Bay Bridge is 68,600 on an Average Non-Summer Weekday, and 118,600 on an Average Summer Weekend.

Table 5-5: 2040 Traffic Volume Forecasts

Corridor	2040 Total Crossing Volumes					
	Average Non-Summer Weekday			Average Summer Weekend		
	ADT on Existing Bridge	ADT on New Crossing	ADT on Combined Crossings	ADT on Existing Bridge	ADT on New Crossing	ADT on Combined Crossings
No-Build	84,300	0	84,300	135,300	0	135,300
1	82,800	16,000	98,800	130,300	36,400	166,700
2	81,900	11,100	93,000	128,400	32,700	161,100
3	78,500	10,700	89,200	123,500	33,900	157,400
4	76,600	12,000	88,600	121,300	35,200	156,500
5	73,600	15,000	88,600	116,600	40,800	157,400
6	69,600	18,200	87,800	111,200	45,700	156,900
7 Build	44,900	44,900	89,800	79,700	79,700	159,400
8	68,100	20,000	88,100	104,300	55,200	159,500
9	76,900	9,100	86,000	118,300	36,800	155,100
10	78,600	7,100	85,700	121,300	32,200	153,500
11	80,500	5,000	85,500	125,300	25,700	151,000
12	81,500	4,100	85,600	127,200	22,300	149,500
13	82,700	2,900	85,600	129,000	18,400	147,400
14	83,800	1,200	85,000	133,000	8,500	141,500

Examination of **Table 5-5** reveals the following:

1. Compared to the No-Build scenario, the total daily traffic volumes crossing over the Chesapeake Bay on the existing Bay Bridge plus a new crossing (shown in the "ADT on Combined Crossings" column) are forecast to be higher for all fourteen corridors. With any new crossing, travel patterns would be expected to change, at least slightly, to take advantage of the new major link in the transportation system. The increases shown in **Table 5-5** are the result of such changes in travel

patterns, and not from a change in the land use forecast for 2040. For Average Non-Summer Weekdays, the highest daily traffic volume increase occurs with Corridor 1 and the lowest increase is seen with Corridor 14. Within the five corridors being analyzed in this document (Corridors 5 – 9, shaded in **Table 5-5**), the highest daily traffic increase occurs with Corridor 7. For Average Summer Weekend conditions, the highest daily traffic volume increase occurs with Corridor 1 and the lowest increase is seen with Corridor 14 at the extreme southern end of the study area. Within the five corridors being analyzed in this document, the highest daily traffic increase occurs with Corridor 8.

2. For Average Non-Summer Weekdays, only two corridors would result in a reduction in volumes below existing (2017) levels at the existing Bay Bridge: Corridors 7 and 8.
3. For Average Summer Weekends, five corridors would result in a reduction in volumes below existing (2017) levels at the existing Bay Bridge: Corridors 5, 6, 7, 8 and 9.

5.2.3 Capacity Analysis

Prior to the performance of capacity analyses, the corridor alternatives were screened for their ability to meet the Purpose and Need (P&N) for the project. If a corridor did not result in a reduction in volumes on the existing Bay Bridge in 2040 during either Average Non-Summer Weekday conditions or Average Summer Weekend conditions, when compared to existing 2017 volumes, that corridor was removed from further study. As a result of this screening, Corridors 5, 6, 7, 8 and 9 were advanced for further analysis.

Capacity analyses for the existing Bay Bridge were performed, assessing the volumes that would be present on the existing Bay Bridge if one additional crossing was constructed. This analysis was performed independently for each of the remaining five corridors. **Tables 5-6 to 5-10** show the results of those analyses. It should again be noted that, in **Tables 5-6 to 5-10**, for the Average Summer Weekend analyses, the Eastbound column refers to Friday-Saturday conditions, when either two or three lanes are provided, depending upon traffic volumes. The single asterisk (*) identifies those hours when contra-flow operation is in effect. The entire Westbound column, which is noted with a double asterisk (**), refers to Sunday conditions, when three lanes are provided at all times.

Table 5-6: 2040 LOS at the Existing Structure of Bay Bridge (Corridor 5)

	Non-Summer Weekday				Summer Weekend			
	Eastbound		Westbound		Eastbound		Westbound**	
Time	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
12-1AM	4.9	A	1.9	A	8.1	A	9.0	A
1-2AM	3.1	A	1.6	A	4.8	A	5.5	A
2-3AM	2.6	A	1.7	A	3.7	A	3.1	A
3-4AM	3.0	A	3.8	A	3.6	A	2.3	A
4-5AM	5.2	A	10.4	A	6.1	A	2.8	A
5-6AM	9.8	A	23.4	C	11.6	B	4.0	A
6-7AM	17.6	B	36.7	E	23.2	C	6.4	A
7-8AM	23.9	C	38.9	E	24.0	C*	9.2	A
8-9AM	25.5	C	29.8	D	26.8	D*	15.1	B
9-10AM	27.4	D	24.2	C	29.4	D*	22.4	C
10-11AM	30.2	D	20.0	C	35.9	E*	29.3	D
11AM-12PM	31.5	D	18.4	C	39.8	E*	30.0	D
12-1PM	33.3	D	18.8	C	41.5	E*	36.5	E
1-2PM	24.2	C*	29.0	D*	42.5	E*	34.5	D
2-3PM	31.4	D*	29.0	D*	41.5	E*	34.1	D
3-4PM	40.1	E*	29.7	D*	-	F*	36.4	E
4-5PM	39.9	E*	31.2	D*	-	F*	41.6	E
5-6PM	41.6	E*	29.0	D*	-	F*	41.5	E
6-7PM	32.1	D*	22.2	C*	-	F*	35.8	E
7-8PM	24.3	C*	16.2	B*	-	F*	39.4	E
8-9PM	24.6	C	8.9	A	32.7	D*	39.2	E
9-10PM	20.0	C	7.6	A	25.1	C*	37.9	E
10-11PM	13.4	B	5.1	A	24.5	C	24.2	C
11PM-12AM	9.6	A	2.8	A	15.4	B	10.4	A

(green)	Light to Moderate Traffic (LOS A-C)
(yellow)	Heavy Traffic (LOS D)
(orange)	High Congestion (LOS E)
(red)	Severe Congestion (LOS F)
-	Density Not Computed Due to Overcapacity
*	Assuming Contra-Flow Operation on the Westbound Bridge
**	Assuming 3 Lanes in the Westbound Peak-Flow Direction (This Never Overlaps the Eastbound Contra-Flow Operation)

Table 5-7: 2040 LOS at the Existing Structure of Bay Bridge (Corridor 6)

	Non-Summer Weekday				Summer Weekend			
	Eastbound		Westbound		Eastbound		Westbound**	
Time	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
12-1AM	4.5	A	1.7	A	7.6	A	8.6	A
1-2AM	2.8	A	1.4	A	4.5	A	5.3	A
2-3AM	2.4	A	1.6	A	3.5	A	2.9	A
3-4AM	2.7	A	3.5	A	3.3	A	2.2	A
4-5AM	4.8	A	9.6	A	5.7	A	2.7	A
5-6AM	9.0	A	21.6	C	10.8	A	3.8	A
6-7AM	16.0	B	34.8	D	21.0	C	6.2	A
7-8AM	21.7	C	38.4	E	32.1	D	9.1	A
8-9AM	23.1	C	29.5	D	23.7	C*	14.9	B
9-10AM	25.5	C	23.5	C	27.0	D*	21.9	C
10-11AM	28.8	D	18.9	C	34.1	D*	28.3	D
11AM-12PM	30.0	D	17.4	B	37.7	E*	29.0	D
12-1PM	31.6	D	17.8	B	39.2	E*	35.0	D
1-2PM	23.1	C*	27.4	D*	40.1	E*	33.1	D
2-3PM	29.9	D*	27.4	D*	39.2	E*	32.8	D
3-4PM	38.2	E*	27.9	D*	43.5	E*	34.7	D
4-5PM	38.5	E*	29.0	D*	-	F*	39.2	E
5-6PM	40.1	E*	27.1	D*	-	F*	39.0	E
6-7PM	30.2	D*	20.5	C*	-	F*	33.9	D
7-8PM	33.6	D	9.9	A	43.2	E*	37.3	E
8-9PM	22.5	C	8.2	A	30.4	D*	37.1	E
9-10PM	18.3	C	7.0	A	23.4	C*	35.9	E
10-11PM	12.3	B	4.7	A	22.9	C	23.2	C
11PM-12AM	8.8	A	2.6	A	14.4	B	9.9	A

(green)	Light to Moderate Traffic (LOS A-C)
(yellow)	Heavy Traffic (LOS D)
(orange)	High Congestion (LOS E)
(red)	Severe Congestion (LOS F)
-	Density Not Computed Due to Overcapacity
*	Assuming Contra-Flow Operation on the Westbound Bridge
**	Assuming 3 Lanes in the Westbound Peak-Flow Direction (This Never Overlaps the Eastbound Contra-Flow Operation)

Table 5-8: 2040 LOS at the Existing Structure of Bay Bridge (Corridor 7)

	Non-Summer Weekday				Summer Weekend			
	Eastbound		Westbound		Eastbound		Westbound**	
Time	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
12-1AM	2.5	A	0.9	A	4.5	A	5.1	A
1-2AM	1.6	A	0.8	A	2.6	A	3.1	A
2-3AM	1.3	A	0.8	A	2	A	1.7	A
3-4AM	1.5	A	1.8	A	2	A	1.3	A
4-5AM	2.6	A	5.0	A	3.4	A	1.6	A
5-6AM	5.0	A	11.4	B	6.4	A	2.3	A
6-7AM	9.0	A	18.7	C	12.4	B	3.6	A
7-8AM	12.4	B	20.9	C	19	C	5.2	A
8-9AM	13.2	B	16.5	B	21.1	C	8.5	A
9-10AM	14.5	B	13.0	B	26.1	D	13.1	B
10-11AM	16.3	B	10.3	A	23.6	C*	17.7	B
11AM-12PM	17.0	B	9.5	A	25.7	C*	18.1	C
12-1PM	17.8	B	9.7	A	26.6	D*	21.6	C
1-2PM	19.6	C	10.0	A	27.1	D*	20.6	C
2-3PM	25.3	C	10.0	A	26.5	D*	20.4	C
3-4PM	31.4	D	10.1	A	26.6	D*	20.2	C
4-5PM	31.5	D	10.4	A	26.9	D*	21.2	C
5-6PM	32.7	D	9.7	A	25.8	C*	21.1	C
6-7PM	25.2	C	7.3	A	25.6	C*	19.3	C
7-8PM	18.4	C	5.2	A	24.1	C*	21.6	C
8-9PM	12.4	B	4.3	A	26.8	D	21.5	C
9-10PM	10.1	A	3.7	A	20.7	C	21	C
10-11PM	6.8	A	2.5	A	13.5	B	13.7	B
11PM-12AM	4.8	A	1.4	A	8.5	A	5.9	A

(green)	Light to Moderate Traffic (LOS A-C)
(yellow)	Heavy Traffic (LOS D)
(orange)	High Congestion (LOS E)
(red)	Severe Congestion (LOS F)
-	Density Not Computed Due to Overcapacity
*	Assuming Contra-Flow Operation on the Westbound Bridge
**	Assuming 3 Lanes in the Westbound Peak-Flow Direction (This Never Overlaps the Eastbound Contra-Flow Operation)

Table 5-9: 2040 LOS at the Existing Structure of Bay Bridge (Corridor 8)

	Non-Summer Weekday				Summer Weekend			
	Eastbound		Westbound		Eastbound		Westbound**	
Time	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
12-1AM	4.4	A	1.6	A	7.0	A	7.6	A
1-2AM	2.7	A	1.3	A	4.1	A	4.7	A
2-3AM	2.4	A	1.5	A	3.2	A	2.6	A
3-4AM	2.6	A	3.2	A	3.1	A	1.9	A
4-5AM	4.7	A	8.9	A	5.3	A	2.4	A
5-6AM	8.7	A	20.0	C	10.0	A	3.4	A
6-7AM	15.5	B	33.9	D	19.4	C	6.4	A
7-8AM	21.0	C	39.8	E	29.7	D	10.2	A
8-9AM	22.3	C	30.4	D	33.2	D	16.6	B
9-10AM	24.6	C	23.6	C	25.2	C*	22.6	C
10-11AM	28.0	D	18.5	C	31.6	D*	26.8	D
11AM-12PM	29.1	D	17.1	B	34.8	D*	27.4	D
12-1PM	30.6	D	17.4	B	36.2	E*	32.9	D
1-2PM	33.9	D	17.9	B	37.0	E*	31.2	D
2-3PM	29.0	D*	26.9	D*	36.2	E*	30.9	D
3-4PM	37.6	E*	27.2	D*	40.9	E*	32.5	D
4-5PM	38.6	E*	28.2	D*	-	F*	36.6	E
5-6PM	40.2	E*	26.3	D*	43.9	E*	36.4	E
6-7PM	29.8	D*	19.5	C*	42.8	E*	30.8	D
7-8PM	32.5	D	9.2	A	38.9	E*	32.4	D
8-9PM	21.9	C	7.6	A	28.0	D*	32.2	D
9-10PM	17.8	B	6.5	A	32.5	D	31.3	D
10-11PM	11.9	B	4.4	A	21.1	C	20.5	C
11PM-12AM	8.5	A	2.4	A	13.3	B	8.8	A

Light to Moderate Traffic (LOS A-C)
Heavy Traffic (LOS D)
High Congestion (LOS E)
Severe Congestion (LOS F)
- Density Not Computed Due to Overcapacity
* Assuming Contra-Flow Operation on the Westbound Bridge
** Assuming 3 Lanes in the Westbound Peak-Flow Direction (This Never Overlaps the Eastbound Contra-Flow Operation)

Table 5-10: 2040 LOS at the Existing Structure of Bay Bridge (Corridor 9)

	Non-Summer Weekday				Summer Weekend			
	Eastbound		Westbound		Eastbound		Westbound**	
Time	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
12-1AM	5.0	A	1.8	A	8.0	A	8.4	A
1-2AM	3.2	A	1.5	A	4.7	A	5.1	A
2-3AM	2.7	A	1.6	A	3.7	A	2.9	A
3-4AM	3.1	A	3.6	A	3.5	A	2.1	A
4-5AM	5.4	A	9.9	A	6.0	A	2.6	A
5-6AM	10.1	A	22.3	C	11.4	B	3.8	A
6-7AM	18.0	C	39.0	E	22.9	C	7.2	A
7-8AM	24.5	C	-	F	23.9	C*	11.7	B
8-9AM	26.2	D	34.8	D	26.6	D*	19.1	C
9-10AM	28.2	D	26.7	D	29.6	D*	25.6	C
10-11AM	31.4	D	20.8	C	36.8	E*	29.8	D
11AM-12PM	32.9	D	19.2	C	40.9	E*	30.6	D
12-1PM	34.8	D	19.6	C	42.6	E*	37.4	E
1-2PM	25.2	C*	30.2	D*	43.7	E*	35.3	E
2-3PM	32.7	D*	30.3	D*	42.6	E*	34.9	D
3-4PM	43.8	E*	30.2	D*	-	F*	37.2	E
4-5PM	-	F*	30.8	D*	-	F*	42.4	E
5-6PM	-	F*	28.8	D*	-	F*	42.2	E
6-7PM	34.4	D*	21.5	C*	-	F*	34.9	D
7-8PM	24.9	C*	15.3	B*	-	F*	36.3	E
8-9PM	25.3	C	8.4	A	32.0	D*	36.1	E
9-10PM	20.5	C	7.2	A	24.6	C*	35.0	E
10-11PM	13.8	B	4.8	A	24.1	C	22.7	C
11PM-12AM	9.8	A	2.7	A	15.2	B	9.7	A

(green)	Light to Moderate Traffic (LOS A-C)
(yellow)	Heavy Traffic (LOS D)
(orange)	High Congestion (LOS E)
(red)	Severe Congestion (LOS F)
-	Density Not Computed Due to Overcapacity
*	Assuming Contra-Flow Operation on the Westbound Bridge
**	Assuming 3 Lanes in the Westbound Peak-Flow Direction (This Never Overlaps the Eastbound Contra-Flow Operation)

5.2.4 Queuing Analysis

Queuing analyses for the existing Bay Bridge were performed, using the volumes that would be present on the existing Bay Bridge if one additional crossing was constructed. This analysis was performed independently for each of the remaining five corridors. **Tables 5-11 through 5-14** show the results of those analyses.

Table 5-11: Queues on Non-Summer Weekdays Eastbound (In Miles)

Eastbound		2040					
Time	Existing (2017)	No-Build	Alt 5	Alt 6	Alt 7	Alt 8	Alt 9
12-1AM							
1-2AM							
2-3AM							
3-4AM							
4-5AM							
5-6AM							
6-7AM							
7-8AM							
8-9AM							
9-10AM							
10-11AM							
11AM-12PM							
12-1PM							
1-2PM							
2-3PM		0.0					
3-4PM	0.2	1.4	0.5	0.3		0.2	0.9
4-5PM	0.5	2.7	1.0	0.6		0.6	2.0
5-6PM	1.0	4.3	1.7	1.1		1.1	3.3
6-7PM	0.3	4.5	1.2	0.3		0.2	3.1
7-8PM		3.3					1.5
8-9PM		2.0					
9-10PM		0.1					
10-11PM							
11PM-12AM							
Max. Queue	**1.0**	**4.5**	**1.7**	**1.1**	**0.0**	**1.1**	**3.3**

The longest queue on the direction throughout the day.

Table 5-12: Queues on Non-Summer Weekdays Westbound (In Miles)

Westbound		2040					
Time	Existing (2017)	No-Build	Alt 5	Alt 6	Alt 7	Alt 8	Alt 9
12-1AM							
1-2AM							
2-3AM							
3-4AM							
4-5AM							
5-6AM							
6-7AM		1.0	0.1				0.4
7-8AM		2.6	0.5	0.3		0.5	1.8
8-9AM		2.6					1.6
9-10AM		1.4					0.1
10-11AM							
11AM-12PM							
12-1PM							
1-2PM							
2-3PM							
3-4PM							
4-5PM							
5-6PM							
6-7PM							
7-8PM							
8-9PM							
9-10PM							
10-11PM							
11PM-12AM							
Max. Queue	**0.0**	**2.6**	**0.5**	**0.3**	**0.0**	**0.5**	**1.8**

The longest queue on the direction throughout the day.

Table 5-13: Queues on Summer Weekends Eastbound (In Miles)

Eastbound		2040					
Time	Existing (2017)	No-Build	Alt 5	Alt 6	Alt 7	Alt 8	Alt 9
12-1AM							
1-2AM							
2-3AM							
3-4AM							
4-5AM							
5-6AM							
6-7AM							
7-8AM							
8-9AM							
9-10AM							
10-11AM							
11AM-12PM	0.2	0.5					
12-1PM	0.5	1.2					
1-2PM	1.1	2.1					
2-3PM	1.4	2.9					
3-4PM	1.9	4.2	0.1				0.6
4-5PM	2.6	6.1	0.8	0.5		0.3	2.0
5-6PM	3.0	7.7	1.2	0.7		0.2	3.0
6-7PM	3.6	9.5	1.7	0.9		0.0	3.9
7-8PM	4.0	11.1	2.1	0.8			4.1
8-9PM	2.5	10.5	0.6				2.5
9-10PM		8.5					
10-11PM		7.4					
11PM-12AM		5.2					
Max. Queue	**4.0**	**11.1**	**2.1**	**0.9**	**0.0**	**0.3**	**4.1**

The longest queue on the direction throughout the day

Table 5-14: Queues on Summer Weekends Westbound (In Miles)

Westbound		2040					
Time	Existing (2017)	No-Build	Alt 5	Alt 6	Alt 7	Alt 8	Alt 9
12-1AM							
1-2AM							
2-3AM							
3-4AM							
4-5AM							
5-6AM							
6-7AM							
7-8AM							
8-9AM							
9-10AM							
10-11AM							
11AM-12PM							
12-1PM	0.6	1.3	0.1				0.2
1-2PM	0.9	2.2					0.2
2-3PM	1.1	3.1					0.0
3-4PM	1.1	4.1	0.1				0.2
4-5PM	1.5	5.9	1.0	0.5		0.1	1.2
5-6PM	1.8	7.6	1.8	1.0		0.2	2.2
6-7PM	1.4	8.5	1.8	0.7			2.0
7-8PM	1.9	10.1	2.4	0.9			2.1
8-9PM	2.3	11.8	2.9	1.1			2.1
9-10PM	2.5	13.2	3.2	1.2			2.0
10-11PM	0.4	11.8	1.1				
11PM-12AM		7.4					
Max. Queue	**2.5**	**13.2**	**3.2**	**1.2**	**0.0**	**0.2**	**2.2**

The longest queue on the direction throughout the day.

In 2040 Non-Summer Weekday conditions, the longest queue in the No-Build eastbound direction is expected to be 4.5 miles throughout a day. The queue length is increased substantially from the 1.0 mile queue observed in the existing conditions at the Bay Bridge. The westbound queue grows to 2.6 miles in the 2040 baseline case although there was no queue observed in the westbound direction in the existing condition. As seen in **Tables 5-11 through 5-14**, the longest queues expected in year 2040 are seen in the No-Build in both directions of travel. The No-Build option presents the longest queues because a new crossing would be expected to draw some traffic from the existing Bay Bridge. Corridor 7 presents the best scenario for the 2040 queue length at the existing Bay Bridge structure due to the forecast of no anticipated queues in either direction on a Non-Summer Weekday. Generally, the daily maximum queue length increases at the existing Bay Bridge the farther the corridor alternative is located from the current crossing. The nearest corridor alternatives to the existing Bay Bridge structure, Corridors 6 and 8, are expected to have the second and the third shortest queues, and the farthest corridor alternatives from the existing Bay Bridge structure, Corridors 5 and 9, are expected to have the next longest queues.

In 2040 Summer Weekend conditions, the queue lengths are expected to be longer than 2040 Non-Summer Weekday due to the nature of summer traffic on the Bay Bridge. The queue lengths in the 2040 No-Build case indicate the maximum queue would be 11.1 miles in the eastbound direction and 13.2 miles in the westbound direction, increased from 4.0 miles and 2.5 miles in the existing condition, respectively. The best corridor alternative for the queue lengths for 2040 Summer Weekend conditions is Corridor 7 with no queues expected in both directions of the existing Bay Bridge if a new crossing within Corridor 7 is constructed. As is the case for 2040 Non-Summer scenarios, the corridor alternatives closer to the existing Bay Bridge have shorter queue lengths. Corridor 8, which is located at 9 miles south of the existing Bay Bridge structure, is expected to be the second shortest queue in 2040 Summer Weekend conditions, 0.3 mile in the eastbound direction and 0.2 mile in the westbound direction. The corridor alternatives with the longest queue lengths other than the No-Build scenario are Corridors 5 and 9.

A summary of the information provided in **Tables 5-11 through 5-14** is provided in **Table 5-15**.

Table 5-15: Summary of 2040 Queues Under Build Conditions

	Number of Hours Where Backup is Greater than 1 Mile	Number of Hours Where Backup is Greater than 4 Miles
Corridor	Typical Non-Summer Weekday	Typical Summer Weekend
Existing Bay Bridge (2017)	0	0
5	3	0
6	1	0
7	0	0
8	1	0
9	6	1
Existing Bay Bridge (2040), under No-Build Conditions	9	9

Examination of **Tables 5-11 through 5-15** reveals the following:

1. Corridor 7 results in the shortest length and duration of backups at the existing Bay Bridge, for both Non-Summer Weekdays and Summer Weekends.
2. Corridors 6 and 8 result in backups over 1 mile on Non-Summer Weekdays for 1 hour at the existing Bay Bridge.
3. Corridors 5 and 9 result in longer backups at the existing Bay Bridge than Corridors 6, 7 and 8.

5.2.5 Diversion Analysis

Diversion analyses were performed for Corridors 5, 6, 8 and 9, to assess "flexibility to support maintenance and incident management in a safe manner". The procedure used for this assessment is described earlier in this document (Chapter 3, Section 3.4.5, on Page 13). This criterion was analyzed by examining a scenario in which the existing Bay Bridge was assumed to be completely closed to traffic for a period of time long enough so that traffic would need to divert to another crossing. In these Tier 1 analyses, the following parameters/assumptions were used:

1. To provide a common starting point, all eastbound vehicles changing their travel paths would divert at the US 50/US 301 junction in Bowie.
2. To provide a common ending point, the destination for all diverted eastbound traffic would be the US 50/US 301 split on the Eastern Shore.
3. Diverted vehicles would travel on major highways to reach the new crossing and would travel at the posted speed limit throughout their trips.

Westbound vehicles would follow the same path as eastbound vehicles, but in reverse.

Since Corridor 7 is the corridor which contains the existing Bay Bridge, the analyses for Corridor 7 assumed that any diversion distance and diversion time required to reach a new crossing from the US 50/US 301 corridor and return to the existing US 50/US 301corridor would be minimal.

The results of those diversion analyses are summarized in **Table 5-16**.

Table 5-16: Diversion Analyses

Corridor	Total Distance (miles)	Total Travel Time (min.)	Additional Travel Time from Existing Bay Bridge (min.)
5	73	79	43
6	56	62	26
7	33	36	0
8	57	62	26
9	70	76	40

The data in **Table 5-16** may be summarized as follows:

1. In Corridor 7, traffic can divert more than 25 minutes faster than the other corridors.
2. Corridors 6 and 8 have similar results to each other, when compared to Corridor 7: approximately 26 additional minutes.
3. Corridors 5 and 9 have similar results to each other, when compared to Corridor 7: approximately 40 to 43 minutes.

The diversion analyses summarized in **Table 5-16** do not consider factors which may increase diversion route travel times. For example, increased traffic on the diversion routes, particularly during peak periods, may result in increased congestion and thus longer travel times.

6.0 SUMMARY

The results of the analyses described above may be summarized as follows:

1. Of the alternatives under consideration, Corridor 7 would best meet the BCS Purpose and Need. Corridor 7 would:

   a. Best provide adequate capacity, reducing volumes on the existing Bay Bridge to a greater extent than any of the other alternatives.
   b. Best provide dependable and reliable travel times, reducing the length and duration of backups at the existing Bay Bridge better than any of the other corridors.
   c. Provide the best diversion route available among the alternatives.

2. Of the other alternatives under consideration, Corridors 6 and 8 would also meet the BCS Purpose and Need better than Corridors 5 and 9. When compared to Corridors 5 and 9, Corridors 6 and 8:

   a. Provide a better degree of adequate capacity.
   b. Provide improved dependability and reliability of travel times.
   c. Provide better diversion routes.

As noted previously, the analyses described above focus on the crossings themselves, and not on the approach and departure roadways. If a Tier 2 Study is conducted after the BCS Tier 1 Study, the traffic analyses for Tier 2 will include specific assessments of the performance of these approach and departure roadways in the project area.