Chesapeake
BAY CROSSING STUDY
TIER 2 NEPA

NOTICE OF INTENT
ADDITIONAL PROJECT INFORMATION DOCUMENT

Maryland Transportation Authority

U S DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

NOVEMBER 2024

NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT

ADDITIONAL PROJECT INFORMATION DOCUMENT

EISX---XMD-1729253019

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ABBREVIATIONS AND ACRONYMS

AAC	Anne Arundel County
ACHP	Advisory Council on Historic Preservation
ADT	Average Daily Traffic
ARDS	Alternatives Retained for Detailed Study
BPW	Board of Public Works
BRT	Bus Rapid Transit
CBCA	Chesapeake Bay Critical Area
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CWA	Clean Water Act
DNR	Department of Natural Resources
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration

GHG	Greenhouse Gas
GI	Green Infrastructure
GIS	Geographic Information System
HRT	Heavy Rail Transit
ICE	Indirect and Cumulative Effects
ICM	Interagency Coordination Meetings
ITT	Immersed Tube Tunnels
LGBTQ+	Lesbian, Gay, Bisexual, Transgender, and Queer
LOS	Level of Service
LRT	Light Rail Transit
LWCF	Land and Water Conservation Fund
MAA	Maryland Aviation Administration
MDE	Maryland Department of the Environment
MDP	Maryland Department of Planning
MDTA	Maryland Transportation Authority
MHT	Maryland Historical Trust
MPA	Maryland Port Administration
MPO	Metropolitan Planning Organization
MTA	Maryland Transit Administration
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPS	National Park Service
NRHP	National Register of Historic Places
NSA	Noise Sensitive Area
O_3	Ozone
O-Ds	Origins and Destinations
PM	Particulate matter
PPX	Post Panamax
PTI	Planning Time Index
PTSU	Part-time Shoulder Use
QAC	Queen Anne's County
REC	Recognized Environmental Condition
ROD	Record of Decision
RTE	Rare, Threatened, and Endangered
SHA	State Highway Administration
SUP	Shared-use Path
TDM	Transportation Demand Management
TSM	Transportation Systems Management
U.S.	United States

U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
WMATA	Washington Metropolitan Area Transit Authority
YBI	Yerba Buena Island

1 INTRODUCTION

The Chesapeake Bay Crossing Study (Bay Crossing Study) is a two-tiered preliminary engineering and environmental study being advanced by the Maryland Transportation Authority (MDTA), in coordination with the Federal Highway Administration (FHWA), to address existing and future transportation issues at the Bay Bridge and its approaches along U.S. 50/301. Each tier of the Bay Crossing Study involves development of an Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) to describe potential significant environmental effects and inform the evaluation of alternatives. Tier 1 of the Bay Crossing Study (Tier 1 Study) was completed in April 2022. At that time, the FHWA issued a Final EIS/Record of Decision (FEIS/ROD) identifying Corridor 7, the corridor including the Bay Bridge and its approaches, as the Selected Corridor Alternative for further evaluation.

This Notice of Intent (NOI) Additional Project Information Document was prepared to support the NOI, the formal announcement of intent to prepare an EIS for Tier 2 of the Bay Crossing Study (Tier 2 Study). This NOI Additional Project Information Document is a summary of all activities that have taken place to date, including public and agency engagement, that have led to specific recommendations regarding the scope of the NEPA process. This report provides information about existing conditions within the Tier 2 Study limits, as discussed in **Section 1.2** and **Section 3**.

The MDTA has identified seven alternatives for the proposed action, including the no-build alternative and six build alternatives. These alternatives comprise the reasonable range of alternatives that will be evaluated in the EIS and are the MDTA's proposed Alternatives Retained for Detailed Study (ARDS). **Sections 3, 4, and 5** of this report include information about the proposed ARDS and the alternatives development and screening process.

1.1 Background

The Chesapeake Bay is one of Maryland's most important natural, economic, and cultural resources and the largest estuary in the United States. The 64,000-square-mile watershed that flows into the Chesapeake Bay spans six states and the District of Columbia and includes 150 major rivers and over 100,000 tributaries. The Chesapeake Bay has historically shaped the region's identity, culture, and traditions.

The Bay Bridge is a two-span structure that crosses the Chesapeake Bay from Anne Arundel County (AAC) on the Western Shore to Queen Anne's County (QAC) on the Eastern Shore. The original span was built in 1952 to connect the communities on both sides of the Chesapeake Bay (**Figure 1.1**). Within ten years of opening, the traffic volumes on the original span had nearly doubled. Planning began for a new structure that would provide additional capacity, and a parallel span directly north of the original Bay Bridge was opened in 1973. The Bay Bridge has become one of Maryland's most iconic and recognizable landmarks, used by millions of Maryland residents and other travelers every year.

As Maryland's only crossing of the Chesapeake Bay, the Bay Bridge is vital in facilitating transportation, commerce, and tourism in the region. In 1974 (the first full year that the second span was open to traffic), 7.5 million vehicles crossed the bridge. By 2002, that number had more than tripled to 25.0 million. Annual volumes have been above 25.0 million each year since, except for the COVID-19 pandemic year of 2020.

Figure 1.1. Construction of the Bay Bridge Span in 1952

The Bay Bridge structure has inadequate capacity for current volumes, particularly during summer weekends. Queues longer than one mile routinely occur and can persist for as long as eight hours. During those eight hours, queues have been observed to extend to nearly five miles.

It is projected that traffic volumes across the Bay Bridge will continue to increase over time. Increases in congestion reduce regional mobility and reliability, which is needed for accessing employment and recreation areas, moving commerce, and providing capacity for emergencies or evacuation events. Congestion also increases during instances of infrastructure maintenance and incident management, both of which can result in closed lanes and are expected to exacerbate conditions as the structures age and risk of congestion-related traffic incidents rises.

1.2 Existing Conditions in the Corridor

The Bay Bridge has two parallel spans, with two eastbound lanes on the original span and three westbound lanes on the newer span. Under peak eastbound traffic conditions, one of the westbound lanes is typically reversed to provide a third lane of traffic heading eastbound. For the purposes of this document, the “Bay Bridge” refers to both spans; if one span or the other is discussed, that span is specifically identified.

U.S. 50/301 on the Western Shore is an access-controlled highway that traverses developed land uses between the Severn River and the Chesapeake Bay. It has six lanes (three per direction) and includes six interchanges. U.S. 50/301 on the Eastern Shore is also an access-controlled highway. Between the Bay Bridge and the U.S. 50/301 split it has six lanes (three per direction) and includes 15 interchanges (including right-in/right-out ramp locations) and three other major water crossings (Cox Creek, Piney Creek, and Kent Narrows).

The lanes on the existing Bay Bridge have less capacity than the U.S. 50/301 approach roadways due to the steep uphill vertical grades, absence of shoulders, height of the bridge above the Bay and the associated viewshed, the lower speed limit, and the presence of two-way traffic. All of these factors cause drivers to slow down, which reduces the capacity of the lanes.

1.3 The Tiered NEPA Process

The Bay Bridge and its approaches have been the subject of many studies and transportation improvements. More information on these improvements and studies is located in **Section 1.3** of **Appendix A**. However, congestion and other transportation issues at the Bay Bridge and its approaches have persisted. To study the broad transportation issues of the Bay Bridge, the MDTA and the FHWA are conducting the Bay Crossing Study as a tiered NEPA study. The tiered approach to NEPA allows the MDTA and the FHWA to focus on large-scale, planning-level decisions related to the preferred location of a potential new Bay crossing in the Tier 1 NEPA EIS, and further analyze more specific, project-level alternatives and potential impacts in the subsequent Tier 2 NEPA EIS.

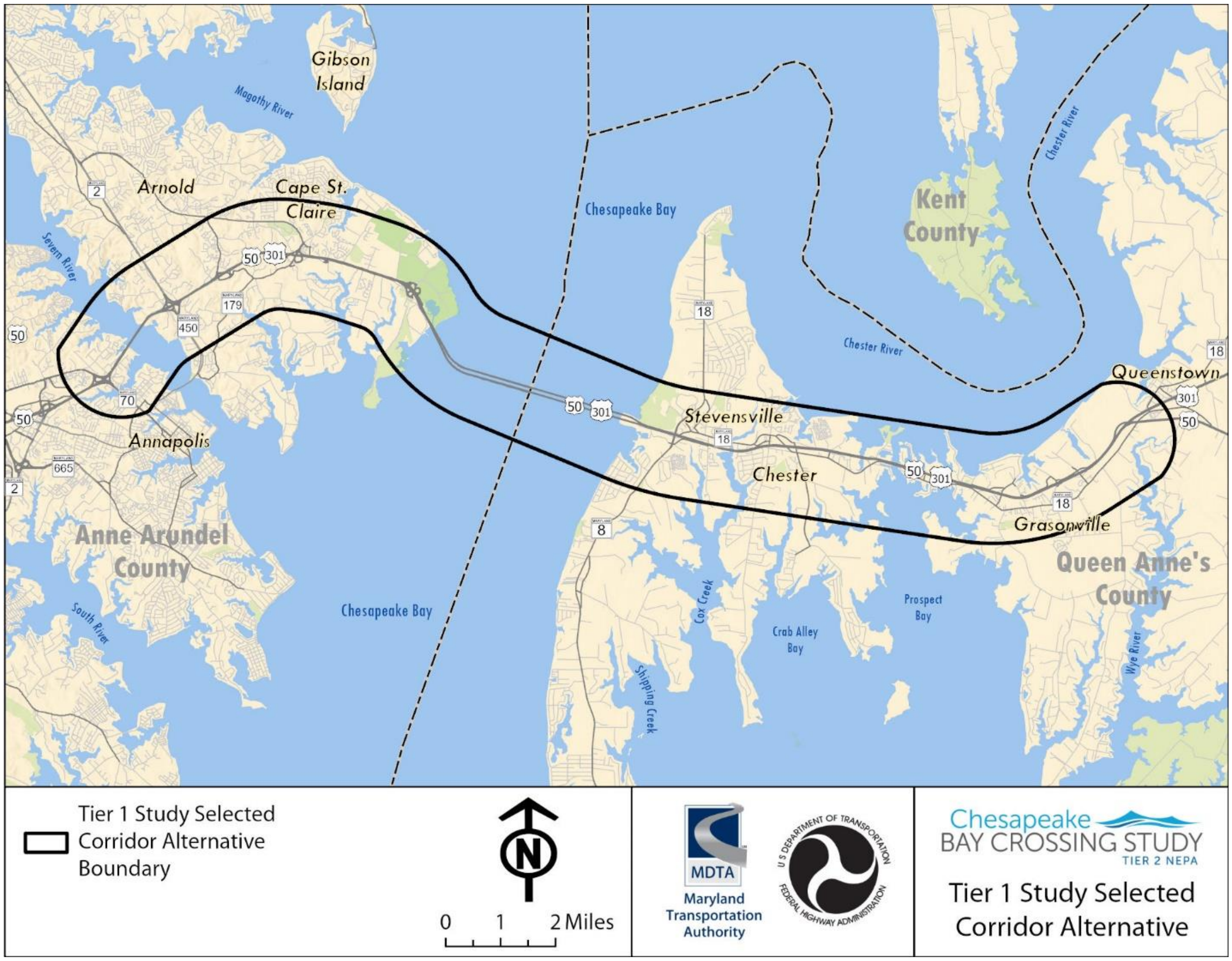
1.3.1 Tier 1

The MDTA and the FHWA initiated the Tier 1 Study in 2016. The Tier 1 Study encompassed a broad geographic area that spanned nearly 100 miles of the Chesapeake Bay between Harford and Cecil counties to the north and St. Mary's and Somerset counties to the south. The Tier 1 Study defined existing and future transportation conditions and needs at the existing Bay Bridge, evaluated 14 possible alternative corridor locations, documented the corridor alternative screening process, and concluded with the identification of a Selected Corridor Alternative in the Tier 1 ROD in April 2022. The Tier 1 Study Selected Corridor Alternative (Corridor 7), depicted in **Figure 1.2**, is a two-mile-wide and approximately 22-mile-long corridor that follows existing U.S. 50/301 and includes the location of the existing Bay Bridge.

Corridor 7 was chosen as the Tier 1 Study Selected Corridor Alternative because it would provide the greatest congestion relief at the existing bridge crossing for existing and future traffic volumes, particularly at peak hours, thus having the greatest ability to meet the Purpose and Need of the Tier 1 Study EIS. Corridor 7 was also the least costly corridor due to the ability to utilize existing infrastructure, particularly the U.S. 50/301 roadway and associated right-of-way. Additionally, this location is the shortest distance across the Chesapeake Bay between the Western and Eastern Shores. The Tier 1 Study EIS also concluded that Corridor 7 would likely have the least adverse impacts to sensitive natural areas and less indirect effects than the other corridors. A full summary of the Tier 1 Selected Corridor Alternative analysis is included in Chapter 6 of the Tier 1 FEIS/ROD.[1]

[1] MDTA, Tier 1 FEIS/ROD, March 2022, https://www.baycrossingstudy.com/tier-2-study-process/tier-1-study-completed/tier1-feis-rod.

Figure 1.2. Tier 1 Study Selected Corridor Alternative (Corridor 7)



1.3.2 Tier 2

The Tier 2 Study was launched in June 2022 to focus on project-level (site-specific) alternatives analysis within the Tier 1 Study EIS Selected Corridor Alternative (Corridor 7). The focus of the alternatives analysis is to identify the environmental impacts associated with alternatives that address the Tier 2 Study's Purpose and Need and objectives. As discussed in **Section 2**, the needs of the study include adequate capacity and reliable travel times, mobility, roadway deficiencies, existing and future maintenance needs, and navigation. The additional objectives are also discussed in **Section 2** and include environmental responsibility, and cost and financial responsibility. This NOI Additional Project Information Document supports the NOI, which is the formal announcement of intent to prepare an EIS for the Tier 2 Study. As part of this NOI, preliminary engineering work and analyses have been conducted to formulate proposed ARDS. Detailed engineering of the ARDS and assessment of their potential environmental impacts will be documented in the EIS. The work performed to date and the proposals for the proposed ARDS advancing in the NOI are presented in **Sections 3** through **5**. The process for the work completed to date is discussed below.

Due to the magnitude and complexity of this Tier 2 Study, the alternatives development process was initiated prior to the NOI so that the EIS could focus on a reasonable range of alternatives.

This process also ensures that the public and resource agencies can review the proposed ARDS and their impacts on sensitive environmental and community resources early in the EIS development.

This Tier 2 Study has identified key elements that are critical components needed to develop and evaluate reasonable alternatives. The key elements of alternatives are study limits, alignments off existing U.S. 50/301, the existing bridges, structure type, number of lanes, shared-use path (SUP), transit, Transportation System Management (TSM)/Transportation Demand Management (TDM) strategies, and structure location, as described in **Section 3** of this report. To date, Tier 2 Study activities have included identification of these key elements of alternatives and analysis of several options for each element. An engineering analysis was conducted using updated traffic counts from 2022, more in-depth land use data, and preliminary cost and impact assessments. This preliminary analysis included comparison of element options in relation to the Tier 2 Study's Purpose and Need to determine if an option was reasonable. This analysis led to development of the proposed ARDS, which are made up of the reasonable options of each element, as described in **Section 4**. Options that were determined not reasonable are not included in the proposed ARDS but are discussed in **Section 5**. The alternative elements and options considered all agency and public input.

Key environmental resources that may be impacted by the proposed ARDS (described in **Section 6** of this report) have also been identified as part of initial Tier 2 Study activities.

1.4 Agency Coordination and Public Scoping Process

The MDTA and the FHWA have provided opportunities for meaningful agency coordination and public involvement throughout the initial Tier 2 Study activities and the development of the NOI. Input from agencies and the public has substantially contributed to the content and analysis described in this report.

1.4.1 Agency Coordination

The MDTA and the FHWA are engaging federal, state, regional, and local agencies (including adjacent counties) and other stakeholders in the Tier 2 Study. The MDTA and the FHWA developed a coordination plan that outlines the public and agency review process and ensures active participation in the Tier 2 Study. To date, agencies have been consulted regarding the coordination plan and study schedule, the preliminary Purpose and Need, methodologies for studying environmental resources, and the alternatives development process. The coordination plan is available in **Appendix B** and on the study website at baycrossingstudy.com.[2]

1.4.1.1 Cooperating and Participating Agencies

The MDTA, in coordination with the FHWA as the lead federal agency, is advancing the Tier 2 Study. Cooperating and Participating agencies at the federal, state, local, and regional levels have been identified in accordance with 40 CFR 1501.8 and 23 U.S.C. § 139. There are nine Cooperating agencies (six federal and three state) and 16 Participating agencies (five federal, eight state, and three local) for the Tier 2 Study (**Table 1-1**). The MDTA has also identified federal, state, MPOs,

[2] https://baycrossingstudy.com/downloads?task=download.send&id=75:tier-2-coordination-plan-august-2024&catid=8

counties, and municipalities as notified agencies. Notified agencies, listed in **Appendix B**, are those that will be informed of Tier 2 Study milestones through the public involvement activities along with the public.

Table 1-1. Lead, Cooperating, and Participating Agencies

Role	Federal Agencies	Maryland / State / Local Agencies
Lead Agencies	• FHWA – Maryland Division	• MDTA
Cooperating Agencies	• U.S. Army Corps of Engineers (USACE) • U.S. Coast Guard (USCG) • Environmental Protection Agency (EPA) • National Marine Fisheries Service (NMFS) • U.S. Fish and Wildlife Service (USFWS) • National Park Service (NPS)	• State Highway Administration (SHA) • Maryland Department of the Environment (MDE) • Department of Natural Resources (DNR)
Participating Agencies	• Federal Transit Administration (FTA) • Advisory Council on Historic Preservation (ACHP) • US Navy - Naval Facilities Engineering Systems Command • Federal Emergency Management Agency (FEMA) • Federal Aviation Administration (FAA)	• Maryland Transit Administration (MTA) • Maryland Port Administration (MPA) • Maryland Department of Planning (MDP) • Maryland Department of Emergency Management • Maryland Board of Public Works (BPW) – Wetlands Division • Maryland Historical Trust (MHT) • Maryland Aviation Administration (MAA) • Delaware Department of Transportation • Queen Anne's County (QAC) • Anne Arundel County (AAC) • Baltimore Metropolitan Council

1.4.1.2 Interagency Coordination Meetings

Meetings to facilitate Cooperating and Participating agency coordination, called Interagency Coordination Meetings (ICM), were initiated during the Tier 1 Study and have continued during the Tier 2 Study. At each ICM meeting, the MDTA and the FHWA present information about a variety of Tier 2 Study topics and seek initial agency feedback. All Cooperating and Participating agencies have been encouraged to provide comments at ICMs or via email between meetings. Nineteen ICMs have been held since the Tier 2 Study began in June 2022. The MDTA and the FHWA have received concurrence from Cooperating Agencies on the Coordination Plan, Purpose and Need, and Environmental Methodologies. In addition to the regular ICM meetings, other meetings with the agencies have included a bus tour in May 2023 that familiarized the agencies with the corridor and existing resources, as well as an alternatives meeting in May 2024 to discuss the alternatives analysis and proposed ARDS described in **Sections 4 and 5** of this report.

Agency representatives helped guide the Tier 2 Study proposed ARDS development by providing input that led to the analysis on specific Bay Crossing structure types, as well as certain transit improvements. Concerns over environmental and community impacts of a build alternative have been expressed by the agencies throughout the Tier 2 Study. Agencies noted specific interest in tunnel and double decker bridge alternatives and if these alternatives might reduce impacts. As a result, a full double decker bridge, full tunnel, and bridge-tunnel combination were considered during the proposed ARDS development, as discussed in **Section 3** of this report. Additionally, agencies noted interest in transit improvements at the Bay Bridge, including bus transit, ferry, and high-capacity transit, which have been considered in the proposed ARDS development process.

1.4.2 Public Engagement

Public engagement activities were initiated shortly after the launch of the Tier 2 Study in June 2022. Input from the public led to the analysis of specific Bay Crossing structure types, transit improvements, and TSM/TDM opportunities. For more information on the outreach tools, methods, and engagement opportunities that have been and will continue to be provided throughout the duration of the Tier 2 Study, including major public engagement activities at key project milestones, refer to the Public Engagement Plan in **Appendix C** of this NOI Additional Project Information Document.

1.4.2.1 September 2022 Public Open Houses

The September 2022 Public Open Houses included a series of three meetings: one virtual open house and two in-person open houses (one on the Eastern Shore and one on the Western Shore). These meetings summarized the results of the Tier 1 Study, described the objectives of the Tier 2 Study, and provided the opportunity for the public to ask questions and provide feedback on the Tier 2 Study.

The virtual open house was held on September 7, 2022, with 351 people in attendance. The first of the in-person open houses was held on Thursday, September 8, 2022, at the Kent Island American Legion Post in Stevensville on the Eastern Shore. A total of 94 members of the public attended this meeting. The second was held on September 13, 2022, at the Broadneck High School in Annapolis on the Western Shore. A total of 132 people attended this meeting.

In total, 713 comments were received during the comment period for the September 2022 Public Open Houses, which ran from August 11 through October 14, 2022. Common themes from the September 2022 Open Houses included:

- The No Build Alternative,
- Other corridor alternatives,
- U.S. 50/301 alternatives,
- Bridge crossing alternatives,
- Tunnel suggestions,
- Traffic,
- Local roadway concerns,
- Safety and emergency services,
- Transit and operational elements/solutions,
- Pedestrian and bicycle support/alternatives,
- Natural resources,
- Socioeconomic impacts,
- Right-of-way concerns,
- Construction, and
- Public involvement transparency in the planning process.

As part of these meetings, the public was encouraged to submit comments and complete an open house survey. The survey sought input on potential Purpose and Need elements, as well as information on how often participants of the survey cross the bridge and where and when they experience congestion along the corridor. Feedback on the potential Purpose and Need elements at these meetings helped shape the draft Purpose and Need statement for the Tier 2 Study.

1.4.2.2 Transit and Bicycle / Pedestrian Listening Meeting

On June 27, 2023, the MDTA held a Virtual Listening Meeting for the public to learn more and provide feedback on transit, bicycle, and pedestrian considerations in the study area. During the meeting, the MDTA conducted live polling and provided the opportunity for the public to provide comments and suggestions regarding how transit service and bicycle/pedestrian facilities could be considered in the Tier 2 Study. The public was also encouraged to complete a survey regarding bicycle/pedestrian use and considerations in the study corridor.

The survey sought input from the public on how often they use transit or bicycle and pedestrian facilities in the study corridor, as well as if they would potentially use transit or a SUP to cross the Chesapeake Bay. Feedback received at the meeting supported further consideration of transit and bicycle and pedestrian facilities at the crossing.

1.4.2.3 September 2023 Public Open Houses

The MDTA held three Public Open Houses in September 2023. The purpose of these open houses was to present the Tier 2 Study's proposed Purpose and Need and the alternatives development process and provide the public with the opportunity to ask the study team questions and give comments and feedback on the information presented.

The first of the three meetings was held in-person on Thursday, September 7, 2023, at the Broadneck High School in Annapolis on the Western Shore. A total of 223 people attended this meeting. The second in-person meeting was held on Tuesday, September 12, 2023, at the Kent Island American Legion Post in Stevensville on the Eastern Shore. One hundred fifty-three people were in attendance. The virtual open house was held on Thursday, September 14, 2023, and included 177 attendees.

The comment period for the open houses ran from August 7 to October 16, 2023. In total, 611 open house survey responses were received, including five written surveys mailed to the MDTA.

Common themes found in comments from the September 2023 Public Open Houses included:

- Congestion on local roads and in communities,
- Traffic on the Severn River Bridge, U.S. 50, and Route 2,
- Location of the bridge alternative,
- Noise impacts,
- Transit,
- Safety concerns,
- Study schedule,
- Traffic,
- Environmental concerns, and
- Support for closing ramps and service roads.

As part of these meetings, the public was encouraged to submit comments and complete an open house survey. The survey sought input on the study's draft needs and considerations, as well as information on how often participants cross the bridge, if they use local roads to avoid congestion on U.S. 50/301, how often construction at the bridge impacts their daily activities, how often and where traffic at the bridge impacts their daily activities, and other issues along the corridor. The survey also sought input on where participants travel to when they cross the bridge, what environmental and community resources are most important to them, if participants would use a SUP at the bridge, and if they would use transit to cross the bridge. Feedback received from the public confirmed the draft study needs and considerations captured the issues identified by the public and supported further consideration of a SUP and transit options.

1.4.2.4 Community Engagement Events

The study team has attended community events to provide information about the Tier 2 Study and encourage public participation. Events attended by the team since summer 2022 include:

- Blood Drives
- STEM Events for Students
- Kent Island Farmer's Markets
- Farragut Farmer's Markets
- QAC and AAC Libraries
- Kent Island Day, May 20, 2023
- Annapolis Pride Festival and Parade, June 30, 2023
- Annapolis Juneteenth Celebration, June 17, 2023
- Chrome City, July 30, 2023
- National Night Out, August 1, 2023
- QAC Fair, August 7-12, 2023
- Maryland Seafood Festival, August 19-20, 2023
- Grasonville Labor Day Parade, September 4, 2023
- AAC Fair, September 13-17, 2023
- Annapolis Baygrass Festival, September 30, 2023
- Bay Bridge Run/Walk, November 12, 2023
- Grasonville Community Center Small Business Expo, February 24, 2024
- State of Black Annapolis: Black Business Celebration, February 27, 2024
- Anne Arundel Asian American Festival, April 7, 2024
- QAC Town Hall Meeting in Stevensville, April 10, 2024
- YMCA Healthy Kids Event, April 20, 2024
- Grasonville Spring Fair, April 27, 2024
- Annapolis Health Fair and Listening Session, May 10, 2024
- Annapolis Vet Center Resource Fair and Community Open House, April 30, 2024
- Fiesta Latina, May 5, 2024
- Annapolis Heather Fair and Listening Summit, May 10, 2024
- QAC Senior Summit, May 17, 2024
- Summer Slam Charity Pickleball, June 1, 2024
- Annapolis Pride Festival and Parade, June 1, 2024
- Kennard African American Cultural Heritage Center Juneteenth Event, June 8, 2024
- The Great Chesapeake Bay Swim, June 9, 2024
- Annapolis Juneteenth Celebration, June 22, 2024
- Biggest Block Party, June 19, 2024
- Annapolis Family Day, July 27, 2024
- QAC Fair, August 12-17, 2024
- AAC Fair, September 11-15, 2024
- Kunta Kinte Heritage Festival, September 14, 2024

1.4.2.5 Equity Survey

As an initial effort in meeting the MDTA's equity goals,[3] an Equity Engagement Survey was developed to assist with identifying the needs and concerns of disadvantaged, underserved, and marginalized communities, including Environmental Justice (EJ) populations. The purpose of the survey was to assist the study team with understanding study area demographics, transportation concerns, and how to best engage with identified groups to meet their specific needs. The survey was available in electronic and hard copy format and was advertised through various means, including mass stakeholder e-blasts, the Bay Crossing Study webpage, boards at the fall 2023 Public Open Houses, and strategic distribution of post cards and yard signs along and near the U.S. 50/301 corridor with survey information and a QR code to take the survey.

Advertisements for the surveys were available at multiple community locations, including parks, community centers, health care facilities and specialty grocery stores along or near the U.S. 50/301 corridor in both AAC and QAC. The survey was also advertised at community events attended by the study team. The survey was live from August 7 through October 16, 2023, and a total of 1,773 responses were received. Information from these surveys was used to bolster the study's already extensive stakeholders list, which includes community resource agencies and organizations, subsidized housing organizations and recipients, religious minorities, and those representing Descendant African-American communities and the Kennard African-American Cultural Heritage Center. Groups and organizations identified by the survey will continue to be engaged as the Tier 2 Study progresses.

1.4.2.6 December 2024 Public Open Houses

The MDTA will hold three Public Open Houses in December 2024 that will serve as public scoping meetings for the EIS. The purpose of these open houses will be to present the information in this NOI Additional Project Information Document, including existing environmental conditions and proposed ARDS for the proposed action.

The first of the three meetings will be held virtually on Wednesday, December 4, 2024. An in-person meeting will be held on Monday, December 9, 2024, at Broadneck High School on the Western Shore, followed by another in-person meeting on Wednesday, December 11, 2024, at the Kent Island High School on the Eastern Shore. The public scoping comment period for this NOI and the December 2024 Open Houses will close January 10, 2025. The MDTA and the FHWA will identify the ARDS in the Draft EIS based on the public and agency comments received during this comment period.

[3] https://mdta.maryland.gov/About/MDTA_Mission_Vision_and_Values.html

2 PURPOSE AND NEED

This section is a summary of the *Chesapeake Bay Crossing Study: Tier 2 NEPA Preliminary Purpose and Need Report* (**Appendix A**) and describes the purpose of the Tier 2 Study, the study needs, and additional objectives.

The purpose of the Tier 2 Study is to address existing and future transportation capacity needs and access across the Chesapeake Bay and at the Chesapeake Bay Bridge approaches along the U.S. 50/301 corridor. The Tier 2 Study is evaluating measures to reduce congestion, improve travel times and reliability, mobility, and roadway deficiencies, and accommodate maintenance activities and navigation, while minimizing impacts to local communities and the environment.

The MDTA has identified five needs for the Tier 2 Study:

- Adequate capacity and reliable travel times,
- Mobility,
- Roadway deficiencies,
- Existing and future maintenance needs, and
- Navigation.

The needs have been updated from the Tier 1 Study to reflect more recent travel conditions which were refined for the Tier 2 Study to focus on the more specific needs of the corridor and the project-level NEPA review process.

In addition to identifying needs, the MDTA has also identified two objectives for consideration:

- Environmental responsibility, and
- Cost and financial responsibility.

Both environmental and cost/financial responsibility are fundamental to the planning process and an integral part of evaluating alternatives. However, including them as objectives in this Tier 2 Study enables heightened scrutiny and greater attention to these issues and allows for greater efficiency in the early stages of alternatives development. The integration of these objectives also recognizes the importance of these issues given the sensitivity of the Chesapeake Bay as an environmental resource and the need to make responsible budgetary decisions regarding a costly proposed action.

2.1 Adequate Capacity and Reliable Travel Times

Traffic demand has consistently risen nearly every year since the original Bay Bridge opened to traffic until 2007, when traffic volumes fluctuated but remained high. Despite the reduction in crossings during the COVID-19 pandemic, travel patterns have since recovered and the number of annual crossings exceeded 26 million in 2021 and 2022. The increase in crossings has accompanied a steady population increase across the region, including AAC and QAC, the other Eastern Shore counties south of Cecil County, and Kent and Sussex counties in southern Delaware. Despite the ability to implement two-way (contraflow) traffic operations to increase capacity for eastbound travel, queue lengths of up to nearly five miles have been observed in 2022; queues longer than one mile can last up to eight consecutive hours.

By 2045, the population in the state of Maryland is expected to increase by approximately 15 percent compared to 2019 levels, and employment is expected to increase by approximately ten percent over the same period.[4] This anticipated growth is expected to contribute to increased demand for trips across the Chesapeake Bay, along with longer-distance trips generated beyond Maryland's borders. Under no-build conditions, traffic volumes at the Bay Bridge are expected to grow by 31 percent on non-summer weekdays and approximately 25 percent on summer weekend days. Under 2045 no-build conditions, using level of service (LOS) metrics, hourly travel demand is predicted to approach or exceed capacity of the Bay Bridge in at least one direction for nine hours on an average non-summer weekday and 11 hours on a summer weekend day with two-way operations. Queue lengths are predicted to grow to over ten miles by 2045, which will further decrease LOS and travel reliability.

Crash rates across the bridge have varied due to the changes in travel demand and traffic volumes caused by the COVID-19 pandemic, the conversion to cashless tolling on the eastbound span in March 2020, and the subsequent removal of the toll plaza in 2021. To account for these changes, six years of crash data were obtained and reviewed (2017 through 2022). Per data from SHA, the crash rates on the Bay Bridge exceeded statewide freeway crash rates in 2018, 2019, 2020, and 2021. Rear-end crashes, commonly associated with congested conditions, accounted for approximately 67 percent of the number of crashes over this period.

Beyond traffic congestion, factors like vehicle breakdowns, crashes, weather events, and maintenance activities can impact the reliability of transportation facilities and make trip planning difficult for users. The annual State Highway Mobility Report, published by the SHA, accounts for these factors in trip reliability using the measurement of the Planning Time Index (PTI). On average for eastbound travel, there are four hours during weekdays, 14 hours on summer Fridays, and 12 hours on summer Sundays that have PTIs categorized as moderately unreliable or highly to extremely unreliable. On average for westbound travel, there are six hours during weekdays, 12 hours on summer Fridays, and nine hours on summer Sundays under the same PTI categories. With expected growth in vehicle queue length, duration, and a predicted increase in the number of hours of unsatisfactory LOS, trip reliability is expected to decrease under no-build conditions. For more information about PTI, please reference **Appendix A**.

2.2 Mobility

There is a lack of mobility for all modes of travel caused by existing and anticipated future conditions at the Bay Bridge. Congestion at the Bay Bridge and its approaches and subsequent spillover effects on local roadways limit the movement of people, goods, and services across the Chesapeake Bay and in adjacent communities.

The U.S. 50/301 corridor was identified as one of the most critical highway portions of the U.S. freight transportation system and top truck bottlenecks in Maryland, according to the SHA's 2021

[4] https://planning.maryland.gov/MSDC/Documents/projection/employment/MD.pdf

Mobility Report, and among the least reliable corridors for truck travel, according to the Maryland State Freight Plan. This hinders agricultural transport from local areas and contributes to larger freight mobility and supply chain issues for the entire Mid-Atlantic region. The Bay Bridge is also a critical evacuation route during emergencies and provides the only roadway connection across the Chesapeake Bay over nearly 200 miles. Increased congestion has constrained the mobility of this important connection and could lead to congestion at alternative routes throughout the region.

The Bay Bridge supports both local trips (e.g., work related and discretionary trips) with origins and destinations (O-Ds) relatively close to the shores of the Chesapeake Bay and regional trips (e.g., commerce, recreation, regional travel) with O-Ds throughout and beyond Maryland. During typical non-summer weekdays, nearly half of trips crossing the Bay Bridge are local or commuter trips beginning or ending in QAC or AAC. During summer weekends, there is a higher percentage of trip O-Ds beyond the western and eastern ends of the bridge, as compared to weekday trips, indicating higher amounts of non-local travel.

Congestion can limit mobility and connectivity within local communities and inhibit access to employment, healthcare, and other important resources, whether nearby or across the Chesapeake Bay. Not only can heavy traffic cause delays in response times for emergency service providers managing incidents on U.S. 50/301, but it also prohibits residents within the adjacent local communities from accessing necessary emergency services when needed. Congestion on U.S. 50/301 can also cause motorists to divert onto local roads, causing spillover traffic in neighboring communities.

Four agencies operate transit service across and adjacent to the Bay Bridge, among other local organizations and private operators that provide service. All transit agencies report congestion as a major issue in keeping transit schedules. There are no existing ferries or passenger rail routes across the Bay. The Bay Bridge does not accommodate pedestrian or bicycle travel across the Chesapeake Bay and worsening congestion on local roadways can create barriers and safety hazards for pedestrians and bicycle users in the surrounding communities.

2.3 Roadway Deficiencies

The Bay Bridge does not meet today’s design standards for lane and shoulder width. Limited shoulder space and narrow lanes not only provide less space for users but can also inhibit emergency management or bridge maintenance activities. The current structures also do not have any physical suicide deterrent systems; they do not prevent incidents involving accidental falls nor do they deter individuals from climbing over the outside of the barriers.

2.4 Existing and Future Maintenance Needs

Due to the age and design life of the existing Bay Bridge, substantial maintenance of the facility is needed now and in the future. These maintenance needs lead to lane closures that make incident management more difficult and cause increased traffic congestion and delays.

The existing Bay Bridge structures are currently in satisfactory condition and can remain in-service for the next several decades until around 2065 with continued scheduled rehabilitation and maintenance.[5] However, maintenance and rehabilitation activities, as well as incident management (i.e., crash response, debris removal) on the Bay Bridge often require lane closures, which reduces capacity and increases congestion on the bridge and at its approaches.

Over the next few decades, the MDTA anticipates major deck replacement, cable replacement, full repainting, and other various rehabilitation projects and maintenance activities for both spans of the Bay Bridge. At a minimum, all projects would require a lane closure which would worsen congestion over time and compound existing traffic congestion, mobility, and roadway deficiency issues. The MDTA anticipates the cost of all future maintenance projects from 2023 through 2065 to be approximately $3.8 billion.

2.5 Navigation

The Bay Bridge serves as a key constraint for ships that travel on the Chesapeake Bay, including to the Port of Baltimore. The Port of Baltimore annually produces approximately $3.3 billion in total personal income, $395 million in taxes, and $2.6 billion in business income, as well as supports over 15,300 direct jobs and over 139,000 connected jobs. Accommodating existing and future ship navigation and traffic on the Chesapeake Bay is critical to maintaining the vitality of the Port of Baltimore and commerce in Maryland.

The existing Bay Bridge spans limit vertical clearance through the Chesapeake Bay to 186 feet. The Francis Scott Key Bridge, which once had a similar vertical clearance to the Bay Bridge, was struck by a large vessel, causing it to collapse on March 26, 2024. As a result, the vertical clearance of the Bay Bridge is the determining factor for the size of ships that can access the Port of Baltimore. Furthermore, it is anticipated that any future structure at the site of the former Francis Scott Key Bridge would be constructed with a vertical clearance of approximately 230 feet. Due to vertical clearance limitations at the Bay Bridge, only 31 percent of cruise ships currently have access to the Port of Baltimore. Additionally, cargo ships are expected to increase in size in the next decade; so, at a height of 186 feet, the Bay Bridge would not be able to accommodate the navigation of ships exceeding the size of Post Panamax (PPX) Generation III Max vessels. The MPA predicts the current vertical clearance of the Bay Bridge may limit the passage of even PPX III Max vessels starting in 2045 due to sea-level rise. Due to its historic nature, the Bay Bridge was designed and constructed before the adoption of more modern design standards and does not utilize current best practices to mitigate the risk of vessel collision.

2.6 Additional Objectives

In addition to the needs discussed above, two objectives will be considered throughout the process of developing and evaluating Tier 2 Study alternatives. The objectives are (1) environmental responsibility and (2) cost and financial responsibility. Rather, the objectives provide additional criteria for evaluating reasonable alternatives. They represent issues the MDTA has deemed important considering the sensitivity of the Chesapeake Bay as an environmental resource, the MDTA's goal to balance the potentially substantial benefits and impacts of major infrastructure projects among all users and neighboring communities, and limited availability of

[5] See MDTA. 2015. U.S. 50/301 William Preston Lane Jr. Memorial (Bay) Bridge: Life Cycle Cost Analysis. https://mdta.maryland.gov/sites/default/files/Files/Bay_Bridge_LCCA_Report_12-2015.pdf

funding resources. Including these issues as additional objectives will lead to higher scrutiny and attention to these issues during alternatives development and will allow for greater efficiency in the early stages of alternatives development. Incorporating the objectives in the analysis will help confirm that alternatives evaluated in the EIS are technically feasible and could ultimately be constructed if selected as a result of the NEPA environmental review process. Ultimately, it will also allow for earlier and clearer communication with stakeholders and the public about the decision-making process.

2.6.1 Environmental Responsibility

The MDTA recognizes the significance of the Bay Bridge and the Chesapeake Bay. "Environmental Responsibility" in the context of the Tier 2 Study is understanding the significance of the natural, built, and human environment and making decisions to meet the Purpose and Need while limiting adverse impacts to these resources. Further, environmental responsibility as an additional objective will encourage the development of alternatives that reflect the MDTA's commitment to protecting the local community and natural environmental resources.

The environmental implications of alternatives will also be examined in the context of equity. Executive Order 13985 defines "equity" as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality. The MDTA's mission is to deliver safe, sustainable, intelligent, exceptional, and inclusive transportation solutions in order to connect MDTA's customers to life's opportunities. One of the MDTA's core values is excellence – excellence in their people, work and environment – and the MDTA strives to reach that through their commitment to diversity and equity. The MDTA will work to ensure meaningful participation throughout the planning process from individuals and groups within communities that have been historically excluded, overburdened, and underserved. To establish a fair and equitable transportation decision, the MDTA will ensure the needs and concerns of individuals and neighboring communities are incorporated into the Tier 2 Study.

2.6.2 Cost and Financial Responsibility

The MDTA recognizes that potential build alternatives must be financially responsible. To assess potential build alternatives, financial responsibility will be considered regarding the means to pay for the development, operation, and maintenance of the facilities. The MDTA will explore potential funding strategies for any potential Bay Crossing improvements, which must be deemed financially viable.

The Tier 2 analysis will present potential crossings at the project-level and will include a greater level of detail than the Tier 1 Study. This Tier 2 Study will define specific construction actions and evaluate the costs associated with each build alternative. Costs associated with the no-build alternative must also be considered.

2.7 Public and Agency Input on the Purpose and Need

Public and agency input has been considered throughout the Purpose and Need development process.

2.7.1 Opportunities for Input

The public was asked to provide input on potential needs as part of the September 2022 open houses through the open house survey. The survey instructed users to rank potential needs identified for the Tier 2 Study, as well as list any other potential needs for consideration. The results of the survey were reviewed and taken into consideration during the development of the draft Purpose and Need.

The draft Purpose and Need was developed in close coordination with Cooperating and Participating agencies. Agencies were first introduced to the Tier 2 Study's draft Purpose and Need elements in the spring of 2023 and were provided with the opportunity to give input. The MDTA reviewed agency input and followed up by presenting the full draft Purpose and Need statement to the agencies at the May 2023 ICM. Following the May meeting, the draft statement was provided to the agencies for comment so that feedback could be received and incorporated in advance of the September 2023 public open houses.

The draft Purpose and Need, revised based on agency comments, was then presented to the public during the September 2023 open houses. The public was asked to provide input on the needs and objectives through the open house survey. Like the survey provided at the September 2022 open houses, this survey asked the public to rank the draft study needs and objectives in order of importance. However, this survey also asked the public to suggest additional needs and objectives that the MDTA should consider when developing and screening proposed ARDS.

2.7.2 Results of Input

Input received from the public was used to refine the draft Purpose and Need. The MDTA completed the Preliminary Purpose and Need Statement and Report and received concurrence from Cooperating agencies in 2024. The Preliminary Purpose and Need Report is included as **Appendix A**.

As a result of public and agency input, the Tier 2 Study has five needs, compared to the three needs that were identified in the Tier 1 Study. The Tier 1 Study Needs "Adequate Capacity" and "Dependable and Reliable Travel Times" were combined into one need due to their commonality of addressing existing and future congestion issues at the U.S. 50/301 corridor. The Tier 1 Study Need "Flexibility to Support Maintenance and Incident Management in a Safe Manner" was split into two separate needs for the Tier 2 Study.

While Corridor 7 was identified as the Tier 1 Study EIS Selected Alternative, the Tier 2 Study is focused more specifically on the issues at the current Bay Bridge structures. As a result of this refinement, it became clear that specific issues related to the impact and cost of maintenance activities on the existing bridge spans needed to be highlighted in the analysis. Another specific issue that emerged upon further scrutiny of the existing crossing was how the bridge causes fear or anxiety while crossing due to the lack of shoulders and narrow lane widths. The anxiety related to crossing the bridge was voiced by many community members in public meetings and in the surveys that were received. This concern, along with issues related to incident management, MDTA worker safety, and suicide prevention measures, provided support for creating a separate need for "Roadway Deficiencies" apart from "Existing and Future Maintenance Needs" in the Tier 2 Study.

In their feedback, agencies and local community representatives emphasized the need for accommodating a broad range of users across the Chesapeake Bay and the importance of providing opportunities for regional transportation connectivity. Additionally, at public meetings and events, many local community members emphatically voiced concern about congestion on the Bay Bridge and how it impacts their ability to move through their communities or complete local trips. Specifically, they cited spillover traffic resulting from bridge congestion as a major issue on local roadways and at certain interchanges and ramps. As a result, "Mobility" was developed as a need to ensure that any alternative would consider solutions to address local connectivity and travel across the Chesapeake Bay by a wide range of local and non-local users.

Due to the project-level (site-specific) focus of the Tier 2 Study, the MDTA considered the current limitations and constraints at the Bay Bridge. "Navigation" was developed as a need to highlight the importance of maintaining the shipping channel through the Chesapeake Bay. Coordination with the MPA identified the constraints that the Bay Bridge will present for shipping traffic to the Port of Baltimore in future decades.

The Tier 1 Study EIS also identified "financial viability" and "environmental responsibility" as other elements that would be considered during the study. Based on input received from agencies and the public for the Tier 2 Study, these elements are now identified as "objectives" and are referred to as "cost and financial responsibility" and "environmental responsibility." Including them as objectives during the Tier 2 Study ensures heightened scrutiny and greater attention to these issues beyond the assessment of environmental effects and cost that would occur during the evaluation of study alternatives.

3 PROPOSED ARDS DEVELOPMENT PROCESS

The MDTA began the alternatives development process by determining the study limits and focusing the early evaluation and screening on the key elements of possible alternatives. Key elements include the existing bridges, structure type, alignments relative to existing U.S. 50/301, number of lanes, structure location, transit, TSM/TDM strategies, and inclusion of a SUP. This process was informed by public feedback received during the September 2022 Public Open Houses, the June 2023 Transit and Pedestrian/Bicycle Listening Meeting, and the September 2023 Public Open Houses. In turn, the evaluation and screening of the key elements supported the development of the proposed ARDS.

Section 3.1 describes the process and data used to determine the study limits. **Section 3.2** describes each of the key elements and the options that were considered in the development of the proposed ARDS. As discussed, each key element has been presented to the public at open houses and to the Cooperating and Participating agencies in 2023 and 2024. The MDTA considered all input received from agencies and the public when evaluating and screening the key elements. A detailed description of the analysis and screening results for each element is provided in **Section 4**. A description of MDTA's proposed ARDS for the NOI is provided in **Section 5**.

3.1 Study Limits

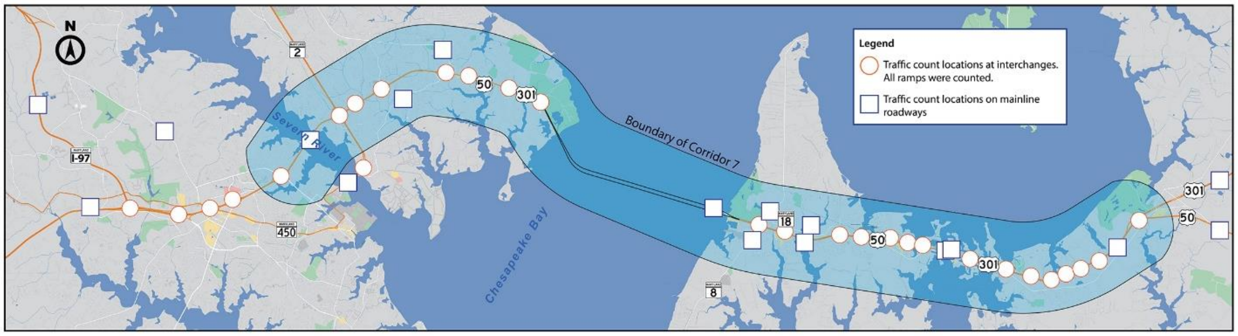
A NEPA action must have logical termini, which the FHWA defines as (1) rational endpoints for a transportation improvement, and (2) rational end points for a review of the environmental impacts.[6] Per 23 CFR 771.111(f), the FHWA requires that proposed improvements:

- Connect logical termini and be of sufficient length to address environmental matters on a broad scope;
- Have independent utility or independent significance, i.e., be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made; and
- Not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

The Selected Corridor Alternative (Corridor 7) identified in the Tier 1 Study FEIS/ROD (**Figure 1.2**) was used as the basis to determine the Tier 2 Study limits along U.S. 50/301. The MDTA collected and reviewed traffic data from April 1 to December 31, 2022, for the Bay Bridge and the U.S. 50/301 corridor. The effort included the collection of traffic volume data on both non-summer weekdays and summer weekends. The locations of the traffic counts can be seen in **Figure 3.1**. Traffic counts were also collected beyond the limits of Corridor 7 and were used to assist with the identification of appropriate endpoints. The data collected was summarized and presented to the agencies and the public in 2023 in a series of graphics, as shown in **Figures 3.2** through **3.7**. Additional traffic data was also collected at a small number of locations in 2023 and 2024.

[6] https://www.environment.fhwa.dot.gov/legislation/nepa/guidance_project_termini.aspx

Figure 3.1. Traffic Count Locations



On the Western Shore, approximately one-third of the traffic crossing the Bay Bridge traveling westbound exits from U.S. 50/301 onto the Broadneck Peninsula. **Figure 3.2** shows that 42 to 65 percent of the traffic crossing the Severn River traveling westbound enters U.S. 50/301 from the Broadneck Peninsula. At four of the five westbound interchanges between the Bay Bridge and the Severn River Bridge, more traffic enters U.S. 50/301 than exits U.S. 50/301. The ramp from southbound MD 2 alone accounts for approximately 16 to 28 percent of the vehicles on the Severn River Bridge. Therefore, there is a net increase in traffic from the Bay Bridge to the Severn River Bridge.

Traveling eastbound, **Figure 3.3** shows that approximately 55 to 71 percent of the traffic crossing the Severn River exits U.S. 50/301 to the Broadneck Peninsula, with most of that exiting traffic using MD 2/MD 450, Bay Dale Drive, or MD 179. The ramp from eastbound U.S. 50/301 to northbound MD 2 alone accounts for approximately 20 to 29 percent of the vehicles from the Severn River Bridge. Eastbound traffic across the Severn River Bridge is higher than across the Bay Bridge by approximately 39 percent on a non-summer weekday and 23 percent on a summer Friday. Overall, there is a net decrease in traffic from the Severn River Bridge to the Bay Bridge.

As noted, the traffic volumes across the Bay Bridge are lower than volumes across the Severn River Bridge on both non-summer weekdays and summer weekends. The analysis of the traffic volumes demonstrates that there is a clear distinction between traffic volumes on U.S. 50/301 associated with the Bay Bridge and traffic volumes at and west of the Severn River Bridge. Thus, while traffic on the Bay Bridge and Severn River Bridge is related, the two bridges are separate and not directly dependent on each other.

Additionally, volumes entering and exiting U.S. 50/301 at the MD 2/MD 450 interchange are more than twice as large as at any other interchange. Due to the high volumes on the MD 2/MD 450 interchange, the interchange acts as the changeover from the Severn River Bridge traffic to the Bay Bridge traffic. Therefore, a western study limit beyond the eastern end of the Severn River Bridge would go beyond the scope of addressing issues related to the crossing of the Chesapeake Bay.

Locating the logical terminus at the MD 2/MD 450 interchange allows any new lanes to be added/dropped at the interchange ramps or merged and transitioned into the existing mainline lanes within the interchange. The tie-in of the proposed improvements with the existing

U.S. 50/301configuration at this interchange would not preclude any future improvements by SHA along U.S. 50/301, MD 2/MD 450, or the Severn River Bridge.

The MD 2/MD 450 interchange is therefore the western end of the logical termini given the possible extent of potential transportation improvements. This interchange is also a rational end point for a comprehensive review of environmental impacts that could result from adding transportation capacity across the Chesapeake Bay.

Conditions on the Eastern Shore are substantially different than on the Western Shore. Overall, the Eastern Shore traffic analysis showed that there is not a significant differential for eastbound or westbound traffic entering/exiting U.S. 50/301, nor is there a substantial change in traffic volume overall. The westbound traffic just west of the U.S. 50/301 split is similar to westbound traffic across the Kent Narrows Bridge, and westbound traffic across the Kent Narrows Bridge is also approximately the same as across the Bay Bridge, as shown in **Figures 3.4 and 3.5**. Eastbound, traffic across the Kent Narrows Bridge is similar to traffic crossing the Bay Bridge and also similar to traffic just west of the U.S. 50/301 split, as shown in **Figures 3.6 and 3.7**. Volumes at the MD 2/MD 450 interchange are also shown in **Figure 3.8.** While individual interchanges do show some differential between entering and exiting volumes, the overall volume on U.S. 50/301 remains relatively constant between the Bay Bridge and the U.S. 50/301 split, in both directions. The situation changes substantially at the U.S. 50/301 split, which is a major highway decision point for traffic heading north or south on the Eastern Shore. Nearly 60 percent of the traffic uses U.S. 50 and approximately 40 percent uses U.S. 301 on non-summer weekdays. On summer weekends, the traffic split is approximately 70 percent using U.S. 50 and approximately 30 percent using U.S. 301. For more information related to origins and destinations, please reference **Section 3.2.2** of **Appendix A**.

Locating the eastern logical terminus at the U.S. 50/301 split allows any mainline improvements that are carried to and through the interchange to be merged into the existing mainline lanes. Depending upon the lane configurations developed as part of the Tier 2 Study, it may be necessary to continue improvements just past the split, to allow transitions back to the existing typical sections of both U.S. 50 and U.S. 301. Regardless, this would not preclude any future improvements by SHA along either roadway.

The U.S. 50/301 split is therefore the western end of the logical termini given the possible extent of potential transportation improvements. This location is also a rational end point for a comprehensive review of environmental impacts that could result from adding transportation capacity across the Chesapeake Bay.

Figure 3.2. Westbound Traffic Volumes between the Severn River Bridge and the Bay Bridge

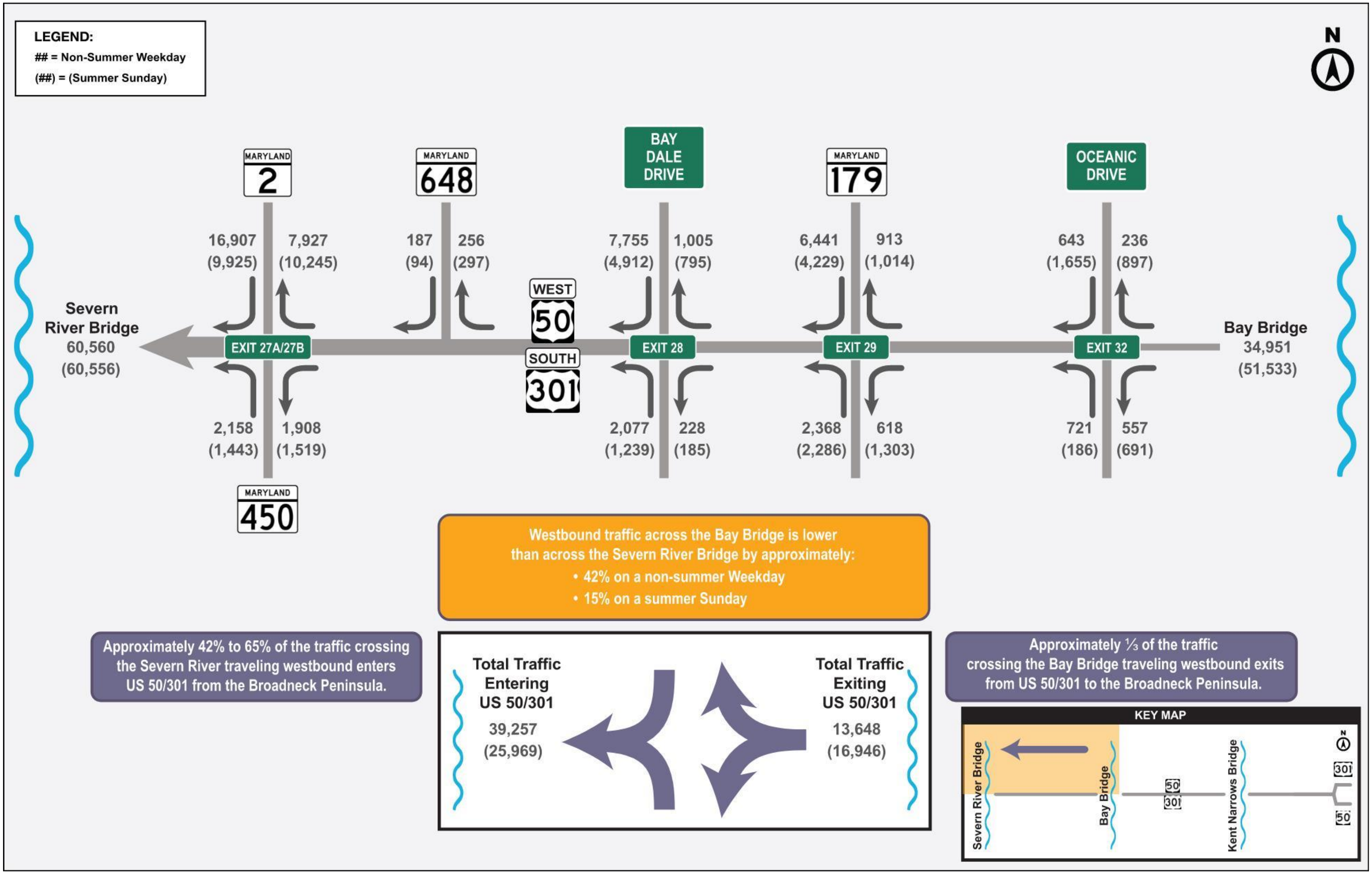


Figure 3.3. Eastbound Traffic Volumes between the Severn River Bridge and the Bay Bridge

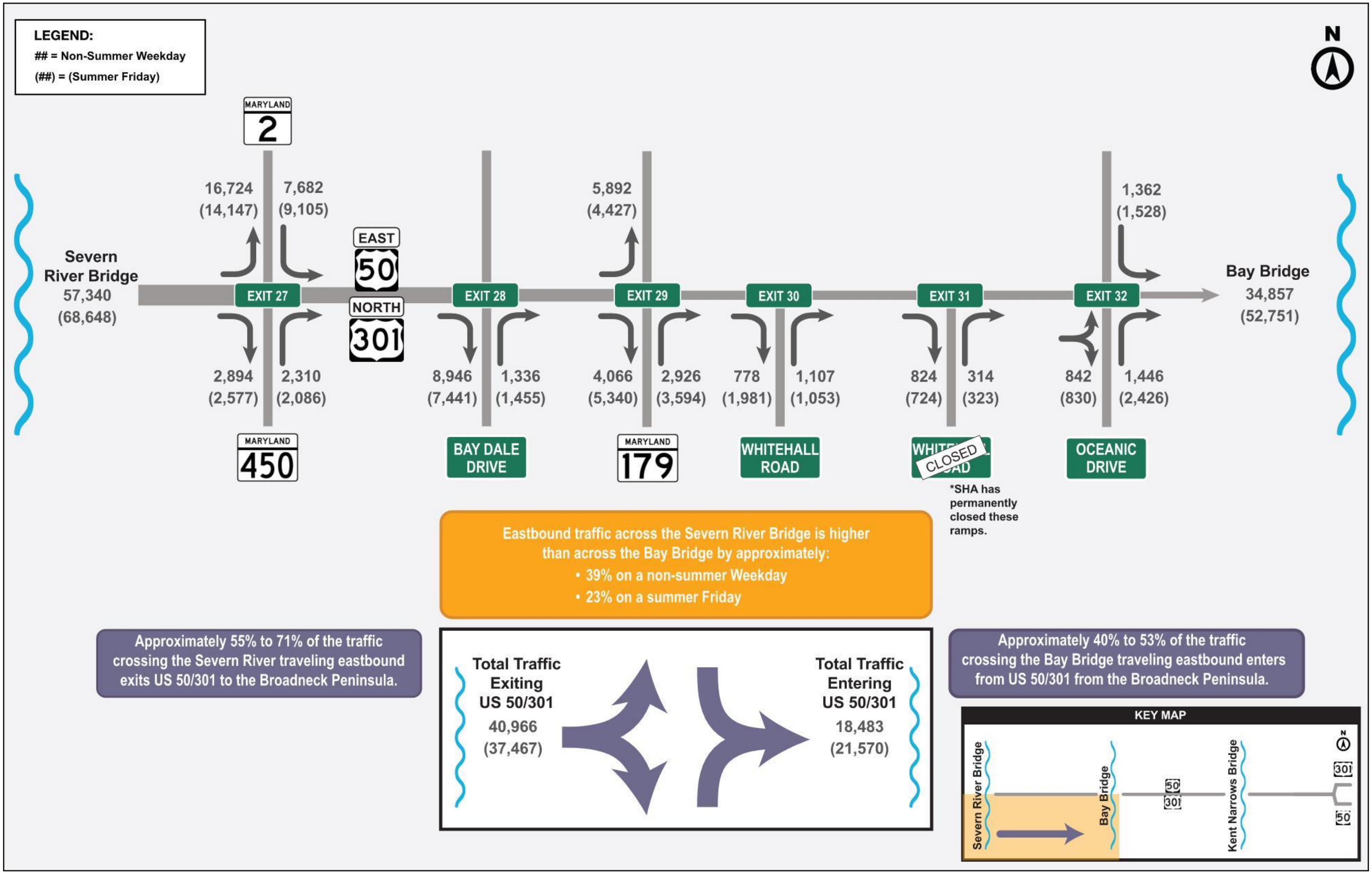


Figure 3.4. Westbound Traffic Volumes between the Kent Narrows Bridge and the U.S. 50/301 Split

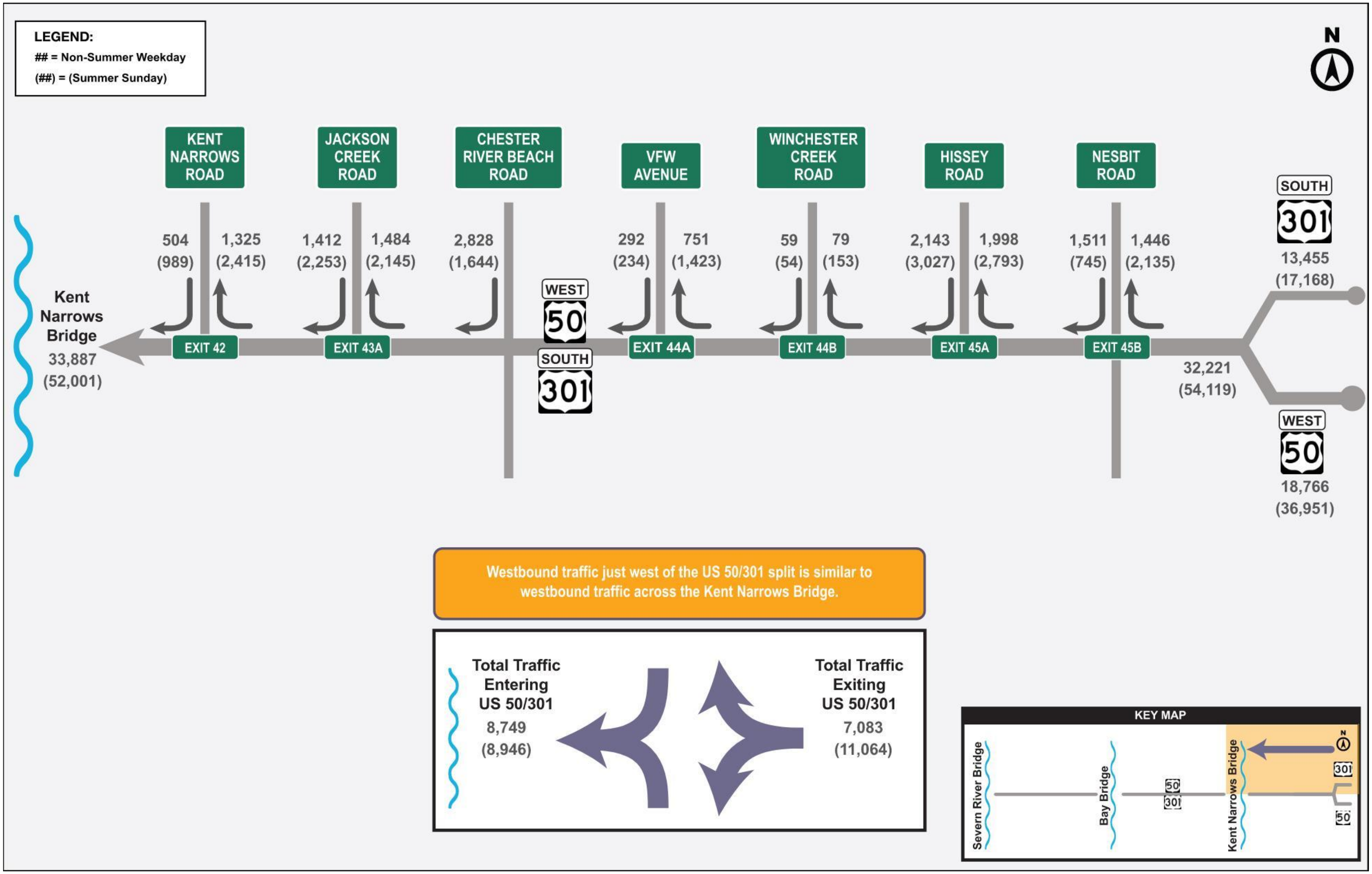


Figure 3.5. Westbound Traffic Volumes between the Bay Bridge and the Kent Narrows Bridge

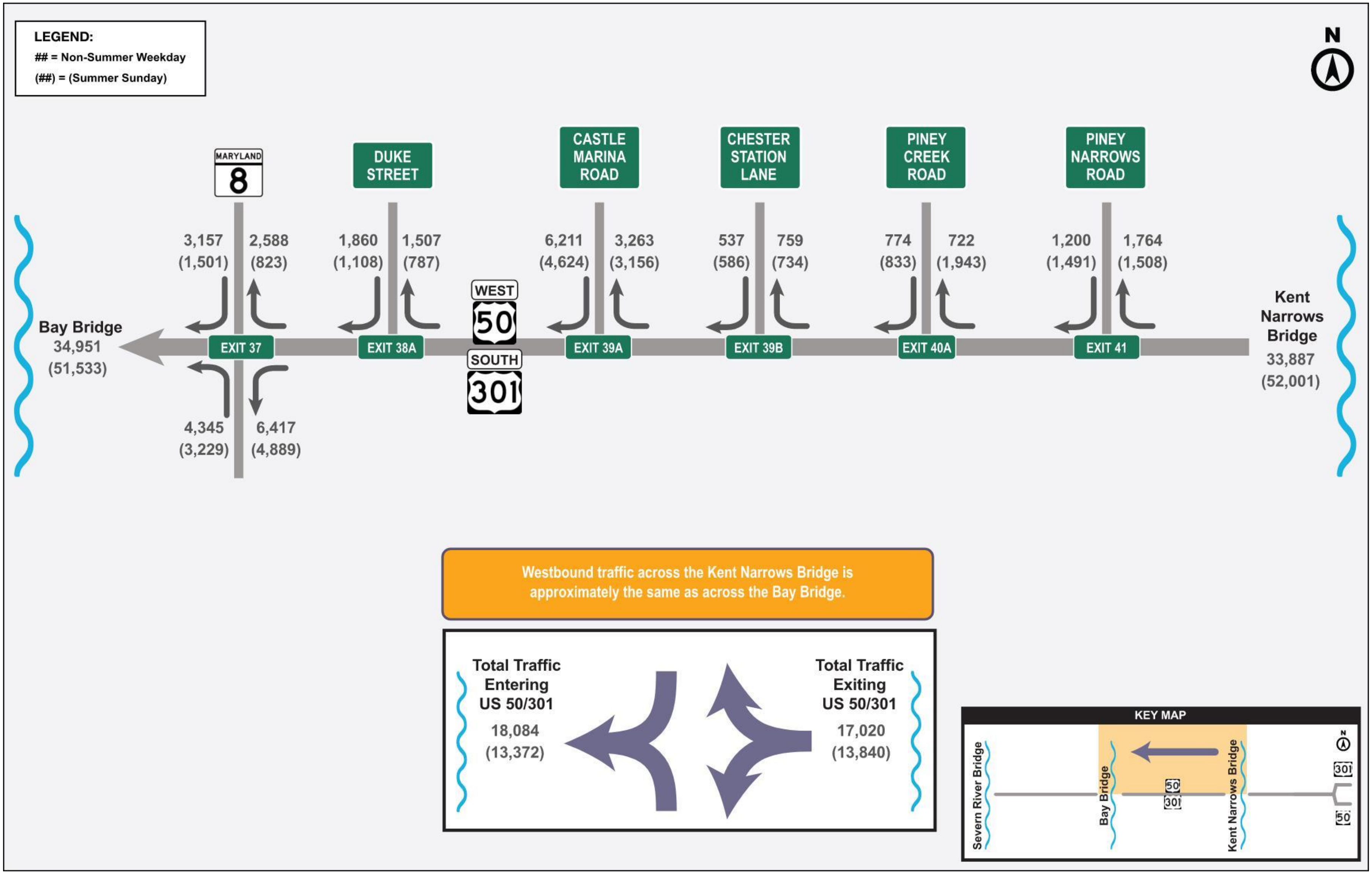


Figure 3.6. Eastbound Traffic Volumes between the Bay Bridge and the Kent Narrows Bridge

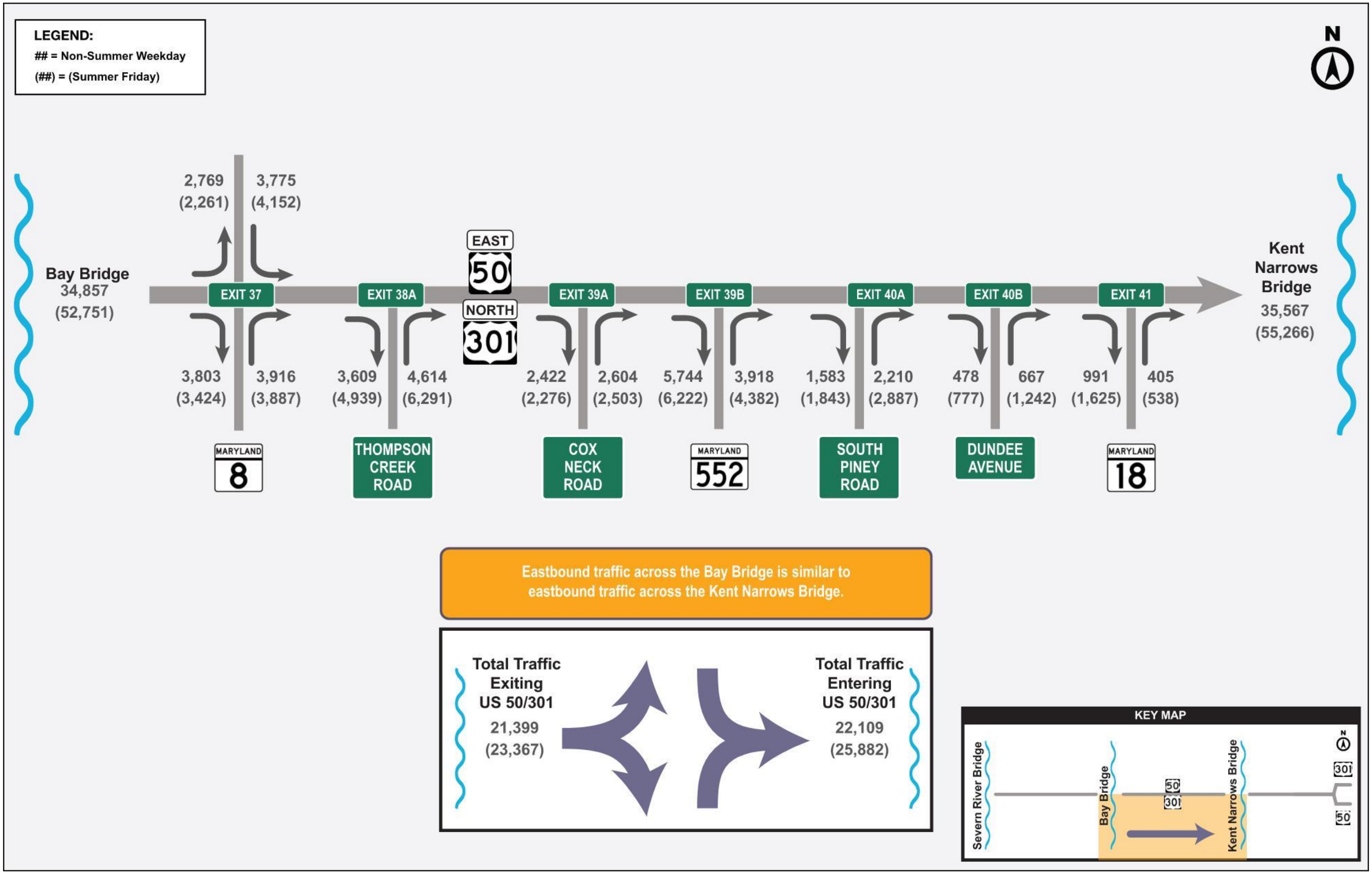


Figure 3.7. Eastbound Traffic Volumes between the Kent Narrows Bridge and the U.S. 50/301 Split

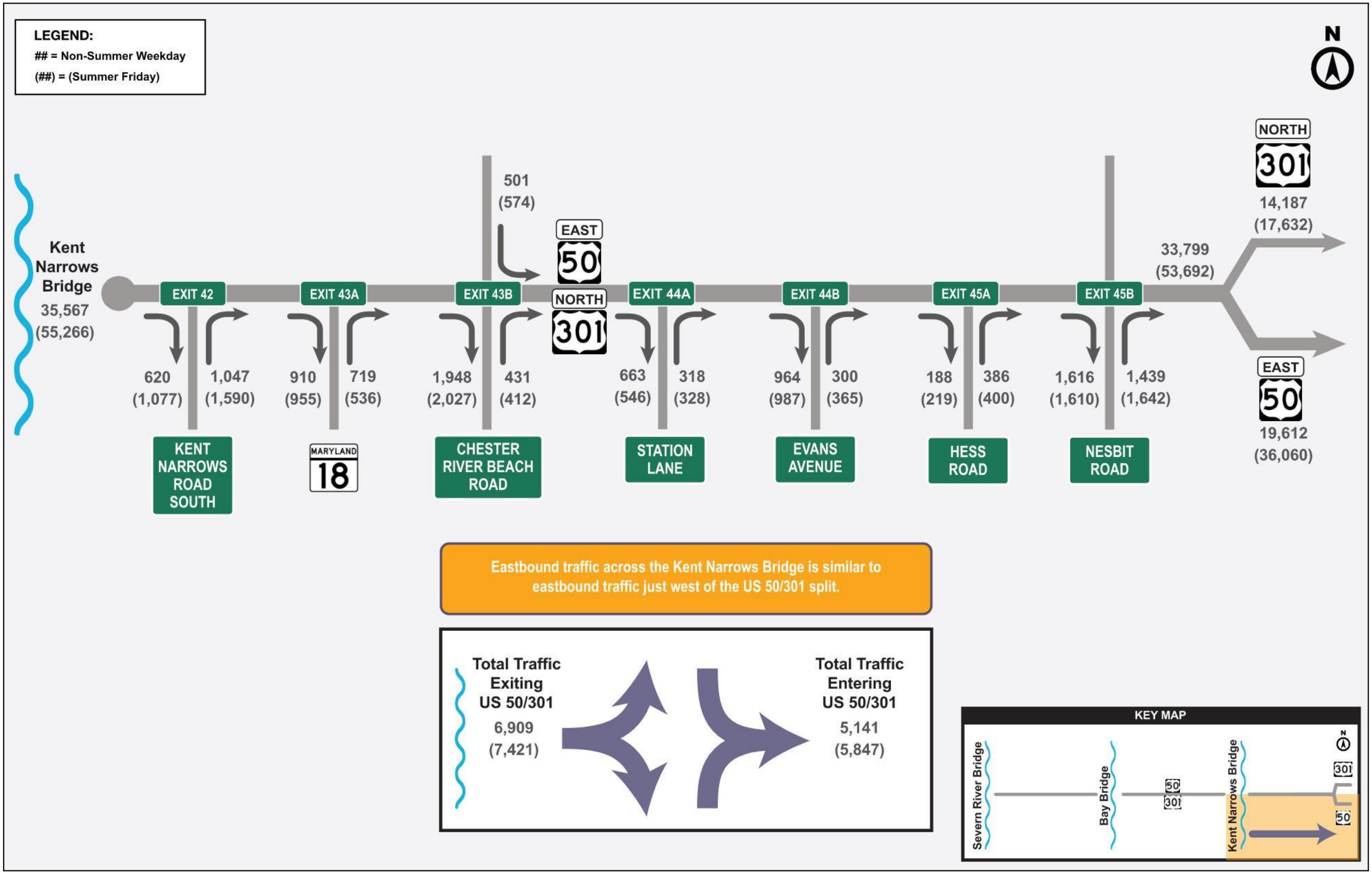
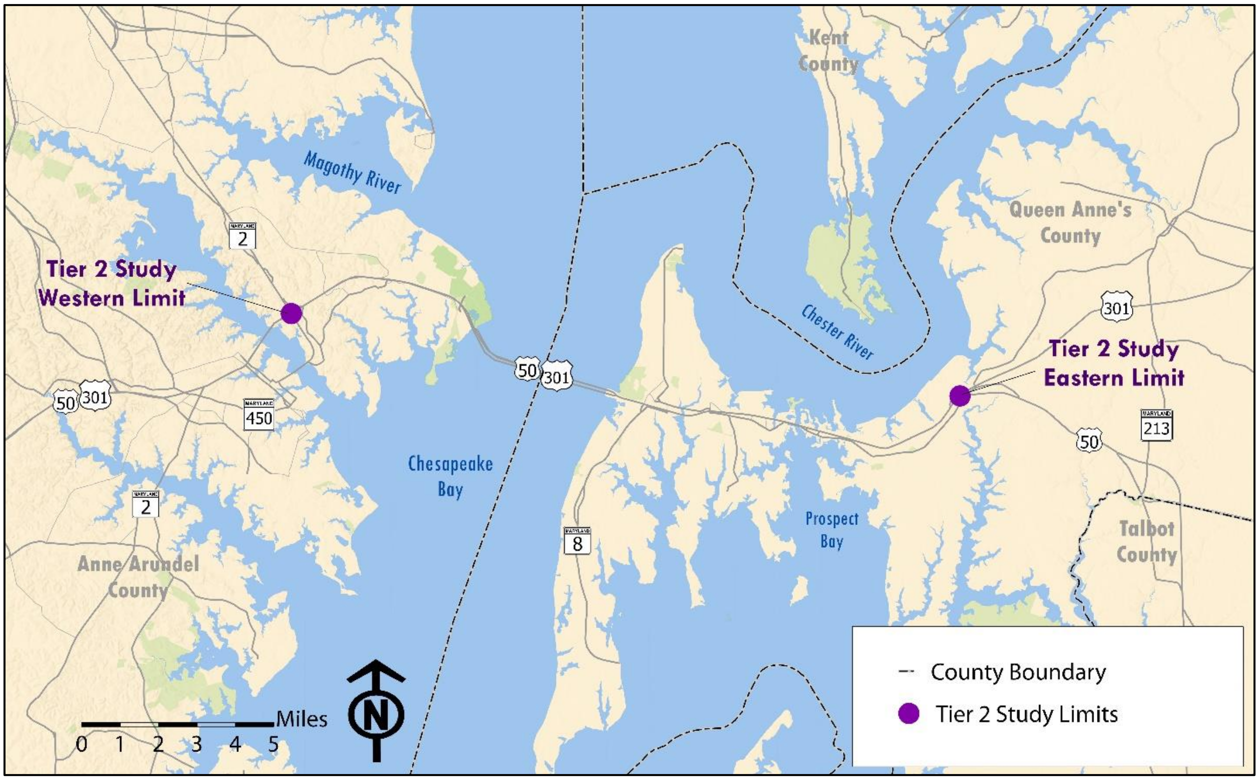


Figure 3.8. Total Traffic Volumes Entering and Exiting at Each Interchange on the Western Shore

The traffic data, analysis, and the MDTA's recommendation for proposed study limits were presented to the agencies and the public in September 2023. Based on the analysis, the western study limit is the MD 2/MD 450 interchange and the eastern study limit is the U.S. 50/301 split (see **Figure 3.9**).

Figure 3.9. Study Limits



3.2 Summary of Key Elements of the Proposed ARDS

Key elements of alternatives were presented to the agencies for comment in the summer and fall of 2023, and to the public during the September 2023 Open Houses (see **Section 1.4**). They are graphically represented in **Figure 3.10** as puzzle pieces.

Figure 3.10. Key Elements of Alternatives

Key Elements

- **Existing Bridges:** The Bay Bridge consists of two spans: a two-lane span that handles eastbound traffic under normal conditions and a three-lane span that handles westbound traffic under normal conditions. The MDTA considered whether to remove both existing spans or to keep one or both existing spans in the future should a build alternative be implemented.
- **Structure Type:** Four main crossing structure types (full bridge – two spans, full bridge – double decker, full tunnel, and bridge-tunnel combination) were considered for a potential new Bay Crossing facility.
- **Alignment:** An alignment for the approach to a new crossing of the Chesapeake Bay off the existing U.S. 50/301 alignment was evaluated, including the consideration of unavoidable impacts to properties, environmental resources, and community resources on the Eastern and Western Shores and in the Chesapeake Bay.
- **Number of Lanes:** The following numbers of lanes were investigated: 6 lanes, 8 lanes, 10 lanes, and more than 10 lanes. These lane numbers were chosen based on preliminary traffic analysis from the Tier 1 Study and additional traffic analyses performed in Tier 2. The Tier 2 analyses used the updated traffic data and confirmed the need to provide more capacity. Proposed alternatives could include a number of lanes that varies between a future Bay crossing and the approach roadways.
- **Structure Location:** Four main crossing locations, relative to the existing crossing location (north, south, fully in-between, and far south), were considered for a potential new Bay Crossing facility.
- **Transit/Transportation Systems Management (TSM)/Transportation Demand Management (TDM):**
    - Transit: The Tier 2 Study has considered transit alternatives, such as ferry, high-capacity transit, including rail and bus rapid transit (BRT), and enhanced bus service.
    - TSM/TDM**:** The Tier 2 Study has considered TSM and TDM alternatives, in combination with other build alternatives, including options that could be implemented with or without additional lanes across the Bay (congestion pricing, ramp metering, park-and-ride facilities, and interchange consolidation) and options that can only be implemented with additional lanes across the Bay (express-local lanes, managed lanes, and part-time shoulder use lanes).
- **Pedestrian and Bicycle SUP:** The Tier 2 Study has considered the safe inclusion of a SUP in combination with other build alternatives. Any tunnel option would not be able to accommodate a SUP.

4 SCREENING PROCESS AND RESULTS

Due to the complexity of the project, the MDTA analyzed key elements described in **Section 3.2,** and screened options of each element to determine which options would be reasonable to include in the proposed ARDS. A reasonable alternative or option is one that is "practical or feasible from the technical and economic standpoint of using common sense"[7] and can "meet the purpose and need for the proposed action."[8] Each element was evaluated independently, and the options that passed the screening were used to identify and develop the proposed ARDS. The intent was to develop alternatives that had potential to be reasonable.

4.1 Screening Process

The needs and objectives (presented in **Section 2**) were used as the screening criteria. Options that do not address the needs and objectives, and thus would not be able to address the Preliminary Purpose and Need for the proposed action, are not included in the proposed ARDS. The analysis performed for each element and the results of the screening are presented in **Sections 4.2** to **4.9**. Tables are provided that summarize the screening results for all options and indicate the needs and objectives that are addressed and likely to be met; not addressed and likely to not be met; or not determined or not applicable.

4.2 Existing Bridges

The eastbound span of the Bay Bridge is more than 70 years old, and the westbound span is more than 50 years old. The original design service life for the spans was 50 years. Keeping the spans in place will be costly from a maintenance and rehabilitation perspective and will require lane closures that would impact the traveling public. Repairs and rehabilitation are essential to keep the bridge safe and open to traffic.

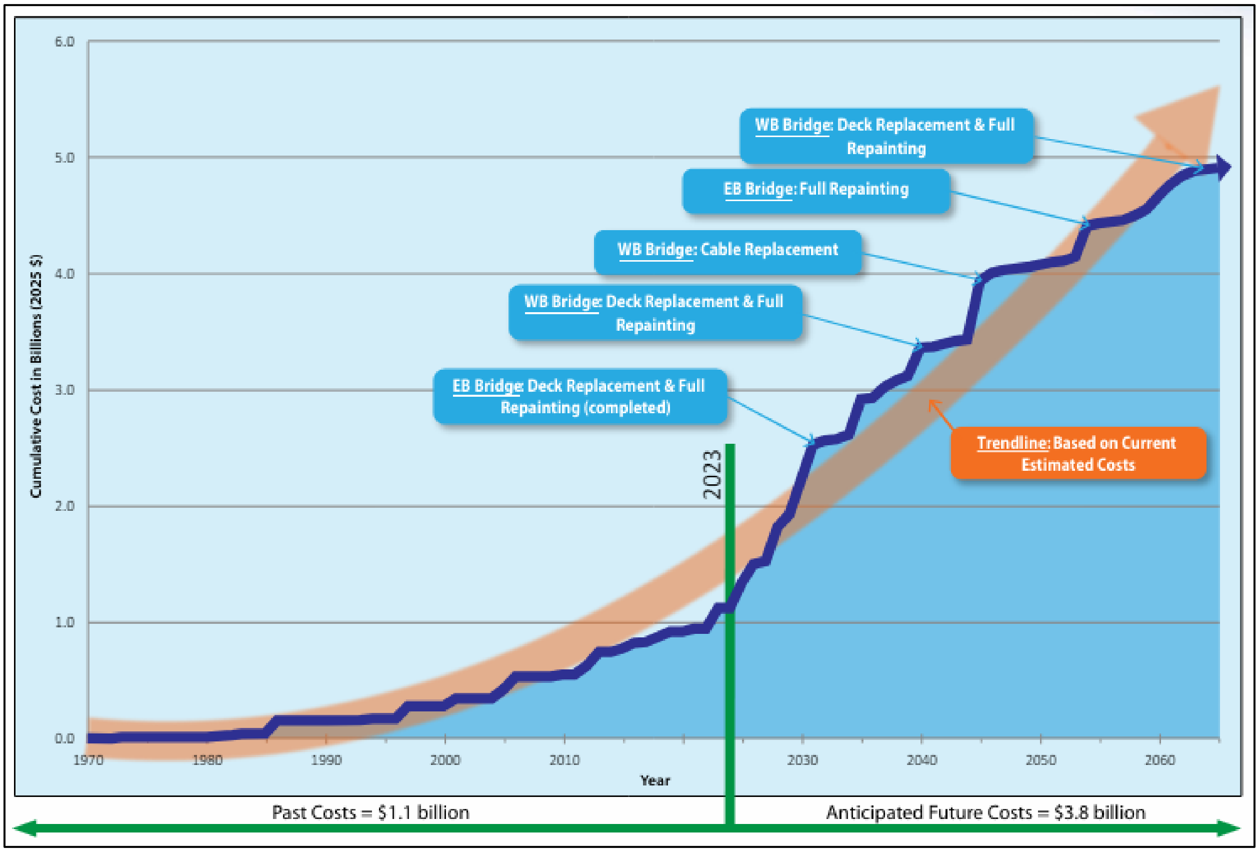
There are two types of repairs performed on the bridge: repairs identified every two years during bridge inspections, such as spot painting or fixing concrete cracks; and major rehabilitation and reconstruction, such as full deck and beam replacements. Between 2023 and 2065, major reconstruction will be needed on the spans for nearly half of that time (approximately 18 years). The traveling public will be impacted by lane closures needed for this reconstruction. Though every effort will be made during these rehabilitation projects to perform lane closures only at night and during off-peak hours, the length of closures will extend into peak travel periods. Certain required major rehabilitation, like beam replacements, will require full time (24/7) lane closures, which historically have had severe traffic impacts, even in the winter months that are less affected by high vacation and weekend traffic volumes.

The cost of Bay Bridge maintenance and rehabilitation from 1970 to 2023 was $1.1 billion. Moving forward, significant ongoing investments will be necessary for ongoing maintenance repairs and major rehabilitation or reconstruction projects. The estimated cost of maintenance and rehabilitation from 2024 through 2065 is approximately $3.8 billion. A graph of the past and

[7] https://ceq.doe.gov/docs/get-involved/citizens-guide-to-nepa-2021.pdf
[8] 40 CFR 1508.1

future maintenance and rehabilitation costs, which was presented to the agencies and the public in September 2023, can be seen in **Figure 4.1**.

Figure 4.1. Existing Bay Bridge Maintenance and Rehabilitation Costs



In addition to the high cost and prolonged impacts from necessary maintenance and rehabilitation, the current navigational vertical clearance of the Bay Bridge is 186 feet. This vertical clearance is not sufficient for existing and future ship navigation and traffic, and therefore, is also a constraint on existing and future shipping operations, employment, and economic development at the Port of Baltimore. Additionally, the roadway shoulders on the existing bridges are substandard. There are minimal offsets between the lanes and the bridge parapets, which have an impact on safety. There is no space for disabled vehicles to pull over or for emergency vehicles to quickly access an incident.

Three options were evaluated for the existing bridges element:

- Remove both existing bridge spans and provide new transportation infrastructure across the Chesapeake Bay,
- Keep one existing bridge span, remove one existing bridge span, and add replacement/additional transportation infrastructure across the Chesapeake Bay; and
- Keep both existing bridge spans and add additional transportation infrastructure across the Chesapeake Bay.

4.2.1 Screening Results

The existing bridge options were evaluated using the screening criteria to determine which should advance to the proposed ARDS. To assess whether an option was reasonable, each option was evaluated independently for each need and objective.

Removing both existing bridge spans and replacing them with new transportation infrastructure across the Bay would meet the Tier 2 Study's Purpose and Need and would therefore be reasonable. Thus, the MDTA proposes to remove the existing bridge spans and replace the transportation infrastructure across the Chesapeake Bay.

Keeping one or both existing bridge spans would not address the roadway deficiencies, existing and future maintenance, and navigation needs. These options would also not address the objective of cost and financial responsibility. The justification is summarized below:

- Roadway Deficiencies: The shoulders on the existing bridges do not meet currently accepted highway design criteria.
- Existing and Future Maintenance: Keeping the spans would require lane closures that would continue to impact the traveling public as the magnitude of the repairs increases with the age of the spans. Repairs and rehabilitation are essential to keep the bridge safe and open to traffic.
- Navigation: The vertical clearance of the existing bridge spans is a constraint on shipping and does not meet the USCG's required clearance.
- Cost and Financial Responsibility: There is a high cost associated with keeping one or both bridge spans relative to the age and condition of the existing bridge spans.

Additionally, due to the future maintenance and navigation needs, maintaining one bridge for pedestrian and bicycle use would not be reasonable. The adequate capacity and reliable travel times, the mobility needs, and the environmental responsibility objectives were not evaluated since the other needs and objectives did not have the potential to be met. Overall, keeping one or both existing bridge spans would not address the Tier 2 Study's Purpose and Need and therefore would not be reasonable.

4.3 Structure Type

Four main crossing structure type options were considered for the proposed ARDS. The structure types are full bridge (two spans), full bridge (double decker), full tunnel, and bridge-tunnel combination. The full bridge (double decker) structure type was considered in response to public comments received during the September 2022 and September 2023 Open Houses. Coordination meetings were held with the FAA, MAA, MPA, USACE, USCG, SHA, and other agencies to identify design considerations and constraints as these crossing types were evaluated.

American Association of State Highway and Transportation Officials' (AASHTO) design criteria and existing mapping (including past surveys, Geographic Information System (GIS) data, bathymetric data, and as-built plans) were used to evaluate the feasibility of the different crossing types at the various potential crossing location alignments. Some key design considerations included the Bay Bridge Airport runway approach, the pier structures of the existing bridges, oyster beds, the navigation channels of the Bay, parklands on both shores of the Bay, future dredge elevation of the navigation channels, and practical tie-ins to existing U.S. 50/301 on both sides of the Bay. The design considerations account for sea level rise and future operations at the Port of Baltimore. Other considerations included truck restrictions, operational limitation on steep grades, and accommodations for pedestrians and bicyclists.

4.3.1 Full Bridge (Two Spans)

The full bridge structure would include an over-water bridge structure crossing the full width of the Chesapeake Bay. The MDTA conducted a preliminary evaluation to determine the potential impacts associated with a bridge structure. Advantages of a full bridge compared to the other structure types, which are described in the following sections, include a smaller environmental footprint, the ability to transport hazardous materials across the Bay, lower cost, and the opportunity for inclusion of a shared use path. Advantages of having two bridge spans instead of one bridge span include redundancy; flexibility in funding; maintenance of traffic during construction, maintenance, and inspections; and the ability to use existing right-of-way with staged construction. Preliminary footprints for several configurations of connecting a new bridge to the approach roadways are shown in **Figures 4.2** through **4.5.** These figures assume eight lanes of traffic on two bridge spans (four lanes on each span) for example purposes. A discussion on the number of lanes for the crossing is provided in **Section 4.5**.

Figure 4.2. Western Shore Approach, Northern Alignment, 8-Lane Bridge

Figure 4.3. Eastern Shore Approach, Northern Alignment, 8-Lane Bridge

Figure 4.4. Western Shore Approach, Southern Alignment, 8-Lane Bridge

Figure 4.5. Eastern Shore Approach, Southern Alignment, 8-Lane Bridge

4.3.2 Full Tunnel

A preliminary evaluation was conducted for a tunnel crossing under the full width of the Chesapeake Bay that would require the construction of a roughly four-mile-long tunnel; tunnel entrance and exit portals; ventilation structures or islands; and an emergency evacuation egress route. A tunnel was studied because it would eliminate the vertical clearance of a bridge and allow navigation through the channel by vessels of all sizes. It should be noted that SUPs are impractical in a four-mile-long tunnel due to several safety and security concerns. This includes ventilation for air quality, humidity, and temperature, as well as emergency and incident management in the enclosed length of the tunnel.

In addition, the tunnel would have restrictions on the transport of certain hazardous materials including propane, fuel oil, and certain farming chemicals, which would affect local/regional deliveries as well as long distance transport. There is no alternative route for the transport of these goods. Finally, the tunnel alignments included steeper maximum grades as compared to a new bridge in order to keep the tunnel portals closer to the shore, reduce potential impacts further inland, and reduce the overall length and costs. This results in slower truck speeds and reduced capacity; the configuration of a tunnel with lanes in separate tubes or stacked would be less flexible for maintenance of traffic and incident management.

Two types of tunnels were considered: immersed tube tunnels (ITT) and bored tunnels. ITTs could be placed ten feet below the channel bed in a dredged trench on top of a bedding layer and covered with soil or stone to provide protection. Bored tunnels do not require dredging; therefore, they can avoid direct physical impacts to resources in the Bay and to the navigational channels. Since bored tunnels need to go to a depth of approximately 60 feet below the channel bed, the length of the bored tunnel would be longer than the ITT to maintain the same grade. The full-length tunnel crossing option would only be reasonable with a bored tunnel because an ITT would impact the bottom of the Chesapeake Bay for the entire four-mile length of the tunnel.

Tunnels require the construction of approach and departure portals, which are structures that transition the tunnel from being fully below the surface to the existing roadway/ground elevation. Portals require a substantial footprint to transition traffic into and out of the tunnel. A four-mile-long tunnel would require ventilation to bring fresh air into the tunnel, remove pollution and gases produced by vehicles out of the tunnel, and clear smoke in the event of a fire or other incident in the tunnel. There are also design considerations for emergency access and evacuation if people need to leave their vehicles. Ventilation is provided by equipment which can include fans and ducts within the tunnel. Some longer tunnels have ventilation structures along their length as well as near the ends of the tunnel. In order to avoid the need for a ventilation structure on an island in the Chesapeake Bay, additional ventilation equipment and space for that equipment would be required in the tunnel. To accommodate the traffic and provide adequate ventilation for an approximately four-mile-long tunnel without the need for a ventilation structure in the Bay, more tunnel bores and a wider portal would be needed. Alternatively, manmade islands could be constructed in the middle of the Bay to provide ventilation.

For the purpose of this analysis, eight lanes of traffic were assumed. A full discussion of the number of lanes is provided in **Section 4.5.** The full tunnel option would require either ventilation structures or a larger tunnel structure. To provide eight lanes of traffic with tunnels that have ventilation structures, two 60-foot-diameter bores would be needed. Each of the two bores would carry four lanes of traffic, stacked in two levels. On the other hand, to provide eight lanes of traffic with tunnels that have ventilation ducts with additional fans, which is more common for new tunnel construction, four 50-foot-diameter bores that each carry two lanes of traffic would likely be more appropriate. The approximate footprint of impacts resulting from constructing tunnel portals for both types of tunnels with eight lanes of traffic are shown in **Figures 4.6** through **4.13**.

Figure 4.6. Western Shore Approach, Northern Alignment, 8-Lane, 2-Bore Tunnel

Figure 4.7. Western Shore Approach, Northern Alignment, 8-Lane, 4-Bore Tunnel

Figure 4.8. Western Shore Approach, Southern Alignment, 8-Lane, 2-Bore Tunnel

Figure 4.9. Western Shore Approach, Southern Alignment, 8-Lane, 4-Bore Tunnel

Figure 4.10. Eastern Shore Approach, Northern Alignment, 8-Lane, 2-Bore Tunnel

Figure 4.11. Eastern Shore Approach, Northern Alignment, 8-Lane, 4-Bore Tunnel

Figure 4.12. Eastern Shore Approach, Southern Alignment, 8-Lane, 2-Bore Tunnel

Figure 4.13. Eastern Shore Approach, Southern Alignment, 8-Lane, 4-Bore Tunnel

Tunneling under the entire Chesapeake Bay would result in the highest construction cost of all the evaluated structure types, as noted in **Table 4-1**. The table notes the cost for only the structure crossing. A full tunnel with eight lanes of traffic is approximately two to three-and-a-half times more expensive than a new bridge providing the same number of lanes. The environmental impact associated with tunneling would be substantial due to the depth of the Chesapeake Bay and/or increased shoreline impacts and would be much greater than the environmental effects associated with a new bridge. With a northern alignment, there would be impacts to Sandy Point State Park and Terrapin Nature Park. With a southern alignment, there would be impacts to Westinghouse Bay and the Bay Bridge Marina. Another environmental impact associated with bored tunnels would be the amount of boring spoils that would need to be disposed; nearly 100,000 cubic yards of boring spoils would need to be excavated and disposed. For tunnels with ten lanes of traffic, there would be greater impacts and cost than the eight lanes assumed for the analysis above.

Table 4-1. Bay Crossing Structure Cost Estimates

	8-Lane Bridge*	10-Lane Bridge*	8-Lane Tunnel	10-Lane Tunnel
Estimated Cost (2024$)	$7.2 billion to $7.5 billion	$ 8.2 billion to $8.7 billion	$16.8 billion to $17.5 billion	$21.0 billion to $21.8 billion

*Cost includes SUP and full shoulders on the bridge

The MDTA performed a review of possible environmental effects associated with the bridge and tunnel with either a north or south location. The analysis assumes eight lanes of traffic and presents the area where there would be a difference in effects for the bridge and tunnel options. The results of this analysis are presented in **Table 4-2**. Socioeconomic, cultural, and natural resources, as well as Section 4(f) and 6(f) impacts were evaluated. These impacts are for the bridge and tunnel approaches on land. In general, the north and south tunnel options have greater environmental impacts than the north and south bridge options. The north and south tunnel options would both require larger acreage of additional right-of-way (ROW). This includes impacts to Sandy Point State Park, Terrapin Nature Park, wetlands, forest areas, and Section 4(f) and 6(f) properties.

Table 4-2. All Bridge and All Tunnel Preliminary Environmental Effects (Approach Only)

Resource Type	Resource	Unit	Bridge	Tunnel
Socioeconomic Resources	ROW	acres	11-12	44-48
	Residential Property	acres	1	1-3
	Commercial Property	acres	1-2	1-18
	MDTA Police Station	acres	2-6	0-22
	Sandy Point State Park	acres	1-5	1-18
	Terrapin Nature Park	acres	1	1-22
Natural Resources	Forest Areas	acres	11-17	19-44
	Horseshoe Crab Habitat	linear ft	600-900	0-2500
	Wetlands	acres	7-9	5-17
	Surface Water*	acres	9	9
	100-Year Floodplain Area	acres	14-21	14-30

*Surface water does not include the Chesapeake Bay.

4.3.3 Bridge-Tunnel

Since a full tunnel would be approximately two to three-and-a-half times more expensive than a new bridge providing the same number of lanes, a bridge-tunnel combination was considered because it would also eliminate the vertical clearance of a bridge over the shipping channel and allow navigation through the channel by vessels of all sizes. The bridges in a bridge-tunnel combination would be shorter in length and lower in height than a full-length bridge. A bridge would cross most of the Chesapeake Bay near both shores and the tunnel would cross underneath the main navigational channel. A bridge-tunnel would eliminate the need for a long bridge span that provides the vertical clearance needed for the navigable channel, but it would require the construction of large portal islands in the middle of the Bay for the transitions between the bridge and tunnel. As noted in **Section 4.3.2**, the bridge-tunnel option would be impractical to include a SUP in the tunnel components of a bridge-tunnel crossing, would have restrictions on the transport of certain hazardous materials with no alternative route for the transport, and the tunnel alignment would have steeper grades as compared to a new bridge, which would result in slower truck speeds and reduced capacity. The configuration of a tunnel with lanes in separate tubes or stacked would be less flexible for maintenance of traffic and incident management.

Like a full tunnel option, two types of tunnels were considered for a bridge-tunnel combination: ITT and bored tunnels. An ITT would result in a bridge-tunnel combination where the tunnel would be needed under the main navigation channel and the bridge could provide sufficient vertical clearance over the secondary channel. Portal islands would be needed on both sides of the main channel in the middle of the Bay, and bridges would connect the portal islands to the existing shores. The portal islands would require a substantial amount of fill in the Bay due to the depth of the Bay. Based on preliminary analysis, the portal islands would be an average of 60 feet deep but reaching 90 feet in some areas. The dimensions of the portal islands at the Chesapeake Bay surface would be over 200 feet wide and over 0.3 miles long (a surface area of approximately 11 acres), with 2:1 slopes down to the bottom of the Bay (having a bottom surface area of approximately 17 to 23 acres). Another environmental impact associated with the ITT is the amount of excavated material; nearly 30,000 cubic yards of excavated material would need to be disposed of.

A bridge-tunnel constructed with a bored tunnel would not be feasible because the tunnel under the main channel would be deeper than an ITT, and it would not surface with enough distance to span the secondary channel with an appropriate grade and the required vertical clearance. Tunneling under both channels would require a tunnel of similar length to the full tunnel option.

4.3.4 Double Decker Bridge

A double decker bridge would be more complex than a single-deck bridge. To address the Tier 2 Study need of accommodating navigational clearance, the bottom elevation of a proposed two-level bridge would need to be the same height as a single-deck bridge, with a minimum of approximately 17 feet between the bridge deck of the lower level and the bottom of the girders of the upper level. This would put the top deck of the bridge at a higher elevation, more than 25 feet higher than the lower-level deck. To reach this higher elevation and get the upper level elevated before the bottom level comes underneath, while still meeting maximum mainline profiles, the length of structure would increase on both shorelines. If an incident on the existing bridge spans requires a temporary or permanent closure, the other bridge span can remain open. Without the redundancy of two structures, an incident that requires a closure could impact the whole crossing. One single bridge would not provide the redundancy that two separate structures would provide; this would not be reasonable from a resiliency perspective.

Additionally, it would not be safe or feasible to construct an upper-level roadway on top of an existing roadway with active traffic, so an upper level could not be added on top of existing U.S. 50/301. To construct a bridge with two levels, both levels of the approach to the bridge would need to be constructed completely off the existing approach roadway.

A double decker bridge would have fewer piers in the Bay compared to two single-deck bridges, but the piers would be larger to accommodate the additional weight of the upper level on the structure. There would be fewer towers for the main span of the bridge over the navigable channel with only one span, but these towers would be taller to accommodate the upper level, and thus require larger foundations. It is anticipated that the environmental impacts and cost for one double decker bridge would be similar to two single deck bridge spans. There would be less environmental impact to the bottom of the Bay as a result of having fewer piers, but constructing off the existing alignment for the approach to the bridges would have larger environmental impacts on the shorelines compared to a two-span single-deck bridge. A large portion of the structure cost associated with building a bridge is associated with the substructure. Building a double decker bridge would require fewer substructure elements, but those substructure elements would be larger to accommodate the larger bridge. Additionally, the structural elements for the upper deck would need to be larger than a single deck to support the cross-sectional span over the lower roadway.

4.3.5 Screening Results

The structure type options were evaluated using the screening criteria to determine which options to advance to the proposed ARDS. To assess whether an option was reasonable, each option was evaluated independently for each need and objective. The options were also evaluated relative to the other options for each objective. The results are shown in **Table 4-3**. Where a box is green, the option is likely to address the need or objective. Where a box is red, the option does not have the potential to address the need or an objective. A more detailed description of each option in relation to the screening criteria is presented below the table.

Table 4-3. Potential of Structure Type Options to Address the Needs and Objectives

Screening Criteria		Structure Type Options			
		Full Bridge	Full Tunnel	Bridge-Tunnel	Double-Decker Bridge
Does the option have the potential to address the need?	Adequate Capacity & Reliable Travel Times	Yes	Yes	Yes	Yes
	Mobility	Yes	No	No	Yes
	Roadway Deficiencies	Yes	Yes	Yes	No
	Existing and Future Maintenance	Yes	Yes	Yes	Yes
	Navigation	Yes	Yes	Yes	Yes
To what extent does the option address the objective?	Environmental Responsibility	Low Impact Relative to other Options (See **Table 4-2**)	High Impact Relative to other Options (See **Table 4-2**)	High Impact Relative to other Options	Low Impact Relative to other Options
	Cost and Financial Responsibility	Low Cost Relative to other Options	High Cost Relative to other Options	High Cost Relative to other Options	Low Cost Relative to other Options

The full bridge would be designed to address all of the study's needs. The full bridge would also have the ability to better address the environmental responsibility and cost and financial responsibility objectives than the other structure type options because it would have a smaller environmental impact and cost. Additional detail can be found in **Section 4.3.1**. A full bridge option would be reasonable because it would have the ability to address the Tier 2 Study's Purpose and Need.

The full tunnel would address the study's adequate capacity and reliable travel times, roadway deficiencies, existing and future maintenance, and navigation needs, but it would not have the potential to address the mobility need and the environmental responsibility and cost and financial responsibility objectives. The rationale is summarized below, and additional detail can be found in **Section 4.3.2**:

- **Mobility:**
  - Vehicles carrying hazardous and explosive materials, such as fertilizer and gasoline, would be prohibited from using a tunnel, and would have to be diverted to other routes.
  - A tunnel could not accommodate a pedestrian/bicycle SUP.
  - The tunnel would have steeper maximum grades than a bridge reducing speeds and capacity.
- **Environmental Responsibility:** A full tunnel would locate the transportation infrastructure below the bottom of the Chesapeake Bay and would be below grade at the Bay's shorelines. This would eliminate impacts from lighting and reduce noise impacts from the bridge. Existing bridge piers would be removed, and the Bay bottom habitat restored at those areas. However, a full tunnel would also have substantial impacts to the Chesapeake Bay bottom due to the tunnel approach portals and manmade islands for ventilation. The portal islands would also have impacts to environmental resources on land. A north alignment would have substantial impacts to Sandy Point State Park and Terrapin Nature Park. A southern alignment would have substantial impacts to Westinghouse Bay and the Bay Bridge Marina. The full tunnel would require disposal of substantial degree of dredge and boring material, over 10 million cubic yards of spoil for an 8-lane tunnel. Additional details on the environmental impacts can be found in **Table 4-3**.
- **Cost and Financial Responsibility:** A full tunnel would be approximately two to three-and-a-half times more expensive than a new bridge that provides the same number of lanes, as noted in **Table 4-1**.

A full tunnel option would not be reasonable because it would not address the Tier 2 Study's Purpose and Need.

Similar to the full-length tunnel option, a bridge-tunnel would address the study's adequate capacity and reliable travel times, roadway deficiencies, existing and future maintenance, and navigation needs, but it would not have the potential to address the mobility need, the environmental responsibility, and cost and financial responsibility objectives. The justification is summarized below, and additional detail can be found in **Section 4.3.3**:

- **Mobility:**
  - Vehicles carrying hazardous and explosive materials, such as fertilizer and gasoline, would be prohibited from using a tunnel and would have to be diverted to other routes.
  - A tunnel could not accommodate a pedestrian/bicycle SUP.
  - The tunnel would have steeper maximum grades than a bridge thus reducing speeds and capacity.

- **Environmental Responsibility:** A bridge-tunnel option would require creation of large man-made portal islands in the Chesapeake Bay and substantial environmental impacts at the tunnel approach portals, thus resulting in substantial environmental impacts. An ITT would require the dredging of the Bay to place the tunnel segments.
- **Cost and Financial Responsibility:** A bridge-tunnel would also be more expensive than a new bridge that provides the same number of lanes. A bridge-tunnel would have the high costs associated with tunneling under a significant portion of the Bay and it would also have high costs associated with construction of the portal islands. The cost of a bridge-tunnel would be less than the cost of a full tunnel due to the shorter length of the tunnel components, but still substantially greater than a new bridge. Additionally, the preliminary cost estimates in Tier 1 showed that a bridge-tunnel would be about two to three times more expensive than a bridge.

A bridge-tunnel option would not be reasonable because it would not address the Tier 2 Study's Purpose and Need.

Compared to the full bridge option, a double decker bridge option would require additional structure to accommodate the grade change for the upper deck. Bridge piers and foundations would also need to be larger to accommodate the additional weight and height of a double decker bridge. The double decker bridge would meet the adequate capacity and reliable travel times, mobility, existing and future maintenance, and navigation needs. This option would also have the potential to address the environmental responsibility and cost and financial responsibility objectives. However, this option would not have the potential to address the roadway deficiencies need. The rationale is summarized below, and additional detail can be found in **Section 4.3.4**:

- **Roadway Deficiencies**: If an incident on the existing bridge spans requires a temporary or permanent closure, the other bridge span can remain open. Without the redundancy of two structures, an incident that requires a closure could impact the whole crossing. One single double-decker bridge would not provide the redundancy that the two existing bridge spans currently provide, and thus would not address the roadway deficiency need.

A double decker bridge option is therefore not reasonable because it does not address the Tier 2 Study's Purpose and Need.

4.4 Approach Alignments Relative to Existing U.S. 50/301

The MDTA has evaluated the feasibility of a new alignment off the existing U.S. 50/301 approach alignment. This analysis looked at diverting U.S. 50/301 from the existing U.S. 50/301 approach alignment, however, any new crossing structure on alignment would likely require diverting from the existing alignment in the vicinity of the shoreline. The MDTA used GIS data to map community and environmental resources within Corridor 7 to assist in evaluating whether an alignment off the existing U.S. 50/301 approach roadway should be advanced. The evaluation considered the resources identified as constraints to new approach alignments off the existing U.S. 50/301 alignment on both the Western Shore and Eastern Shore. Tables identifying the community, historic, and natural environmental resources within Corridor 7 were presented to the public at the September 2022 Open Houses and a map showing identified environmental, historic, and community resources within Corridor 7 was presented to the public at the September 2023 Open Houses. Important resources on each shore of the Bay are described below.

Western Shore: From MD 2/MD 450 to the existing Bay Bridge there are dense neighborhoods, parks, wetlands, commercial facilities, and community facilities. Specific constraints on the north side of U.S. 50/301 include Broadneck Park, Bay Head Park, Sandy Point State Park, Corcoran Environmental Study Area, seven schools, six churches, Mill Creek, and Little Magothy River. Specific constraints on the south side of U.S. 50/301 include St. Margarets Day School, Holly Beach Farm, Mill Creek, Whitehall Creek, Rideout Creek, and Meredith Creek.

Eastern Shore: Between the existing Bay Bridge eastern approach and the Kent Narrows Bridge, there are dense community areas and various environmental resources near the Kent Narrows Bridge. Specific constraints on the north side of U.S. 50/301 include Terrapin Nature Park, Kent Island Narrows Landing, Long Point Park, Piney Creek Nature Area, Waterman's Basin, six schools, the Historic Stevensville neighborhood, and Cox Creek. Specific constraints on the south side of U.S. 50/301 include various neighborhoods and commercial areas of Stevensville and Chester; Cox, Crab Alley, Kirwan, and Goodhands Creeks; and the Bay Bridge Airport.

The area between the Kent Narrows Bridge and the U.S. 50/301 split has neighborhoods, many environmental resources, and the town of Grasonville. Specific constraints on the north side of U.S. 50/301 include wetlands, Jackson Creek, and Winchester Creek. Specific constraints on the south side include community facilities of Grasonville, wetlands, natural oyster bars, and Marshy Creek. It is important to note that alternative alignments through this section would most likely include a new crossing of Kent Narrows.

4.4.1 Screening Results

The approach alignments relative to existing U.S. 50/301 options were evaluated using the screening criteria to determine which options to advance to the proposed ARDS. To assess whether an option was reasonable, each option was evaluated independently for each need and objective. The options were also evaluated relative to the other options for each objective. The results are shown in **Table 4-4**. Where a box is green, the option is likely to address the need or objective. Where a box is red, the option does not have the potential to address the need or an objective. Where a box is white, the need was not applicable to the option because the need applies only to the existing Bay Bridge, and this element applies only to the approach roadways. A more detailed description of each option in relation to the screening criteria is presented below the table.

Table 4-4. Potential of Approach Alignment Options to Address the Needs and Objectives

Screening Criteria		Alignment Options Relative to Existing U.S. 50/301	
		Approach Alignment on Existing	Approach Alignment off Existing
Does the option have the potential to address the need?	Adequate Capacity & Reliable Travel Times	Yes	Yes
	Mobility	Yes	Yes
	Roadway Deficiencies	Not Applicable	Not Applicable
	Existing and Future Maintenance	Not Applicable	Not Appliable
	Navigation	Not Applicable	Not Applicable
To what extent does the option address the objective?	Environmental Responsibility	Low Impact Relative to other Options	High Impact Relative to other Options
	Cost and Financial Responsibility	Low Cost Relative to other Options	High Cost Relative to other Options

An approach alignment on existing U.S. 50/301 would be designed to meet the adequate capacity and reliable travel times and mobility needs. This option would have the ability to address the environmental responsibility and cost and financial responsibility objectives, relative to an alignment off existing U.S. 50/301. The roadway deficiencies, existing and future maintenance, and navigation needs are not applicable to this option because these needs apply to the existing Bay Bridge. As such, an approach alignment on the existing U.S. 50/301 centerline is reasonable to advance because it has the ability to address the Tier 2 Study's Purpose and Need.

An approach alignment off the existing U.S. 50/301 centerline would be designed to meet the adequate capacity and reliable travel times and mobility needs, but it would have a higher relative environmental impact and cost compared to an alignment along existing U.S 50/301. The roadway deficiencies, existing and future maintenance, and navigation needs are not applicable to this option because these needs apply to the existing Bay Bridge.

An approach alignment off the existing U.S. 50/301 centerline would not have the potential to address the study's objectives. The justification is summarized below:

- Environmental Responsibility: There would be substantial unavoidable impacts to environmental and community resources. This would include Section 4(f) properties such as Sandy Point State Park, Holly Beach Farm, Terrapin Nature Preserve, and historic sites; Section 6(f) properties including Sandy Point State Park and Holly Beach Farm; community facilities; numerous wetlands, tidal and non-tidal waters; forests; and private property.

- Cost and Financial Responsibility: There would be substantial cost associated with constructing a completely new roadway, including costs for both construction itself and ROW acquisition.

An approach alignment off the existing U.S. 50/301 centerline therefore would not be reasonable because it would not address the Tier 2 Study's Purpose and Need.

4.5 Number of Lanes

The MDTA has considered a wide range of lane configurations for the approach roads and the bridge, including: six lanes, eight lanes, 10 lanes, and more than 10 lanes. These lane numbers were chosen based on preliminary traffic analysis from the Tier 1 Study EIS and the need to provide more capacity. The lower limit was chosen as six lanes because that would provide an additional lane across the Bay compared to the existing condition but would match the existing condition on the approach roadways. The upper limit was chosen as more than 10 lanes because the U.S. 50/301 corridor is heavily developed with commercial properties, residential properties, frontage roads, and a variety of cultural and natural resources adjacent to the roadway on both shores. Based on preliminary analysis, substantially greater environmental and community impacts would be expected with widening the approach roads to more than twice their existing footprint to accommodate more than 10 lanes.

The existing Bay Bridge has less capacity than the approach roadways for several reasons. The bridge has two eastbound lanes and three westbound lanes, one of which can be reversed to provide a third lane for eastbound traffic. Assuming weather conditions permit the use of two-way operations on the westbound bridge, the off-peak direction only has two lanes of capacity, compared to the approaches with 3 lanes. Additionally, the following factors contribute to a reduction in capacity on the Bay Bridge:

- The steep vertical grades across the bridge cause trucks to travel at a speed that is slower than the other vehicles;
- The lack of shoulders across the bridge and the height of the bridge above the Bay create fear for some individuals, causing them to drive more slowly;
- The speed limit across the bridge is lower than on the approach roads; and
- Maintenance activities and incident management often require lane closures due to lack of space on the roadway and shoulders, as noted in **Section 2.4**.

Potential lane combinations are based on the number of lanes provided across the new bridge and the approaches on U.S. 50/301. However, the locations of transition between the number of approach lanes and number of crossing lanes have not been identified yet. The number of lanes in each area and the locations of transitions will be informed by future traffic and capacity analysis, using combinations of the number of lanes as described above as a starting point.

The evaluated lane combinations included:

- **"6-6-6":** 6 lanes on the Western Shore, 6 lanes on the crossing, and 6 lanes on the Eastern Shore;
- **"6-8-6":** 6 lanes on the Western Shore, 8 lanes on the crossing, and 6 lanes on the Eastern Shore;
- **"8-8-8":** 8 lanes on the Western Shore, 8 lanes on the crossing, and 8 lanes on the Eastern Shore;
- **"8-10-8":** 8 lanes on the Western Shore, 10 lanes on the crossing, and 8 lanes on the Eastern Shore; and
- **"10-10-10":** 10 lanes on the Western Shore, 10 lanes on the crossing, and 10 lanes on the Eastern Shore.

Travel demand forecasts were prepared for the year 2045 for the no-build condition and for the five combinations of lane configurations described above. These volumes were prepared through use of the Maryland Statewide Transportation Model; for each alternative under consideration, two sets of forecasts were prepared:

- Non-Summer Weekday, which represents typical non-summer Tuesdays and Wednesdays for both the eastbound and westbound directions, and
- Summer Weekend, which represents Summer Fridays in the eastbound direction and Summer Sundays in the westbound direction.

Capacity analyses were then performed. These analyses focused on the Bay Crossing itself, because, as noted above, the existing Bay Bridge has a lower capacity than its approach roadways and the purpose of the study is to address existing and future transportation capacity needs and access across the Chesapeake Bay and at the Chesapeake Bay Bridge approaches. The results of these analyses showed the maximum queue lengths anticipated and the number of hours during which queues would be expected to exceed one mile in length; they are summarized in **Table 4-5**.

Table 4-5. Traffic Analysis for Number of Lanes

			Eastbound		Westbound	
Scenario	Conditions	Daily Traffic Volume	Maximum Queue (miles)	Duration of Queues >1 Mile (hours)	Maximum Queue (miles)	Duration of Queues > 1 Mile (hours)
No-Build	NSWD (1)	91,150	4.1	4	4.9	11
	SWED	130,500	>10	14	>10	14
6-6-6	NSWD	91,800	4.3	4	1.2	2
	SWED	130,500	>10	14	>10	14
6-8-6	NSWD	92,600	0.0	0	0.0	0
	SWED	143,150	7.3	10	8.0	10
8-8-8	NSWD	93,450	0.1	0	0.0	0
	SWED	148,600	7.5	11	8.4	11
8-10-8	NSWD	93,850	0.0	0	0.0	0
	SWED	148,650	0.0	0	0.0	0
10-10-10	NSWD	94,450	0.0	0	0.0	0
	SWED	150,900	0.0	0	0.0	0

NSWD = Non-Summer Weekday
SWED = Summer Weekend Day
(1) *Assumes three lanes eastbound during any hours that eastbound queuing would occur with only two lanes eastbound.*

Examination of **Table 4-5** reveals the following:

- Under 2045 no-build conditions, extensive queues, both in terms of physical length and duration, would be expected under both Non-Summer Weekday conditions and Summer Weekend conditions.
- The 6-6-6 option would also show queuing under both Non-Summer Weekday conditions and Summer Weekend conditions. (The 6-6-6 scenario is identical to no-build on Summer Weekends.)
- None of the other options are expected to show queuing at the Bay Crossing on Non-Summer Weekdays.
- The 8-10-8 and 10-10-10 options would show no queuing at the Bay Crossing on Summer Weekends.

The lane combination options are described below.

4.5.1 Six Lanes on Western Shore, Six Lanes on Bridge, Six Lanes on Eastern Shore (6-6-6)

The 6-6-6 lane configuration would add one additional lane on the bridge and maintain the existing number of lanes on both shores. This configuration could be provided with either two new three-lane spans or with maintaining the existing westbound span and providing one new three-lane eastbound span. In the existing condition, there are five total lanes with three of those lanes operating in the peak direction, weather permitting. The use of contraflow allows one lane on the westbound bridge to be converted to an eastbound lane when the eastbound direction is the peak direction. Adding a sixth lane on the bridge would always provide a third lane for both directions, regardless of weather conditions. The traffic analysis summarized in **Table 4-5** indicated that there would still be queues with a maximum length of 4.3 miles in the non-summer weekday eastbound direction; queues of one mile or longer would persist for four hours. Queues up to 1.2 miles in the non-summer weekday westbound direction would be expected to occur, with queues of one mile or longer persisting for two hours. Queues of over ten miles would be expected on summer weekends in both directions. Queues of one mile or longer would be expected in each direction for 14 hours.

One additional lane on the crossing would not reduce queuing in the peak direction on summer weekends, compared to the no-build configuration in 2045. This would be the case with both two new three-lane spans and with maintaining the existing westbound span and constructing one new span.

4.5.2 Six Lanes on Western Shore, Eight Lanes on Bridge, Six Lanes on Eastern Shore (6-8-6)

The 6-8-6 lane configuration would add three additional lanes on the bridge and maintain the existing number of lanes on both shores. This configuration would be provided with two new four-lane spans.

4.5.3 Eight Lanes on Western Shore, Eight Lanes on Bridge, Eight Lanes on Eastern Shore (8-8-8)

The 8-8-8 lane configuration would add three additional lanes on the bridge and add one lane in each direction on both shores. This configuration would be provided with two new four-lane spans.

4.5.4 Eight Lanes on Western Shore, Ten Lanes on Bridge, Eight Lanes on Eastern Shore (8-10-8)

The 8-10-8 lane configuration would add five additional lanes on the bridge and add one lane in each direction on both shores. This configuration would be provided with two new five-lane spans.

4.5.5 Ten Lanes on Western Shore, Ten Lanes on Bridge, Ten Lanes on Eastern Shore (10-10-10)

The 10-10-10 lane configuration would add five additional lanes on the bridge and add two lanes in each direction on both shores. This configuration could be provided with two new five-lane spans. More than eight lanes on the Eastern and Western Shores and more than ten lanes on the bridge are not proposed to be included in the proposed ARDS. The traffic analysis summarized in **Table 4-5** indicated that an 8-10-8 configuration would perform well with 2045 Build traffic volumes, with no anticipated queuing on the bridge during any of the peak periods. Thus, a larger 10-10-10 lane configuration would not be necessary to accommodate 2045 traffic volumes. Additionally, early resource analysis indicated that a design footprint larger than the 8-10-8 lane configuration would have greater environmental impacts.

4.5.6 Screening Results

The number of lanes options were evaluated using the screening criteria to determine the options that would advance to the proposed ARDS. To assess whether an option was reasonable, each option was evaluated independently for each need and objective. The options were also evaluated relative to the other options for each objective. The results are shown in **Table 4-6**. Where a box is green, the option is likely to address the need or objective. Where a box is red, the option does not have the potential to address the need or an objective. A more detailed description of each option in relation to the screening criteria is presented below the table.

Table 4-6. Potential of Number of Lanes Options to Address the Needs and Objectives

Screening Criteria		Number of Lanes				
		6-6-6	6-8-6	8-8-8	8-10-8	10-10-10
Does the option have the potential to address the need?	Adequate Capacity & Reliable Travel Times	No	Yes	Yes	Yes	Yes
	Mobility	Yes	Yes	Yes	Yes	Yes
	Roadway deficiencies	Yes	Yes	Yes	Yes	Yes
	Existing and Future Maintenance	Yes	Yes	Yes	Yes	Yes
	Navigation	Yes	Yes	Yes	Yes	Yes
To what extent does the option address the objective?	Environmental Responsibility	Low Impact Relative to 10-10-10 Option	Low Impact Relative to 10-10-10 Option	Low Impact Relative to 10-10-10 Option	Low Impact Relative to 10-10-10 Option	High Impact Relative to other Options
	Cost and Financial Responsibility	Low Cost Relative to 10-10-10 Option	Low Cost Relative to 10-10-10 Option	Low Cost Relative to 10-10-10 Option	Low Cost Relative to 10-10-10 Option	High Cost Relative to other Options

The 6-8-6, 8-8-8, and 8-10-8 options would be designed to address the study's needs. These options also have the ability to address the study's objectives. Additional detail can be found in **Table 4-6** and **Sections 4.5.2** through **4.5.4**. The 6-8-6, 8-8-8, and 8-10-8 options are reasonable because they have the ability to address the Tier 2 Study's Purpose and Need.

Because the 6-6-6 lane configuration option would add only one travel lane across the Chesapeake Bay and would not add any travel lanes to U.S. 50/301 east and west of the existing Bay Bridge, this option would result in less environmental impact than the other proposed build alternatives. Expanding the existing crossing from five to six lanes would also be less costly than the other options, which would expand the crossing to eight or ten lanes. The 6-6-6 option would address the study's mobility, roadway deficiencies, existing and future maintenance, and navigation needs, but it would not have the ability to address the adequate capacity and reliable travel times need. The justification is summarized below, and additional details can be found in **Section 4.5.1**:

- **Adequate Capacity and Reliable Travel Times:** The 6-6-6 option would not appreciably reduce congestion or improve the travel time reliability relative to existing and 2045 no-build conditions.

A 6-6-6 option is therefore not reasonable because it does not address the Tier 2 Study's Purpose and Need.

The 10-10-10 option would address the study's needs. However, preliminary analysis shows that the 8-10-8 option would provide sufficient additional capacity to alleviate congestion and improve travel time reliability compared to existing and 2045 no-build conditions. Thus, a larger 10-10-10 option, which would add an additional lane in each direction along the U.S. 50/301 approaches compared to the 8-10-8 lane configuration, would not be necessary to accommodate future traffic volumes and would provide more transportation capacity than necessary. Additionally, the 10-10-10 option would not have the potential to address the environmental responsibility and cost and financial viability objectives compared to the other options. The justification is summarized below, and additional detail can be found in **Table 4-5** and **Section 4.5.5**:

- **Environmental Responsibility:** The 10-10-10 configuration would have a larger footprint and require additional right-of-way along U.S. 50/301 on both the Eastern and Western Shores, which would have greater impacts to the environment and local communities compared to any of the other lane options.
- **Cost and Financial Responsibility:** The 10-10-10 lane configuration would include substantial additional roadway infrastructure construction and thus would be more costly than any of the other lane options.

Constructing a roadway larger than the 8-10-8 lane configuration would have greater impacts, cost more money, and have diminishing returns in terms of traffic improvement. The 10-10-10 option, and any number of lane combinations that have more than eight lanes on the Eastern and Western Shores and more than ten lanes on the bridge, are therefore not being advanced, because they would not address the Tier 2 Study's Purpose and Need.

4.6 Structure Location

The MDTA has evaluated the location of a new bridge. The alignments for the roadway east and west of a new bridge would remain along the existing U.S. 50/301 alignment to reduce environmental effects, but at the shorelines, the approach alignment would be adjusted to connect the approach roads to a new bridge. The alignment options for a new bridge were evaluated at a "north bridge location," a "south bridge location," an "in-between bridge location," and a "far south bridge location." The MDTA has proposed these locations in relation to the existing Bay Bridge.

4.6.1 North Bridge Location

A north bridge location could include the following options, which are also shown in **Figure 4.14**:

- Two spans to the north of the existing westbound Bay Bridge span; or
- One span north of the westbound Bay Bridge span and one span between the existing westbound and eastbound span.

There are different advantages to both options. A new bridge could be located completely to the north to avoid conflicting with the existing spans during construction. If one of the existing Bay Bridge spans is removed after construction of one of the new bridge spans, the other new bridge span could be constructed between the existing bridge span locations. For both options, removal of the existing spans could be sequenced into the maintenance of traffic to maintain the number of existing lanes during construction of the new bridge spans.

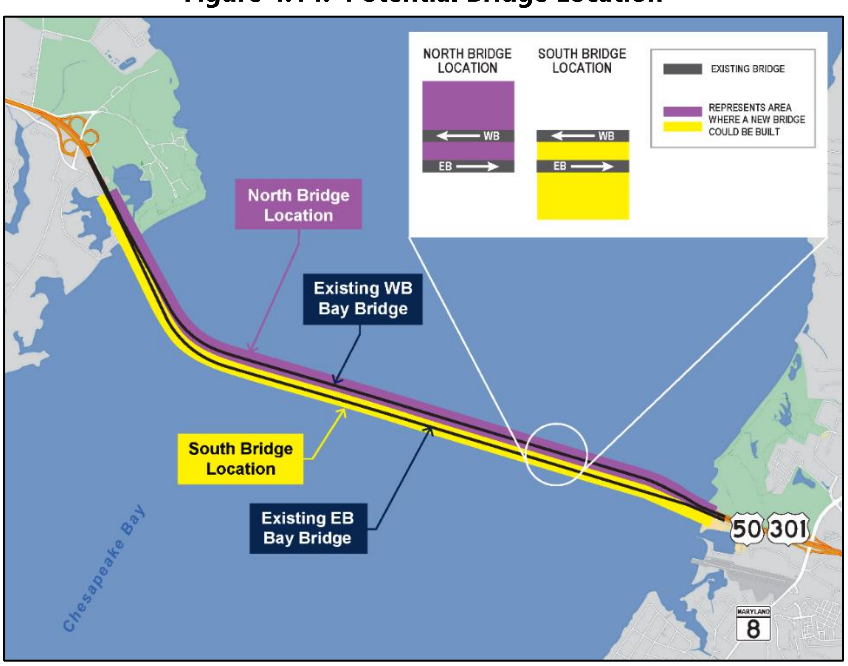
4.6.2 South Bridge Location

A south bridge location could include the following options, which are also shown in **Figure 4.14**:

- Two spans to the south of the existing eastbound Bay Bridge span; or
- One span south of the eastbound Bay Bridge span and one span between the existing westbound and eastbound span.

Like the north bridge location, there are different advantages to both options. A new bridge could be located completely to the south to avoid conflicting with the existing spans during construction. If one of the existing Bay Bridge spans is removed after construction of one of the new bridge spans, the other new bridge span could be constructed between the existing bridge span locations. For both options, removal of the existing spans could be sequenced into the maintenance of traffic to maintain the number of existing lanes during construction of the new bridge spans.

Figure 4.14. Potential Bridge Location



4.6.3 In-Between Bridge Location

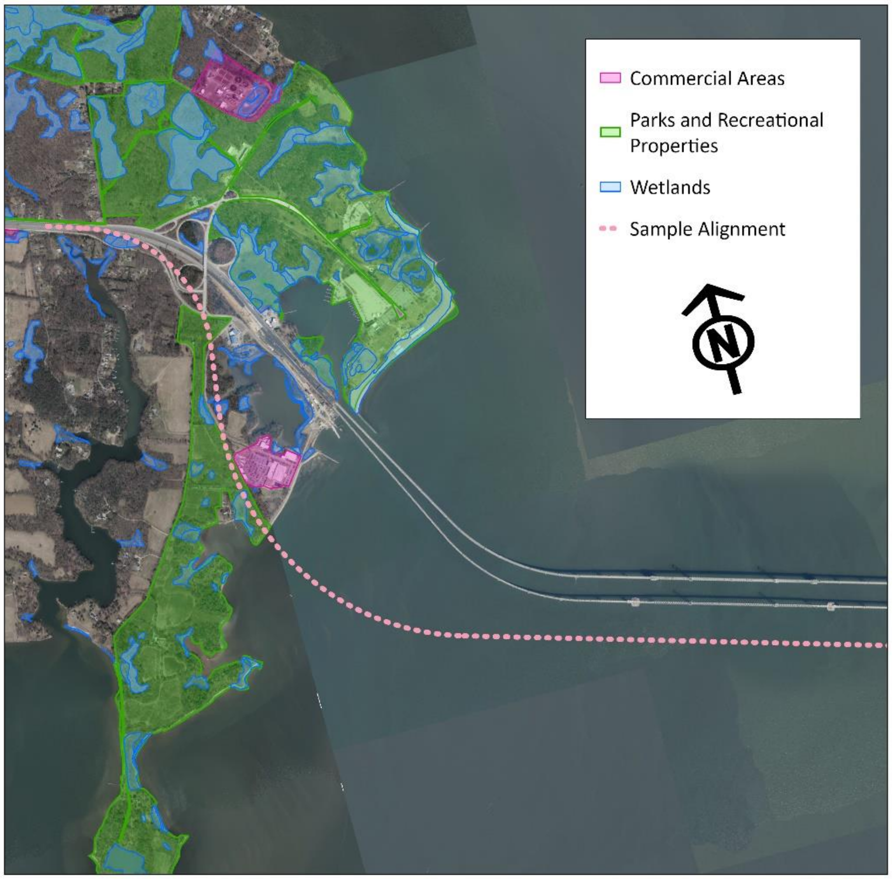
It would not be practical to locate a new bridge in between the existing bridges. For example, with an 8-lane new bridge, proposed with the 6-8-6 or 8-8-8 number of lanes, the footprint of just one new four-lane bridge span including shoulders would be 78 feet wide, which would be greater than the space available at the Western Shore between the two existing Bay Bridge spans (approximately 51 feet) (**Figure 4.15**). The 8-10-8 number of lanes option would require even more width and would be impractical as well. Construction of any new bridge in between the existing spans would thus require demolition of one of the existing spans before construction of the new bridge could be completed. This would reduce the number of existing travel lanes during construction and result in severe congestion and unreliable travel conditions.

Figure 4.15. In-Between Bridge Position in Relation to Existing Bridge Spans

4.6.4 Far-South Bridge Location

A "far-south bridge location" alignment was evaluated to determine if there was an alignment for the bridge that could flatten the horizontal curve of the existing bridges while still crossing straight across the Chesapeake Bay navigational channel within the limits of study area. An example of an alignment is shown in **Figure 4.16**. A far south bridge location alignment was determined unreasonable because it would deviate from the existing U.S. 50/301 alignment prior to the shoreline (likely near the Oceanic Drive Interchange or further west) and would have increased environmental impacts to Westinghouse Bay and Holly Beach Farm, as well as wetlands and the FEMA 100-year floodplain, compared to an alignment that remains on existing U.S. 50/301 and uses the existing right-of-way up to the shoreline. The Oceanic Drive Interchange would also need to be completely reconstructed.

Figure 4.16. Sample Alignment for a Far South Bridge Location



4.6.5 Screening Results

The structure location options were evaluated using the screening criteria to determine which options would advance to the proposed ARDS. To assess whether an option was reasonable, each option was evaluated independently for each need and objective. The options were also evaluated relative to the other options for each objective. The results are shown in **Table 4-7**. Where a box is green, the option is likely to address the need or objective. Where a box is red, the option does not have the potential to address the need or an objective. A more detailed description of each option in relation to the screening criteria is presented below the table.

Table 4-7. Potential of Structure Location Options to Address the Needs and Objectives

Screening Criteria		Structure Location Options			
		North Bridge Location	South Bridge Location	In-Between Bridge Location	Far-South Bridge Location
Does the option have the potential to address the need?	Adequate Capacity & Reliable Travel Times	Yes	Yes	No	Yes
	Mobility	Yes	Yes	No	Yes
	Roadway Deficiencies	Yes	Yes	Yes	Yes
	Existing and Future Maintenance	Yes	Yes	Yes	Yes
	Navigation	Yes	Yes	Yes	Yes
To what extent does the option address the objective?	Environmental Responsibility	Low Impact Relative to the Far-South Option	Low Impact Relative to the Far-South Option	Low Impact Relative to the Far-South Option	High Impact Relative to other Options
	Cost and Financial Responsibility	Low Cost Relative to the Far-South Option	Low Cost Relative to the Far-South Option	Low Cost Relative to the Far-South Option	High Cost Relative to other Options

The north bridge location and a south bridge location would be designed to address the study's needs and would address the study's objectives better than the far-south bridge location because they would have a smaller environmental impact and a lower cost. Additional details can be found in **Sections 4.6.1** and **4.6.2**. The north bridge location option and the south bridge location option are reasonable because they would have the ability to address the Tier 2 Study's Purpose and Need.

The in-between bridge location would be designed to meet the study's needs following construction. However, the in-between bridge location is infeasible to construct without demolishing one of the existing spans before constructing the new span because there is not enough space between the existing spans on the Western Shore approach to construct a new span. Demolishing one of the existing spans before constructing a new span would reduce the number of existing travel lanes during construction and result in severe congestion and extremely unreliable travel conditions. Therefore, during construction, the in-between bridge location would not have the potential to address the adequate capacity and reliable travel times and mobility needs. The in-between bridge location option would therefore not be reasonable because it is not practical to construct and because it does not address the Tier 2 Study's Purpose and Need.

The far-south bridge location would address the study's needs but would not address the study's environmental responsibility and cost and financial responsibility objectives because it would have a substantially larger environmental impact and cost than the north bridge location and the south bridge location. Additional detail is located in **Section 4.6.4** and the justification is summarized below:

- **Environmental Responsibility**: The far-south option would have substantially greater unavoidable impacts to environmental and community resources compared to the other structure location options. This would include the Holly Beach Farm Section 4(f) and Section 6(f) property; historic properties; community facilities; numerous wetlands, tidal and non-tidal waters; forests; and private property including residences, Northrup Grumman, and a marina.
- **Cost and Financial Responsibility**: There would be substantial cost associated with constructing a far-south bridge location, including costs for both construction itself and ROW acquisition.

A far-south bridge location option would not be reasonable because it does not address the Tier 2 Study's Purpose and Need.

4.7 Transit / Transportation Systems Management / Transportation Demand Management

4.7.1 Transit

Transit alternatives including ferry service, BRT, and rail modes were evaluated as part of the Tier 1 NEPA Study. The Tier 1 Study eliminated those options from consideration as stand-alone alternatives. The Tier 2 Study is considering transit alternatives within this corridor and in combination with other build alternatives. This study acknowledges the need to find multiple ways to move people reliably and efficiently across the Chesapeake Bay and seeks to identify solutions to this challenge that might include enhanced transit if warranted by demand, based on a thorough analysis of existing conditions; planned and predicted conditions; and stakeholder and community input.

There are no existing ferries or high-capacity transit options across the Chesapeake Bay. High-capacity transit is transit that offers frequent scheduled service, limited stops, and fast travel speeds that operates within its own ROW, such as passenger rail, commuter rail, heavy rail, light rail, and BRT. Bus service that crosses the Bay Bridge today is limited to one deviated fixed route which crosses the bridge three times in each direction (operated by QAC Ride) and three commuter bus routes that cross the bridge during peak periods only (one to/from Baltimore and two to/from Washington, D.C., operated by the MTA). While there are few transit options today between the Eastern Shore and the rest of the State, the MTA *Maryland Statewide Transit Plan* recognizes that improved transit connections would help Eastern Shore residents and visitors travel to/from the State's major metropolitan areas.[9] Therefore, facilitating an intercity transit

[9] https://s3.amazonaws.com/mta-website-staging/mta-website-staging/files/Transit%20Projects/Statewide%20Transit%20Plan/Maryland%20Statewide%20Transit%20Plan_DRAFT_January%202022.pdf

connection between the Eastern Shore and Baltimore/Washington, D.C. is part of the long-term transit vision for the State.

In June 2023, the MDTA hosted a virtual Transit & Bicycle/Pedestrian Listening Meeting for the public to learn more and provide feedback on transit, bicycle, and pedestrian considerations in the study area. This Listening Meeting provided information on the Tier 1 Study transit findings and existing transit service in the study area. Only about 20 percent of meeting participants currently use/rely on transit in the corridor (including bus and paratransit). A little more than half of the meeting participants feel it is very important to have transit options to cross the Chesapeake Bay, and another quarter of participants feels it is somewhat important. Ease of access to transit, a convenient transit schedule, desirable destinations, reliability, and time efficiency were the top factors that would encourage meeting participants to use transit in the corridor. The meeting participants were also surveyed on the types of trips they would use for transit travel across the Chesapeake Bay. The top responses were recreation, personal reasons, dining, and shopping.

4.7.1.1 Ferry

Based on analysis completed during the Tier 1 Study, implementing a vehicular ferry would not provide enough capacity to result in a sufficient reduction in traffic volumes crossing the Bay Bridge to reduce congestion. It is estimated that a ferry could only accommodate up to 1.07 percent of the total volume of anticipated crossings in 2045. A comparison of daily existing and projected Bay Bridge traffic volumes and ferry capacity updated based on 2022 average daily traffic (ADT) is presented in **Table 4-8**.

Table 4-8. Comparison of Daily Existing & Projected Bay Bridge Traffic Volumes & Ferry Capacity

Time Frame	Existing (2022) ADT	Projected 2045 No-Build ADT	Maximum Daily Ferry Vehicle Capacity	Ferry as a percentage of 2045 volumes
Non-Summer Weekday Average	69,588	91,150	972	1.07%
Summer Weekend Average	104,284	130,500	972	0.74%

The analysis determined that the capacity of a ferry service operating at maximum capacity could accommodate less than five percent of the anticipated growth in traffic volume between 2017 and 2045 and would not reduce existing volumes. Additionally, fare revenues generated by most ferry route locations would not be enough to cover operational costs. As a result, a ferry was not carried forward in the Tier 1 Study EIS as a stand-alone alternative.

If a ferry alternative was included in combination with the proposed ARDS that include additional highway capacity, it would only provide a small amount of additional capacity as compared to the capacity added from an additional highway lane. It would also require additional infrastructure within the corridor for the ferry terminals and access roads, which would have additional environmental impacts.

Exploring the potential for a passenger ferry network that would connect communities on both sides of the Chesapeake Bay and its potential to augment travel options offered by the new Bay Bridge is worthwhile and is currently being studied by Visit Annapolis & AAC. A new passenger ferry service could potentially connect to local transit service, but that service would need to have a similar frequency as the ferry service and the routes would need to be modified to connect to new ferry terminals.

4.7.1.2 High-Capacity Transit

High-capacity transit is transit that offers frequent scheduled service, limited stops, and fast travel speeds that operates within its own ROW, such as passenger rail, commuter rail, heavy rail, light rail, and BRT.

A. Rail Option

The types of rail that were considered for the Bay Crossing Study include intracity and intercity rail. Intracity service connects major activity centers within a single city or metropolitan area and includes heavy rail transit (HRT) and light rail transit (LRT). Intercity rail connects multiple cities over longer distances and includes commuter rail, long-haul, express, and regional service.

For the Tier 2 Study, the MDTA evaluated commuter rail, HRT, or LRT that would cross the Chesapeake Bay on a new structure. The MDTA's 2019 *Bay Crossing Study Modal and Operational Alternative: Transit Service Report* (Transit Service Report)[10] estimated the potential of transit to remove vehicles from the bridge. The calculations conducted in the Transit Service Report were updated based on 2022 existing traffic volumes and the projection for transit to remove 294 vehicles from the bridge on non-summer weekdays and 774 vehicles on summer weekends. This reduction would be approximately 0.3 percent of the traffic on a non-summer weekday and 0.6 percent of traffic on a summer weekend. Rail would therefore not effectively relieve congestion and improve travel times at the existing Bay Bridge.

Rail on a new bridge would require additional engineering considerations that would substantially increase the cost of the alternatives. For example, larger foundation and structural improvements would be needed to accommodate future rail, rail may require more gradual grades resulting in a longer structure and additional roadway and interchange improvements, and the structure would need to be designed to accommodate rail loads and vibrations. Additionally, new, extensive rail infrastructure would need to be constructed on the approaches to connect to the nearest rail systems on both shores. On the Western Shore, the Bay Bridge is more than 18 miles from the nearest MARC/Amtrak/CSX line and more than 20 miles from the nearest Washington Metropolitan Area Transit Authority (WMATA) transit line. On the Eastern Shore, the Bay Bridge is approximately 14 to 20 miles from the nearby rail lines, however the railroad lines on the Eastern Shore are not used for passenger service, they are short-line railroad lines associated with the Maryland and Delaware Railroad (14 miles away) or the Chesapeake Railroad (20 miles away) and are partially abandoned. Intercity rail and transit options would also incur operational costs and require rail vehicles and maintenance facilities. Depending on the layout of a new bridge, inspection and routine maintenance of the rail facility may affect the adjacent roadway travel lanes.

[10] https://baycrossingstudy.com/images/nepa_process/Appendix%20B%20-%20BCS%20Tier%201%20NEPA%20-%20Transit%20Service%20Evaluation.pdf

Intercity rail and transit would necessitate additional safety considerations from the perspective of design and operations:

- Barriers – Vertical barriers would be needed to protect the adjacent automobiles, limit the impact of a derailment on the adjacent roadway lanes, and limit the likelihood of a train falling off the bridge if it derails.
- Breakdowns – The bridge would need to accommodate equipment to clear or repair an inoperable train.
- Emergency egress for passengers – Adequate space would be needed within the design to offload and shelter passengers in the event of a breakdown.

Rail options would create greater environmental impacts. Including rail on the bridge would necessitate a larger project footprint due to the taller, flatter, wider, and longer structure needed, as well as the substantial additional impacts resulting from the construction of new rail connections beyond the bridge to the existing rail network. In combination with a build alternative, rail would not be an effective strategy for reducing congestion, and the reduction in congestion would not justify the cost and environmental impacts.

B. Bus Rapid Transit Option

The FTA defines BRT as "a high-quality bus-based transit system that delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms and enhanced stations." For the Tier 2 Study, BRT would consist of a dedicated bus lane for BRT across the bridge. As previously stated in **Section 4.7.2.1**, the MDTA's Transit Service Report[11] estimated the potential of transit to remove vehicles from the bridge and estimated that transit would only remove 294 vehicles from the bridge on Non-Summer Weekdays and 774 vehicles on Summer Weekends. BRT would not effectively relieve congestion and improve travel times at the existing Bay Bridge.

BRT would require additional engineering considerations that would increase the cost of the alternatives. BRT is typically implemented on corridors with higher-density activity centers or development nodes providing connections between large city centers and outlying residential and commercial centers. Study area land use is low density on either side of the bridge, when compared to major urban areas, and existing transit demand is low. With existing LRT and HRT servicing Baltimore and Washington, D.C., a likely BRT connection would include service from the Kent Island Park and Ride to either the Glen Burnie LRT station or the New Carrolton or Largo Town Center WMATA Metrorail stations. New, extensive BRT infrastructure would need to be constructed on the approach roads to connect to existing service, which on the Western Shore in particular is many miles away. While major activity centers exist on the west side of the bridge in Annapolis, major activity centers on the east side of the bridge, such as Ocean City or Salisbury, are much further away from the Bay Bridge than a typical BRT corridor, and there is no existing infrastructure to connect to them. BRT options would also incur operational costs and require new buses and maintenance facilities.

[11] https://baycrossingstudy.com/images/nepa_process/Appendix%20B%20-%20BCS%20Tier%201%20NEPA%20-%20Transit%20Service%20Evaluation.pdf

BRT options would have greater environmental impacts from the construction of new connections beyond the bridge to the existing transit network. BRT can only be included with the construction of a new crossing to provide space for the dedicated BRT lane. Even in combination with a build alternative, BRT would not be an effective strategy for reducing congestion, and the reduction in congestion would not justify the cost and environmental impacts.

4.7.1.3 Enhanced Bus Service

Enhancements to bus service could include potential expanded bus service and potential transit priority treatments. Potential enhancements to bus service include:

- **Local Bus Service** – Currently, QAC Ride operates one deviated fixed route three times a day in each direction on weekdays across the bridge. Enhanced service could provide a connection to the new planned Parole Transit Center allowing riders to access Annapolis Transit and AAC Transit routes to reach other destinations. Expanded local bus service will be evaluated in the EIS.
- **Commuter Bus Service** – The existing commuter bus service across and adjacent to the Bay Bridge is operated by the MTA as MTA Commuter Bus. Today, the MTA operates three commuter bus routes across the bridge (one to Baltimore, with three trips in each direction per day, and two to Washington, D.C., one with five trips in the morning and six trips in the afternoon, and the other with six trips in each direction per day). The trips occur during AM and PM peak periods only. Expanded commuter bus service will be evaluated in the EIS.
- **Intercity Bus Service** – Intercity bus services are typically operated privately and connect multiple cities over longer distances than local bus service. New or expanded intercity service may be warranted to connect to and from Baltimore, Washington D.C., Annapolis, Ocean City and elsewhere. Intercity bus service will be studied in the EIS.

These three types of bus service could operate with or without potential transit priority treatments, as discussed below. Bus services would incur operational costs and require vehicles and potentially expanded maintenance facility capacity.

The proposed build alternatives may also include potential bus transit priority treatments, including 24-hour dedicated transit lanes, congested-period-only dedicated transit lanes, bus-on-shoulder operation, and queue jump lanes. These priority treatments are described as follows:

- A 24-hour dedicated transit lane involves providing a lane in each direction on the bridge exclusively for transit use. There would need to be sufficient existing and anticipated transit demand and service to justify the cost of a fully dedicated lane. Signage and enforcement would be needed to prevent other drivers from using the dedicated transit lane.
- A congested-period only dedicated transit lane is similar to a 24-hour dedicated transit lane but only operates during designated time periods.
- Bus-on-shoulder operation is the conversion of shoulders to travel lanes for transit vehicles during certain hours of the day or under certain conditions as a strategy for improving transit reliability. Transit vehicles would operate along the approach shoulders and/or

bridge shoulders. For bus-on-shoulder operation on the bridge, a new bridge would need to be designed to include bus shoulders.

- Queue jump lanes provide travel lanes for transit vehicles to bypass queued traffic on the approach to the bridge and then use a queue jump signal or a merge lane to enter general traffic lanes prior to the bridge. This option could use bus-on-shoulder operation as the queue jump lane on the approaches to the bridge.

Compared to other bus service enhancements, bus transit priority infrastructure would result in additional capital costs and would likely result in additional environmental effects that would be evaluated in the EIS.

4.7.1.4 Screening Results

The transit options were evaluated using the screening criteria to determine the options to advance to the proposed ARDS. To assess whether an option was reasonable, each option was evaluated independently for each need and objective. The options were also evaluated relative to the other options for each objective. The results are shown in **Table 4-9**. Where a box is green, the option is likely to address the need or objective. Where a box is red, the option does not have the potential to address the need or an objective. Where a box is white, the need was not applicable to the option because the need applies only to the existing Bay Bridge. A more detailed description of each option in relation to the screening criteria is presented below the table.

Table 4-9. Potential of Transit Options to Address the Needs and Objectives

Screening Criteria		Transit Options			
		Ferry	Rail	BRT	Enhanced Bus Service
Does the option have the potential to address the need?	Adequate Capacity & Reliable Travel Times	No	No	No	Yes
	Mobility	Yes	Yes	Yes	Yes
	Roadway Deficiencies	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Existing and Future Maintenance	Not Applicable	Applicable	Not Applicable	Not Applicable
	Navigation	Not Applicable	Not Appliable	Not Applicable	Not Applicable
To what extent does the option address the objective?	Environmental Responsibility	Moderate Impact Relative to other Options	High Impact Relative to other Options	Moderate Impact Relative to other Options	Low Impact Relative to other Options
	Cost and Financial Responsibility	Moderate Cost Relative to other Options	High Cost Relative to other Options	Moderate Cost Relative to other Options	Low Cost Relative to other Options

The ferry option would provide an additional mode of transportation across the Bay and as such, would address the study's mobility need. However, the ferry option would not have the potential to address the adequate capacity and reliable travel times need or the environmental responsibility and cost and financial responsibility objectives. The justification is summarized below, and additional details can be found in **Section 4.7.1**:

- **Adequate Capacity and Reliable Travel Times:** A ferry would be able to accommodate less than five percent of the anticipated growth in traffic volume between 2017 and 2045; therefore, it would not appreciably reduce existing volumes. In combination with proposed ARDS that include additional highway capacity, a ferry would only provide a small amount of additional capacity.
- **Environmental Responsibility:** A ferry would require additional infrastructure within the corridor for the ferry terminals and access roads, which would have environmental impacts.
- **Cost and Financial Responsibility:** Fare revenues generated by most ferry route locations would not be adequate to cover operational costs; therefore, there would be substantial

additional cost associated with the additional infrastructure needed for ferry terminals and access roads.

The roadway deficiencies, existing and future maintenance, and navigation needs are not applicable to this option because these needs apply to the existing Bay Bridge. A ferry option would not be reasonable because it would not address the Tier 2 Study's Purpose and Need. The Tier 2 Study does not preclude implementation of a new ferry service resulting from another study.

The rail option would provide an additional mode of transportation across the Bay and as such, would address the study's mobility need. However, the rail option would not have the potential to address the adequate capacity and reliable travel times need or the environmental responsibility and cost and financial responsibility objectives. The justification is summarized below, and additional detail can be found in **Section 4.7.2.1**:

- **Adequate Capacity and Reliable Travel Times:** Rail is estimated to have the potential to remove less than 2 percent of traffic from vehicular travel lanes, which would not appreciably relieve congestion nor improve travel times.
- **Environmental Responsibility:** Providing rail on a new bridge, either on the same bridge as roadway lanes or on a separate bridge, would necessitate a larger structure or an additional structure. This option would also require construction of lengthy new rail connections to reach the existing rail networks on both shores, resulting in substantial environmental impacts.
- **Cost and Financial Responsibility:** The larger or additional structure and the lengthy new rail connections would also have substantial cost.

The roadway deficiencies, existing and future maintenance, and navigation needs are not applicable to this option because these needs apply to the existing Bay Bridge. A rail option would not be reasonable because it would not address the Tier 2 Study's Purpose and Need.

The BRT option would provide an additional mode of transportation across the Bay and as such, would address the study's mobility need. However, the BRT option would not have the potential to address the adequate capacity and reliable travel times need or the environmental responsibility and cost and financial responsibility objectives. The justification is summarized below, and additional details can be found in **Section 4.7.2.2**:

- **Adequate Capacity and Reliable Travel Times:** BRT is estimated to have the potential to remove less than 2 percent of traffic from vehicular travel lanes, which would not appreciably relieve congestion and improve travel times.
- **Environmental Responsibility:** A BRT option would require construction of lengthy new connections to reach appropriate high-capacity end points, resulting in substantial environmental impacts.
- **Cost and Financial Responsibility:** The lengthy new BRT connections would also have substantial cost.

The roadway deficiencies, existing and future maintenance, and navigation needs are not applicable to this option because these needs apply to the existing Bay Bridge. A BRT option would not be reasonable because it would not address the Tier 2 Study's Purpose and Need.

Enhanced bus service would be designed to address the study's adequate capacity and reliable travel times and mobility needs. The roadway deficiencies, existing and future maintenance, and navigation needs are not applicable to this option because these needs apply to the existing Bay Bridge. Enhanced bus service would also have the ability to better meet the environmental responsibility and cost and financial viability objectives than the other transit options because it would have a substantially smaller environmental impact and cost. Additional details can be found in **Section 4.7.3**. Enhanced bus service would be reasonable because it would have the ability to address the Tier 2 Study EIS's Purpose and Need.

4.7.2 Transportation Systems Management/Transportation Demand Management

TSM and TDM alternatives were evaluated as part of the Tier 1 Study EIS. TSM and TDM strategies are used to increase the efficiency and operations of transportation systems. The Tier 1 Study EIS eliminated those options from consideration as stand-alone alternatives. This Tier 2 Study is considering TSM and TDM alternatives in combination with other build alternatives. The TSM and TDM alternatives were allocated into two categories.

- TSM and TDM alternatives that could be implemented with or without additional lanes across the Chesapeake Bay include congestion pricing, ramp metering, park-and-ride facilities, and interchange consolidation.

- TSM and TDM alternatives that can only be implemented with additional lanes across the Chesapeake Bay include express-local lanes, managed lanes, and part-time shoulder use lanes.

4.7.2.1 Congestion Pricing

Congestion pricing uses variable tolls to shift some peak period travel to the off-peak period in order to reduce congestion and provide a more reliable trip.[12]

4.7.2.2 Ramp Metering

Ramp metering is an approach that controls or "meters" the traffic entering a highway at ramps by using traffic signals; the intent is to reduce merging friction along the corridor. For this corridor, ramp metering could be considered at eastbound entrance ramps on the Western Shore and westbound entrance ramps on the Eastern Shore. Under the right conditions, ramp metering can be an effective strategy to reduce congestion along freeway segments without widening the mainline. Ramp metering was considered as a potential TSM/TDM solution for improving traffic operations at the Bay Bridge, but a pilot study conducted by SHA in summer 2022 demonstrated that ramp metering did not improve travel times at the Bay Bridge. In fact, the ramp metering

[12] FHWA, "Congestion Pricing" https://ops.fhwa.dot.gov/publications/fhwahop08039/fhwahop08039.pdf

resulted in negative impacts including queuing and severe congestion along the ramps and frontage roads.

During SHA's pilot study, the ramp meter was installed at the Oceanic Drive entrance ramp to eastbound U.S. 50/301. SHA presented the results of the pilot study to the Broadneck Council of Communities in the fall of 2022[13] and noted that as part of the pilot study, it was determined that without the ramp meter in place, the primary cause of congestion and diversions on U.S. 50/301 eastbound on summer Fridays and Saturdays was the unavailability of contraflow due to weather and/or incidents. With the ramp meter in place, it was determined that travel times were still more influenced by weather and contraflow availability than the implementation of ramp metering. The pilot study demonstrated that the congestion and diversions onto the local road network are caused by a lack of capacity across the bridge. Ramp metering is not an effective solution to reduce congestion on its own since it does not add capacity to the bridge. Given the results of the pilot study and the negative impacts to the local road network, ramp metering would not enhance a build alternative, but rather detract from it, and would not be reasonable for implementation.

4.7.2.3 Park-and-Ride Facilities

Park-and-ride facilities can be used to encourage carpooling and bus use across a new bridge. Currently, there are three existing Park and Ride locations within the study area for drivers who utilize local and commuter bus networks or carpool. The Stevensville Park and Ride is located on the southeastern side of the U.S. 50/301 and MD 8 (Romancoke Road) interchange. The Kent Narrows Park and Ride is located beneath U.S. 50/301 at Kent Narrows, between Piney Narrows Road and Main Street. The Castle Marina Park and Ride is located on the northern side of U.S. 50/301 off Castle Marina Road. The MDTA will further assess park and ride services and the potential for new facilities as part of the transit analyses that will be completed for the proposed ARDS, including whether existing park and ride capacity is adequate for future travel demand.

4.7.2.4 Interchange Consolidation

Along U.S. 50/301 on the Eastern Shore, there are many closely spaced interchanges. Interchange consolidation could be used to control access to highways to manage congestion and reduce crashes. However, in light of potential impacts to communities on the Eastern Shore, the MDTA will only consider interchange consolidation at interchanges where the proposed ARDS create geometric issues to the existing ramp configurations.

4.7.2.5 Express-Local Lanes

An express-local system would separate local traffic entering and exiting the highway at the interchanges from the traffic traveling through the study area from end to end. The express lanes could be separated from the local lanes by some type of buffer or physical barrier but could only be provided across the Chesapeake Bay on a new bridge. This separation would increase the width of the roadway, leading to potentially more environmental impacts and higher cost. Additionally, to implement an express-local system, proper advance guide signs would be required a significant distance in advance of the start of the express-local system. Due to the close spacing of the interchanges throughout the study limits, there is not adequate space to

[13] https://maryland.maps.arcgis.com/sharing/rest/content/items/bdee1cca2a8d4eceb2032c326063b960/data

accommodate multiple ingress/egress movements, so the express system would likely need to extend for most of the study area. This would make mobility difficult and hinder ease of access to businesses and other locations off U.S. 50/301.

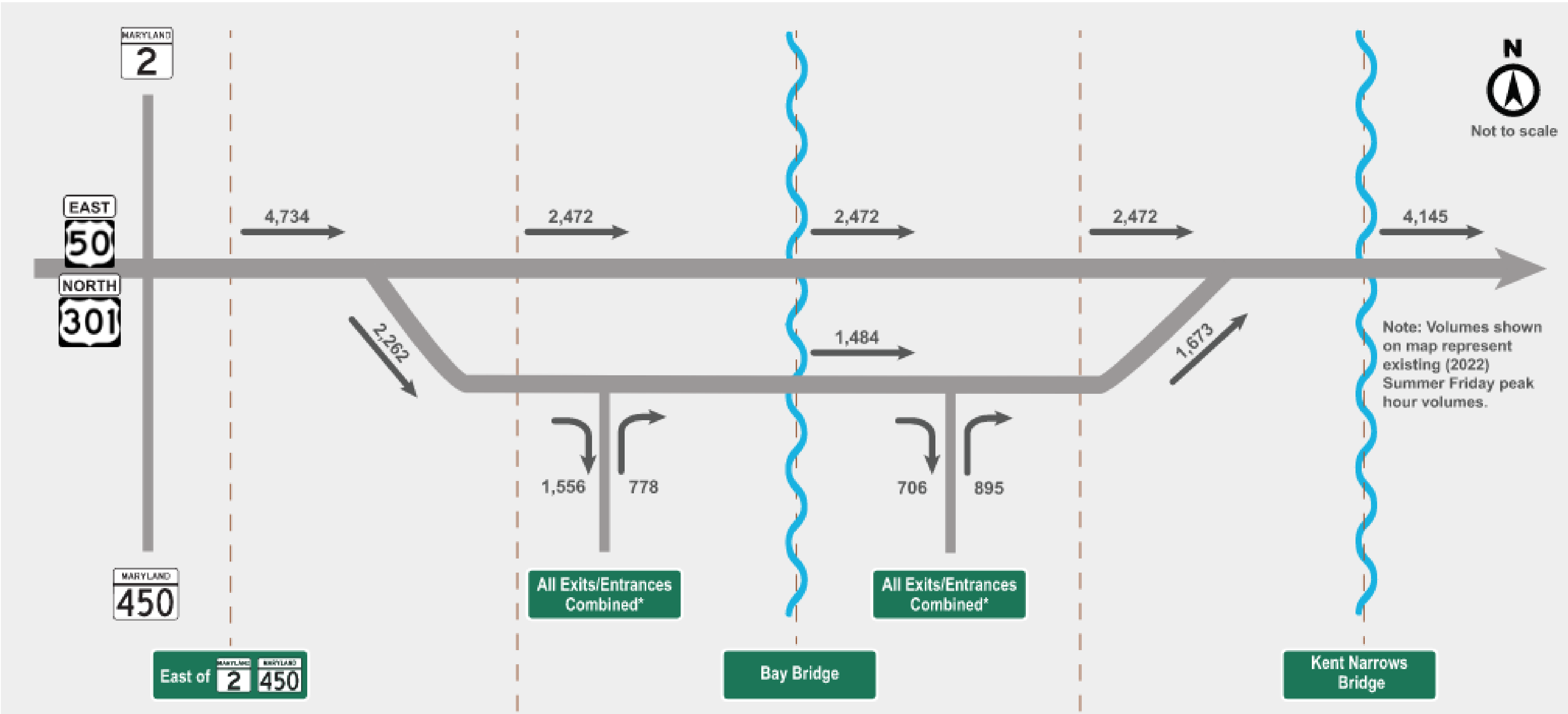
One of the features of an express-local system is that it requires local traffic to use the local lanes but does not limit "through" traffic (traffic that does not use entrance or exit ramps within the limits) to the express lanes. If congestion were to occur in the express lanes, due to heavy traffic volumes or an incident, through traffic would be expected to divert to the local lanes, potentially congesting the local lanes. If congestion or an incident were to occur in the local lanes, local traffic would not have the option of diverting to the express lanes.

A preliminary traffic analysis was performed for this option, for the eastbound direction, using existing (2022) Summer Friday peak hour volumes. For the purposes of the preliminary traffic analysis, the following simplifying assumptions were made:

1. The express-local system would extend from just east of the MD 2/MD 450 interchange to just west of the Kent Narrows Bridge.
2. All access/egress to/from the express lanes would occur at the endpoints of the system. That is, traffic entering U.S. 50/301 at a local interchange would be required to remain on the local lanes until the endpoint of the system.

Origin-destination information was obtained from StreetLight Data and was analyzed to determine the amount of traffic on U.S. 50/301 that is truly through traffic. The results of the analyses are summarized in **Figure 4.17**.

Figure 4.17. Potential Express-Local System on Eastbound U.S. 50/301, with Summer Friday Volumes



East of MD 2 / MD 450

Scenario		Number of Lanes Needed: Computed	Rounded
Without Express-Local		2.93	3
With Express-Local	Express Lanes	2.93	3
	Local Lanes	0	0
	Total	2.93	3

Scenario		Number of Lanes Needed: Computed	Rounded
Without Express-Local		2.93	3
With Express-Local	Express Lanes	1.53	2
	Local Lanes	1.40	2
	Total	2.93	4

Bay Bridge

Scenario		Number of Lanes Needed: Computed	Rounded
Without Express-Local		3.17	4
With Express-Local	Express Lanes	1.98	2
	Local Lanes	1.19	2
	Total	3.17	4

Scenario		Number of Lanes Needed: Computed	Rounded
Without Express-Local		2.56	3
With Express-Local	Express Lanes	1.53	2
	Local Lanes	1.03	2
	Total	2.56	4

Kent Narrows Bridge

Scenario		Number of Lanes Needed: Computed	Rounded
Without Express-Local		2.56	3
With Express-Local	Express Lanes	2.56	3
	Local Lanes	0	0
	Total	2.56	3

* Does not include vehicles that both enter the Local Lanes at an interchange and also exit the Local Lanes at an interchange.

Figure 4-17 demonstrates the following:

- Prior to the start of the express-local system, 2.93 lanes would be needed to handle the peak hour traffic volumes. Since it is not possible to provide fractions of lanes, three lanes would be needed.
- Once the express-local system begins, 1.53 *express* lanes would be needed to handle the peak hour traffic volumes—meaning that two lanes would be required. Similarly, 1.40 *local* lanes would be needed—meaning, again, that two lanes would be required. Thus, a total volume that can be accommodated in three general-purpose lanes requires four lanes in an express-local system. (This is a common occurrence with express-local systems.)
- Similar conditions would be found downstream of the Bay Bridge, where the total number of general-purpose lanes would be lower than the sum of the express-local components.
- At the Bay Crossing itself, four lanes would be needed under either scenario.

An express-local lanes option would make trips along U.S. 50/301 more complex and hinder movements between the express and local systems. It could also make trips to local destinations such as businesses on Kent Island more difficult. Additionally, this option would require more right-of-way than the proposed build alternatives, and thus would incur greater environmental impact and be more costly.

4.7.2.6 Priced Managed Lanes

Priced managed lanes along U.S. 50/301 for this study would be tolled lanes that operate similarly to an express-local system with the addition of congestion pricing to the express, managed lanes. Since the Bay Bridge is already a toll facility, providing managed lanes across a new bridge would require those lanes to have a surcharge in addition to the base toll. The two tolls would be challenging to communicate to users.

To maintain free flow speeds in the managed lanes as congestion increases in the corridor, the price to use the managed lanes would increase. While congestion in the general-purpose lanes would improve slightly because some vehicles would use the managed lanes, there would still be significant congestion in the general-purpose lanes. Managed lanes would provide the same challenges as express-local lanes in terms of a greater footprint likely causing more environmental impacts. Also, similar to the express-local lanes, through traffic cannot be prevented from using the general-purpose lanes, from beginning to end. If congestion were to occur in the managed lanes, due to heavy traffic volumes or an incident, through traffic would be expected to divert to the general-purpose lanes, potentially congesting the general-purpose lanes. If congestion or an incident were to occur in the general-purpose lanes, local traffic would not have the option of diverting to the managed lanes.

With the managed lanes option more congestion would remain in general purpose lanes; trips along U.S. 50/301 would be more complex and access to local destinations would be hindered; and there would be greater environmental impacts and cost because of the additional footprint and additional infrastructure to support the managed lanes.

4.7.2.7 Part-Time Shoulder Use (PTSU) Lanes

PTSU lanes use the shoulder of a roadway for temporary travel during certain hours of the day, typically during peak hours where there is recurring congestion. As a strategy for addressing congestion and reliability issues, PTSU can be a cost-effective solution where geometric clearances, visibility, and pavement requirements can be met.[14] Part-time shoulder use will be studied for both bus-only operations and general vehicular operations.

4.7.2.8 Combined Transit/TSM/TDM Option

The Tier 1 Study EIS concluded that ferry service, BRT, rail transit, and TSM/TDM would not be carried forward for further evaluation as stand-alone alternatives. Throughout the preliminary evaluation process, agencies and local communities emphasized the need for accommodating a broad range of users across the Chesapeake Bay and the opportunities for regional transportation connectivity. There were many comments received at the September 2022 Open Houses, the June 2023 Transit & Bicycle/Pedestrian Listening Meetings, and the September 2023 Open Houses that supported further consideration of transit and TSM/TDM options, including evaluation of the ability for several transit and TSM/TDM options in combination with each other to reduce congestion. Based on agency and public feedback, the MDTA considered an option that combines various transit, TSM, and TDM elements and improves travel conditions across the Chesapeake Bay and along U.S. 50/301 without proposing a new crossing structure.

Although this alternative would not include a new bridge or modification to the existing number of lanes, it was evaluated including bus enhancements, ferry, interchange consolidation, park-and-ride facilities, congestion pricing, and PTSU as part of a package to determine its ability to provide additional capacity and improve travel time reliability. There is no way to provide additional physical vehicular capacity across the existing Bay Bridge since it does not have shoulders; this would require a new structure.

The total reduction of vehicles crossing the bridge due to transit would not equal the sum of all transit options' vehicle reduction, since the same people may use multiple different transit options. Ferry would only reduce the projected 2045 daily traffic volumes by 1.07 percent on a non-summer weekend and 0.74 percent on a summer weekend. Improvements could be made to bus service and park-and-ride facilities to support the bus service but buses would need to continue to use the existing Bay Bridge lanes. Thus, transit priority treatments, such as dedicated transit lanes or bus-on-shoulder, could not be implemented across the bridge without reducing the number of general-purpose travel lanes. The bridge would still be the bottleneck, and bus travel times would continue to be unreliable. Like bus service, PTSU could add capacity to the approaches during peak periods but could not be provided across the bridge, and the bridge would remain the bottleneck. The PTSU lanes would allow more traffic to get to the bridge but would not influence how much traffic can get across the bridge. Interchange consolidation could reduce friction along the approach roads but would not add any capacity to the bridge. Congestion pricing could allow the existing capacity across the bridge to be utilized more efficiently by spreading out the demand, but in the no-build condition there are queues greater than one mile on non-summer weekdays that last four hours eastbound and 11 hours westbound and there are queues greater than one mile on summer weekends that last 14 hours in both directions. Since the congested

[14] FHWA, "Use of Freeway Shoulders for Travel" https://ops.fhwa.dot.gov/publications/fhwahop15023/ch1.htm

periods are so long, there is less ability for congestion pricing to shift trips to periods with less congestion, particularly since many of those periods without congestion would be overnight.

Without additional capacity across the Bay Bridge, it is not expected that there would be any improvements to travel time reliability. Moreover, because the existing Bay Bridge would continue to be used and there would be no new crossing structure, this option would not address the study's roadway deficiencies, existing and future maintenance, or navigation needs.

4.7.2.9 Screening Results

The TSM and TDM options were evaluated using the screening criteria to determine the options to advance to the proposed ARDS. To assess whether an option was reasonable, each option was evaluated independently for each need and objective. The options were also evaluated relative to the other options for each objective. The results are shown in **Table 4-10**. Where a box is green, the option is likely to address the need or objective. Where a box is red, the option does not have the potential to address the need or an objective. Where a box is white, the need was not applicable to the option because the need applies only to the existing Bay Bridge. A more detailed description of each option in relation to the screening criteria is presented below the table.

Table 4-10. Potential of TSM/TDM Options to Address the Needs and Objectives

Screening Criteria		TSM/TDM Options							
		Congestion Pricing	Ramp Metering	Park-and-Ride Facilities	Interchange Consolidation	Express-Local Lanes	Priced Managed Lanes	Part-Time Shoulder Use (PTSU) Lanes	Combined Transit / TSM / TDM Option
Does the option have the potential to address the need?	Adequate Capacity & Reliable Travel Times	Yes	No	Yes	Yes	Yes	No	Yes	No
	Mobility	Yes	No	Yes	Yes	No	No	Yes	Yes
	Roadway Deficiencies	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	No
	Existing and Future Maintenance	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	No
	Navigation	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	No
To what extent does the option address the objective?	Environmental Responsibility	Low Impact Relative to other Options	Low Impact Relative to other Options	Low Impact Relative to other Options	Low Impact Relative to other Options	High Impact Relative to other Options	High Impact Relative to other Options	Low Impact Relative to other Options	Moderate Impact Relative to Other Transit/TSM/ TDM Options
	Cost and Financial Responsibility	Low Cost Relative to Other Options	Low Cost Relative to Other Options	Low Cost Relative to Other Options	Low Cost Relative to Other Options	High Cost Relative to Other Options	High Cost Relative to Other Options	Low Cost Relative to Other Options	Moderate Cost Relative to Other Transit/TSM/ TDM Options

*In this table, the combined transit/TSM/TDM option is the only stand-alone alternative. All other options would need to be in combination with other build alternatives. Therefore, the potential for the option to address the roadway deficiencies, existing and future maintenance, and navigation needs are not applicable.

Congestion pricing has the ability to address the study's adequate capacity and reliable travel times and mobility needs. This option also has the ability to address the environmental responsibility and cost and financial responsibility objectives because it is an operational strategy, and the only physical infrastructure would be toll gantries and signing. Thus, the environmental impact and cost would be low. Additional detail can be found in **Section 4.7.2.1**. The ability for congestion pricing to enhance the proposed ARDS will be studied in the EIS. Congestion pricing would be reasonable because it would have the potential to address the Tier 2 Study's Purpose and Need.

Although ramp metering would have relatively low environmental impacts and cost compared to the other options, it would not have the potential to address the adequate capacity and reliable travel times and mobility needs. The justification is summarized below, and additional detail can be found in **Section 4.7.2.2**:

- **Adequate Capacity and Reliable Travel Times:** Ramp metering would not add capacity to the Bay Bridge or the U.S. 50/301 approaches.
- **Mobility:** Ramp metering could result in queuing at ramps and worsen backups on local roadways in some areas, thereby hindering local trips.

Ramp metering would not be reasonable because it would not address the Tier 2 Study's Purpose and Need.

The park-and-ride option has the potential to address the study's adequate capacity and reliable travel times and mobility needs. This option also has the ability to address the environmental responsibility and cost and financial responsibility objectives because it would have relatively low environmental impacts and cost. Additional detail can be found in **Section 4.7.2.3**. The ability for the park-and-ride option to enhance the proposed ARDS will be studied in the EIS. Park-and-ride would be reasonable because it would have the potential to address the Tier 2 Study's Purpose and Need.

The interchange consolidation option has the potential to address the study's adequate capacity and reliable travel times and mobility needs. This option also has the ability to address the environmental responsibility and cost and financial responsibility objectives because it would prevent large environmental impacts and have relatively low cost. Additional detail can be found in **Section 4.7.2.4**. The ability for the interchange consolidation option to enhance the proposed ARDS will be studied in the EIS. Interchange consolidation would be reasonable because it would have the potential to address the Tier 2 Study's Purpose and Need.

Express-local lanes would address the study's need for adequate capacity and reliable travel times. However, this option would not address the study's mobility need and the environmental responsibility and cost and financial responsibility objectives. The justification is summarized below, and additional detail can be found in **Section 4.7.2.5**.

- **Mobility:** Express-local lanes require local traffic to use the local lanes but do not limit through traffic to the express lanes. Through traffic can use the local lanes when the express lanes are congested, but local traffic cannot use the express lanes when local lanes are congested.

- **Environmental Responsibility:** Express and local lanes need some type of physical separation between each other, which increases the width of the roadway, leading to potentially more environmental impacts than the same number of general purpose lanes.
- **Cost and Financial Responsibility:** The additional roadway width needed for physical separation would also lead to a larger cost than the same number of general purpose lanes.

The express-local lanes option would not be reasonable because it would not address the Tier 2 Study's Purpose and Need.

Priced managed lanes would not address the study's adequate capacity and reliable travel time and mobility needs and the environmental responsibility and cost and financial responsibility objectives. The justification is summarized below, and additional detail can be found in **Section 4.7.2.6**.

- **Adequate Capacity and Reliable Travel Times:** Priced managed lanes are intended to maintain free-flow speed in the managed lanes. While congestion in the general-purpose lanes would improve slightly because some vehicles would use the managed lanes, there would still be significant congestion in the general purpose lanes.
- **Mobility:** Managed Lane traffic can use the local lanes when the managed lanes are congested, but local traffic cannot use the managed lanes when local lanes are congested.
- **Environmental Responsibility:** Priced managed lanes need some type of physical separation between the managed lanes and the general purpose lanes, which increases the width of the roadway, leading to potentially more environmental impacts than the same number of general purpose lanes.
- **Cost and Financial Responsibility:** The additional roadway width needed for physical separation would also lead to a larger cost than the same number of only general purpose lanes.

The priced managed lanes option would not be reasonable because it would not address the Tier 2 Study's Purpose and Need.

The PTSU option has the potential to address the study's adequate capacity and reliable travel times and mobility needs. This option also has the ability to address the environmental responsibility and cost and financial responsibility objectives because it would have few environmental impacts and lower cost than the same number of full-time lanes. Additional detail can be found in **Section 4.7.2.7**. The ability for the PTSU option to enhance the proposed ARDS will be studied in the EIS. PTSU would be reasonable because it would have the potential to address the Tier 2 Study's Purpose and Need.

The combined transit/TSM/TDM option would have the ability to address the study's mobility need, however, this option would not address the study's adequate capacity and reliable travel times, roadway deficiencies, existing and future maintenance, and navigation needs. The justification is summarized below, and additional detail can be found in **Section 4.7.2.8**:

- **Adequate Capacity and Reliable Travel Times:** Without a new structure, there is no way to provide additional physical capacity. Even in combination, the transit, TSM, and TDM options do not have the ability to shift enough vehicles to other modes to improve travel times.
- **Roadway Deficiencies:** Without a new structure, the roadway deficiency concerns with the existing Bay Bridge would remain.
- **Existing and Future Maintenance:** Without a new structure, the existing and future maintenance concerns with the existing Bay Bridge would remain.
- **Navigation:** Without a new structure, there is no way to provide additional navigational vertical clearance.
- **Environmental Responsibility:** The combined transit/TSM/TDM option would have less environmental impacts than the rail and BRT transit options, but would have more environmental impacts than congestion pricing, park-and-ride, interchange consolidation, and PTSU options.

  Cost and Financial Responsibility: The combined transit/TSM/TDM option would have lower cost than the rail and BRT transit options, but would have greater cost than congestion pricing, park-and-ride, interchange consolidation, and PTSU options.

A combined transit/TSM/TDM option would not be reasonable because it would not address the Tier 2 Study's Purpose and Need.

4.8 Pedestrian and Bicycle Shared Use Path (SUP)

Public comments received in response to the Tier 1 Study EIS expressed support for the safe inclusion of a SUP on a new crossing. In June 2023, the MDTA hosted a virtual Transit & Bicycle/Pedestrian Listening Meeting for the public to learn more and provide feedback on transit, bicycle, and pedestrian considerations in the study area. This Listening Meeting provided information on existing and proposed trails and additional SUP considerations. Slightly more than half of meeting participants currently use bicycle or pedestrian facilities in the Tier 2 corridor or near the Bay Bridge, and of those participants, the majority of them use the facilities for exercise/recreation. About two-thirds of meeting participants said they would use a SUP across the Chesapeake Bay if it were available. Over half of meeting participants feel it is very important to have access across the Chesapeake Bay for bicycle/pedestrian use.

As presented in the Listening Meeting, there are currently planned improvements, extensions, and connections for existing trails on both approaches to the Bay Bridge in QAC and AAC. However, there is no way for bicyclists and pedestrians to cross the Bay Bridge, other than getting a vehicle to transport them.

A SUP across a new Bay Bridge would be a two-way pedestrian and bicycle facility that is part of a new bridge structure and is separated from the adjacent travel lanes by a physical barrier. The SUP could extend for the full length of the bridge, connecting to adjacent trails, parks, or parking facilities on either shore, or it could extend part-way across the bridge from one shore only with a turnaround point somewhere along the bridge. The primary purpose of the facility would be for recreational activities, but a SUP that extends across the full length of the Bay could be used for commuting purposes as well.

Connecting the shores of the two counties over the Chesapeake Bay with a SUP on a new Bay Bridge would provide connectivity for pedestrians and bicyclists between the Eastern and Western Shores and allow users to cross the Chesapeake Bay without the need for vehicular assistance. Safety and design elements would be considered to provide sufficient comfort and safety for SUP users, such as:

- The height of railing needed to protect against falls and climbing, while maintaining views of the Chesapeake Bay;
- The impact of wind loads on SUP users and design requirements; and
- The impact of deflections and vibrations that are felt SUP users.

Additional SUP considerations would include:

- Time restrictions for SUP use (e.g. daylight only);
- Use by roller skaters, people on scooters, skateboarders, people with pets, anglers, and vendors;
- Lighting and security;
- Trash receptacles and restrooms;
- Surface material and drainage; and
- Benches, overlooks and charging stations.

The MDTA has reviewed design considerations for SUPs on large bridges and will further evaluate them as part of the proposed ARDS. Additional research on safety measures for including a SUP on a future Bay crossing will also be included in the proposed ARDS.

The MDTA completed a review of similar large structures across the U.S. to better understand bicycle and pedestrian access and that review is summarized below. It should be noted that SUPs are impractical in a tunnel the length of the Bay Crossing due to the limited space available and several safety and security concerns.

Maryland: The Woodrow Wilson Bridge is a 1.15-mile-long bridge with an over 3-mile-long SUP that opened in 2009 and carries I-495/I-95 between the City of Alexandria in Virginia and National Harbor in Prince George's County, Maryland. The bridge crosses over the Potomac River with the SUP located on the outside of the I-495/I-95 westbound traffic lanes. The SUP's 14-foot width allows for bicycle and pedestrian traffic in both directions. At the highest points on the bridge, the SUP runs at a height of approximately 98 feet above the Potomac River.

Opened in 1940, the Thomas J. Hatem Memorial Bridge carries U.S. 40 over the Susquehanna River in northeastern Maryland. The 1.4-mile-long structure has a height of approximately 85 feet above Susquehanna River and has a four-lane, two-way road separated by a center concrete barrier and has no shoulders or sidewalks. Bicyclists and pedestrians were prohibited from crossing the bridge until July 2016, when the MDTA granted bicyclists permission to do so on weekdays from 9 AM to 3 PM, and from dawn to dusk on weekends and State holidays. In September 2016, the policy was amended to only allow bicycle traffic from dawn to dusk on weekends, and on weekdays on a State holiday.

The existing American Legion Memorial Bridge opened to traffic in 1962 and is on the I-495 Capital Beltway highway system, crossing over the Potomac River connecting McLean, Virginia and Bethesda, Maryland. The current bridge does not have an SUP; however, plans for a reconstructed dual-span bridge include an SUP located on the outside of the I-495 Inner Loop travel lanes. The new structure is anticipated to be similar in length to the existing structure (1,443 feet) and cross over the Potomac River in the same location as the existing structure, with a height of approximately 140 feet above the Potomac River.

Other Locations: The San Francisco-Oakland Bay Bridge in California is a 3.9-mile-long bridge that opened in 2013 and carries I-80 between Oakland, California and San Francisco, California. The bridge consists of three sections. The SUP is a partial crossing over the San Francisco Bay and is located on the outside (south side) of the I-80 eastbound traffic lanes to the east of Yerba Buena Island (YBI) only. The SUP stops on YBI at the San Francisco-Oakland Bay Bridge Trail lookout, which is approximately 2.3 miles from the closest entry point, just east of the bridge abutment on the Oakland side. The SUP's 15.5-foot width allows for bicycle traffic in both directions and an outside lane for pedestrians. The SUP is part of the San Francisco Bay Trail which is currently under construction. There are plans to extend the SUP to downtown San Francisco across the San Francisco Bay west of YBI. Since the bridge has a vertical clearance of 220 feet, the SUP is taller than 220 feet at its highest point.

In New York, the Mario M. Cuomo (Tappan Zee) Bridge is a 3-mile-long structure with a 3.6-mile SUP that opened in 2020 and carries I-287 between South Nyack in Rockland County, New York and Tarrytown in Westchester County, New York. The bridge crosses over the Hudson River with the SUP located on the outside of the I-287 westbound traffic lanes. The SUP's 12-foot width allows for bicycle and pedestrian traffic in both directions. There are six overlooks along the length of the structure and landings with amenities at each end. The overlook with the tallest elevation is Half Moon Overlook at 140 feet above the water; however, this overlook is not located at the highest point across the bridge. The SUP connects to the Raymond G. Esposito Trail in South Nyack and a parking lot in Tarrytown.

4.8.1 Screening Results

The SUP options were evaluated using the screening criteria to determine which options to advance to the proposed ARDS. To assess whether an option was reasonable, each option was evaluated independently for each need and objective. The options were also evaluated relative to the other options for each objective. The results are shown in **Table 4-11**. Where a box is green, the option is likely to address the need or objective. Where a box is red, the option does not have the potential to address the need or an objective. Where a box is white, the option is not applicable because an SUP is not a standalone option and is being considered as a potential supplemental transportation improvement to a new Bay crossing. A more detailed description of each option in relation to the screening criteria is presented below the table.

Table 4-11. Potential of SUP Options to Address the Needs and Objectives

Screening Criteria		Consider Inclusion of Shared Use Path
Does the option have the potential to address the need?	Adequate Capacity & Reliable Travel Times	Not Applicable
	Mobility	Yes
	Roadway Deficiencies	Not Applicable
	Existing and Future Maintenance	Not Applicable
	Navigation	Not Applicable
To what extent does the option address the objective?	Environmental Responsibility	Not Applicable
	Cost and Financial Responsibility	Not Applicable

The inclusion of an SUP has received strong interest from the public, and it would address the study's mobility need. Additional detail can be found in **Section 4.9**. The ability for an SUP to safely and reasonably enhance the proposed ARDS will be studied in the EIS. At this time, the MDTA will continue to consider an SUP because it could have the potential to address the Tier 2 Study's Purpose and Need but additional analysis is needed.

5 PROPOSED ACTION AND ARDS

The proposed action would remove the existing Bay Bridge spans and replace them with a new bridge over the Chesapeake Bay. The new bridge would consist of two spans for the reasons discussed in **Section 4.3.1**. The proposed action also includes bus service improvements, TSM/TDM improvements, and pedestrian/bicycle SUP considerations.

Based on the results of the screening analysis as described in Section 4, the MDTA has identified seven alternatives for the proposed action, including the No-Build Alternative and six build alternatives. The alternatives comprise the reasonable range of alternatives that would be evaluated in the EIS and are the MDTA's proposed ARDS. The proposed ARDS are based on the number of lanes provided across the new bridge and on the approaches as well as the bridge location. Consistent with FHWA and CEQ regulations, the No-Build Alternative is being advanced as baseline and will be evaluated in the EIS. The proposed ARDS are:

- **Alternative A – No-Build**: retains the existing Chesapeake Bay Bridge, the U.S. 50/301 alignment, and the existing number of lanes;
- **Alternative B - 6-8-6 North:** 6 lanes along U.S. 50/301 on the Western Shore, 8 lanes across the Chesapeake Bay on a new bridge to the north of the existing bridge, and 6 lanes along U.S. 50/301 on the Eastern Shore;
- **Alternative C - 6-8-6 South**: 6 lanes along U.S. 50/301 on the Western Shore, 8 lanes across the Chesapeake Bay on a new bridge to the south of the existing bridge, and 6 lanes along U.S. 50/301 on the Eastern Shore;
- **Alternative D - 8-8-8 North**: 8 lanes along U.S. 50/301 on the Western Shore, 8 lanes across the Chesapeake Bay on a new bridge to the north of the existing bridge, 8 lanes along U.S. 50/301 on the Eastern Shore;
- **Alternative E - 8-8-8 South**: 8 lanes along U.S. 50/301 on the Western Shore, 8 lanes across the Chesapeake Bay on a new bridge to the south of the existing bridge, 8 lanes along U.S. 50/301 on the Eastern Shore;
- **Alternative F - 8-10-8 North**: 8 lanes along U.S. 50/301 on the Western Shore, 10 lanes across the Chesapeake Bay on a new bridge to the north of the existing bridge, 8 lanes along U.S. 50/301 on the Eastern Shore and
- **Alternative G - 8-10-8 South**: 8 lanes along U.S. 50/301 on the Western Shore, 10 lanes across the Chesapeake Bay on a new bridge to the south of the existing bridge, 8 lanes along U.S. 50/301 on the Eastern Shore.

Figure 5.1. Proposed Build Alternatives Retained for Detailed Study (ARDS)

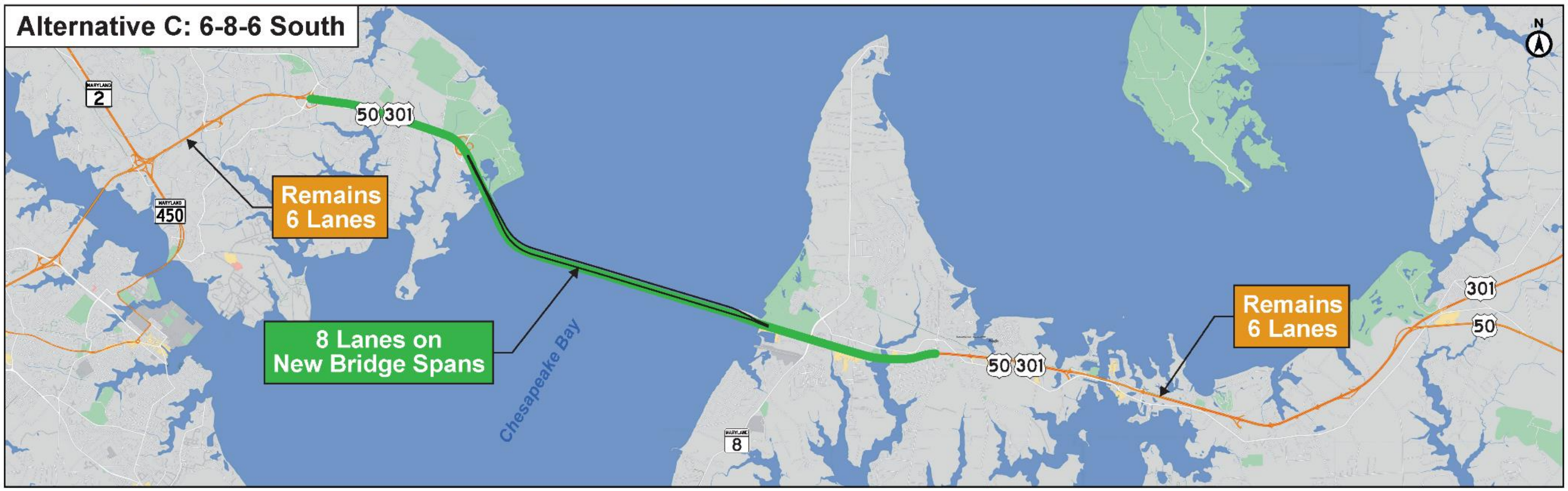


Figure 5.1. Proposed Build Alternatives Retained for Detailed Study (ARDS)

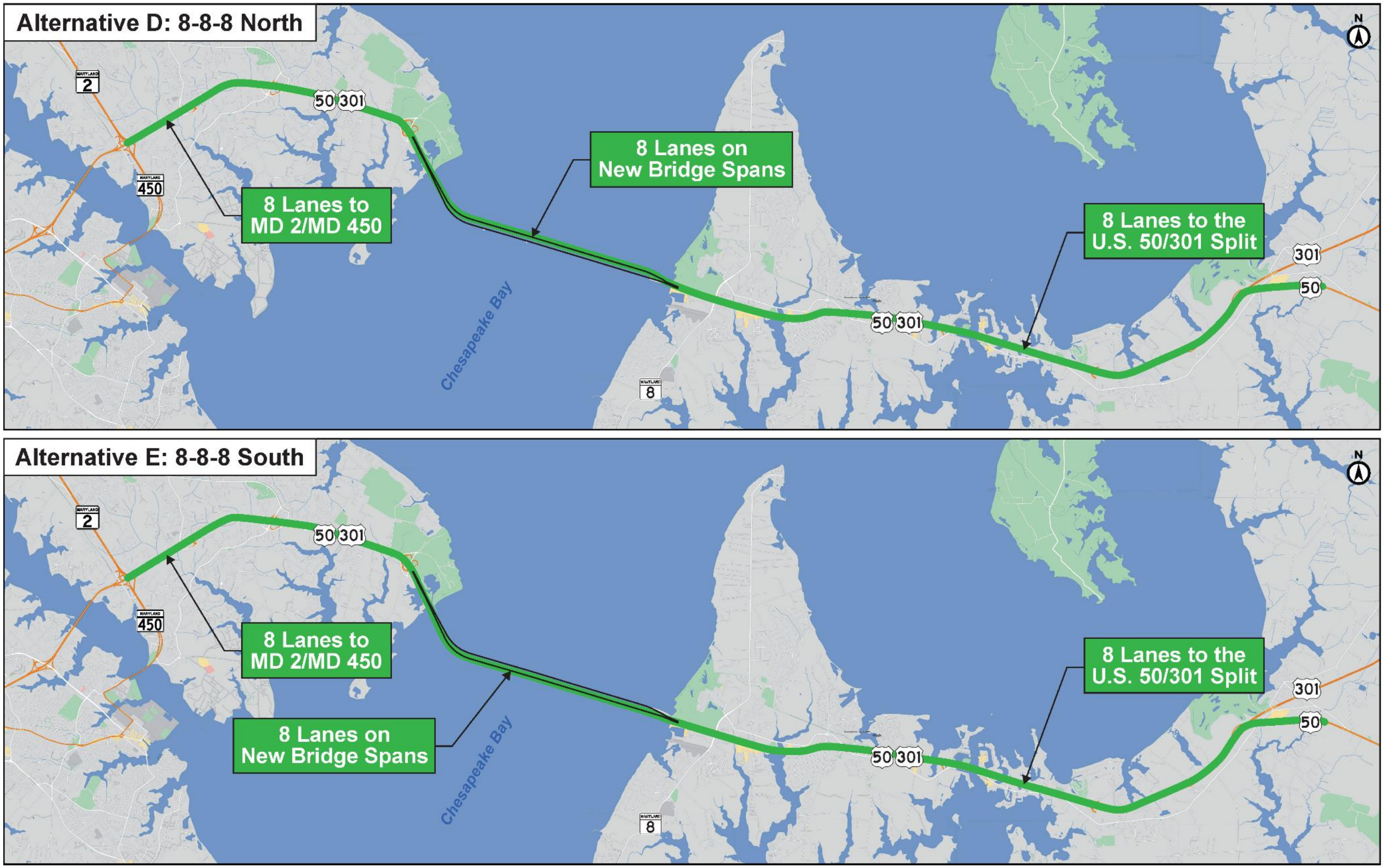
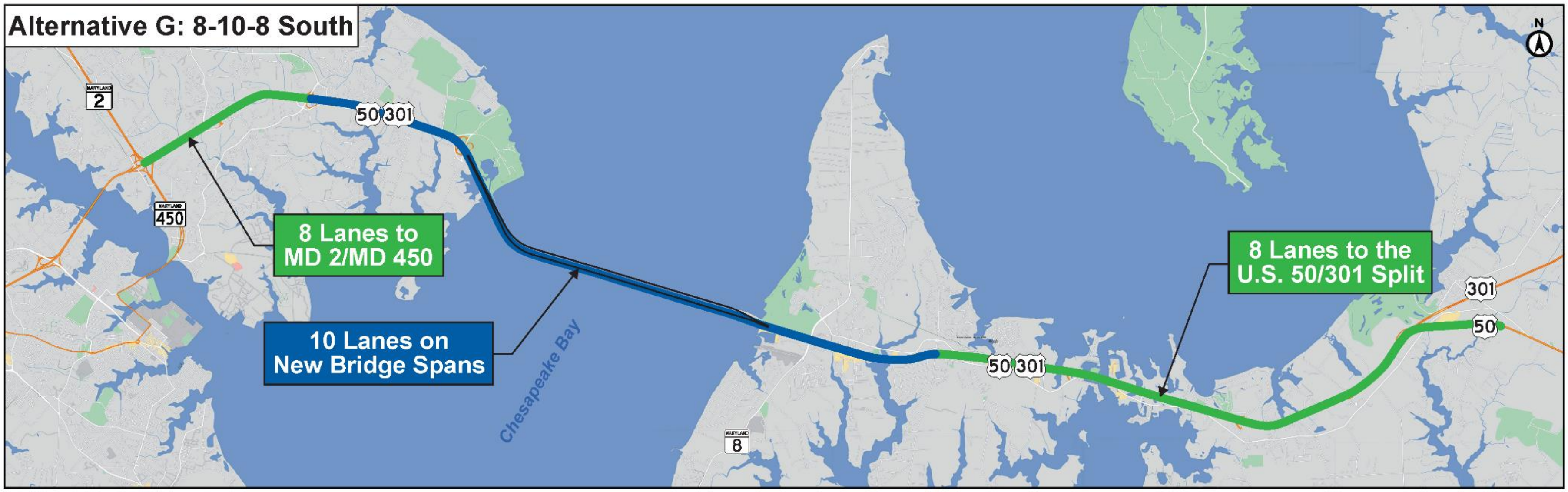


Figure 5.1. Proposed Build Alternatives Retained for Detailed Study (ARDS)



Other options considered in the development of the proposed build alternatives that have been screened out are described in **Section 4**. The MDTA and the FHWA will finalize a reasonable range of alternatives that will be retained for detailed study in the EIS based on comments received in response to this NOI and NOI Additional Project Information Document. The following sections describe other considerations included in the proposed ARDS.

5.1 Considerations Included in all Proposed Build Alternatives

All proposed build alternatives will include options for bus improvements, TSM/TDM improvements, and the safe inclusion of a pedestrian/bicycle SUP as described below.

5.1.1 Bus Improvements

The proposed ARDS will include potential bus improvements, such as enhanced local and intercity bus service, as described in **Section 4.7.1.3**. The MDTA will also further consider potential transit priority treatments. Impacts and feasibility associated with these improvements will be studied as part of the proposed ARDS.

5.1.2 TSM / TDM Improvements

Several TSM/TDM measures will be considered with the proposed ARDS, including congestion pricing (**Section 4.7.2.1**), park-and-ride facilities (**Section 4.7.2.3**), interchange consolidation (**Section 4.7.2.4**), and part-time shoulder use (PTSU) lanes (**Section 4.7.2.7**). The MDTA will evaluate if the implementation of congestion pricing with the proposed ARDS could improve the ability of the alternative to address the Purpose and Need. As part of the enhanced bus service analysis in the proposed ARDS, the MDTA will look at ways existing park-and-ride facilities can be better utilized or expanded to make bus service more efficient. In an effort to keep current access locations open for nearby residents and businesses, the MDTA will continue to consider interchange consolidation where needed based on the proposed mainline improvements in the proposed ARDS. The MDTA will continue to study options for both bus-only operations and general vehicular operations to determine if a PTSU configuration for the proposed ARDS could provide adequate capacity without a full-time lane.

5.1.3 Pedestrian / Bicycle Shared Use Path (SUP)

The MDTA will consider the option of including a safe SUP along a new bridge as part of the proposed ARDS. This analysis will include study of the environmental impacts, potential tie-in locations to existing pedestrian and bicycle facilities, and the cost associated with constructing an SUP. This analysis will be used to determine whether the MDTA's Recommended Preferred Alternative will include an SUP.

5.2 Alternative A (No-Build)

The EIS will consider a No-Build Alternative ("no-action alternative") that would retain the existing Chesapeake Bay Bridge, U.S. 50/301 alignment, and number of lanes. This alternative would retain six lanes on the approaches on the Eastern and Western Shores and five lanes on the Bay Bridge. The No-Build Alternative will include regular maintenance of the Chesapeake Bay Bridge and U.S. 50/301, but no capital improvements other than currently planned and programmed projects.

The No-Build Alternative would not address the Tier 2 Study's Purpose and Need but will be retained as a baseline for comparison with the proposed ARDS, per the Council on Environmental Quality (CEQ) regulations (40 CFR § 1502.14(d)). A preliminary evaluation of the No-Build Alternative (Alternative A) and how it relates to the Purpose and Need is provided in **Table 5-1**.

Table 5-1. Potential to Address Purpose and Need– No-Build (Alternative A)

Needs	
Adequate Capacity and Reliable Travel Times	This alternative would not provide additional capacity or improve travel reliability. The corridor would retain six lanes on the approaches and five lanes across the Chesapeake Bay with no other changes to transit or bridge operations. Current and future traffic conditions would remain. This alternative would not provide safer conditions through increased capacity or congestion alleviation.
Mobility	By providing no additional capacity on U.S. 50/301, this alternative would not improve mobility for users traveling across the Chesapeake Bay. Spillover traffic in local communities would remain. Transit users would have the same options for travel across the Chesapeake Bay. Pedestrians and bicyclists would not be able to cross the Chesapeake Bay.
Roadway Deficiencies	This alternative would not provide safer conditions through wider lanes and shoulders. It would retain the existing bridge spans and there would be no change to narrow lane and shoulder widths. Traffic operations, congestion rates, and incident management practices would remain as they currently are. Fall prevention would not be addressed.
Existing and Future Maintenance Needs	The alternative would retain the aging structures and would continue requiring significant construction/maintenance in order to remain operable for future decades. The spans would continue to have limited space for maintenance workers and construction/ maintenance projects would continue to exacerbate congested conditions in the future.
Navigation	This alternative would retain the existing vertical clearances. Current limitations to shipping traffic would remain, and further limit the growth and operation of the Port of Baltimore as freighters and cruise ships continue to increase in size.
Objectives	
Environmental Responsibility	This alternative would result in no environmental effects to resources within the Chesapeake Bay and areas along the U.S. 50/301 roadway at either shore. Local communities would not experience any impacts through implementation of a build alternative but would retain existing conditions of the structure.
Cost and Financial Responsibility	This alternative would have continued costs of approximately $3.8 billion through 2065 in order to keep the existing structures in adequate condition.

5.3 Alternative B (6-8-6 North)

As described above for all proposed build alternatives, Alternative B would replace the existing Bay Bridge spans with two new bridge spans. Alternative B (6-8-6 North) would consist of six lanes along U.S. 50/301 on the Western Shore (three per direction), eight lanes crossing the Bridge (four per direction) north of the existing bridge, and six lanes along U.S. 50/301 on the Eastern Shore (three per direction). With Alternative B (6-8-6 North), the five existing bridge lanes would be increased to eight bridge lanes; however, the number of lanes on the Western Shore and

Eastern Shore would not change. This proposed alternative retained for detailed study will be further evaluated in the EIS.

For the purposes of this NOI and NOI Additional Project Information Document, the MDTA has assumed the typical sections for Alternative B (6-8-6 North) as shown in **Figure 5.2**. The lanes and shoulders would be 12 feet wide, and the median width would vary. A potential SUP could be 10 feet wide with 2-foot-wide offsets to the vertical barriers on both sides of the SUP.[15] In order for the shoulder to be used as a PTSU lane during congested periods, the shoulder must be at least 12 feet wide with an offset to the median barrier. For the purposes of the Tier 2 Study as shown in the typical section, the PTSU lane would be 12 feet wide with a 2-foot offset to the concrete median barrier.

Preliminary footprints for an eight-lane bridge approach connecting with a north bridge location on the Western Shore and the Eastern Shore are provided in **Figures 4.2 and 4.3**, respectively. The footprints show one potential alignment for the north bridge location, but it is not the only potential alignment. The alignment was used to determine a preliminary magnitude of impacts. The location for the transition between eight lanes across the bridge and six lanes on the approaches has not yet been identified and will be identified in the DEIS.

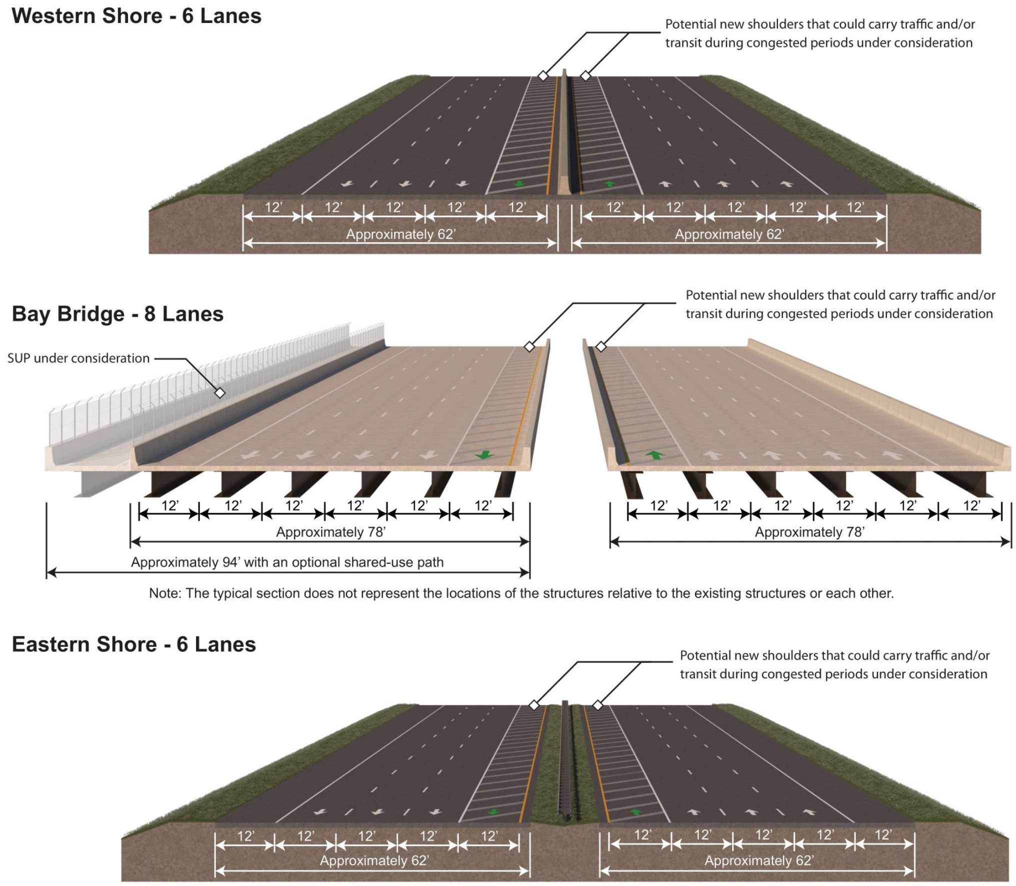
5.4 Alternative C (6-8-6 South)

As described above for all proposed ARDS, Alternative C would replace the existing Bay Bridge spans with two new bridge spans. Alternative C (6-8-6 South) would consist of six lanes along U.S. 50/301 on the Western Shore (three per direction), eight lanes crossing the Bridge (four per direction) south of the existing bridge, and six lanes along U.S. 50/301 on the Eastern Shore (three per direction). With Alternative C (6-8-6 South), the five existing bridge lanes would be increased to eight bridge lanes; however, the number of lanes on the Western Shore and Eastern Shore would not change. This proposed ARDS will be further evaluated in the EIS. For the purposes of this NOI and NOI Additional Project Information Document, the MDTA has assumed the typical sections for Alternative C (6-8-6 South), would be the same as those for Alternative B (6-8-6 North), as shown in **Figure 5.2**.

Preliminary footprints for an eight-lane bridge approach connecting with a south bridge location on the Western Shore and the Eastern Shore are provided in **Figures 4.4 and 4.5**, respectively. The footprints show one potential alignment for the south bridge location, but it is not the only potential alignment. The alignment was used to determine a preliminary magnitude of impacts. The location for the transition between eight lanes across the bridge and six lanes on the approaches has not yet been identified.

[15] Lane and shoulder widths are preliminary and subject to change.

Figure 5.2. Alternatives B and C (6-8-6) Typical Sections



5.5 Alternative D (8-8-8 North)

As described above for all proposed build alternatives, Alternative D would replace the existing Bay Bridge spans with two new bridge spans. Unlike Alternatives B and C, Alternative D (8-8-8 North) would increase the number of lanes along the U.S. 50/301 approaches to eight lanes. Thus, the alternative would consist of eight lanes along U.S. 50/301 on the Western Shore (four per direction), eight lanes crossing the Bridge (four per direction) north of the existing bridge, and eight lanes along U.S. 50/301 on the Eastern Shore (four per direction). This proposed alternative retained for detailed study will be further evaluated in the EIS.

With Alternative D (8-8-8 North), the five existing bridge lanes would be increased to eight bridge lanes. The number of lanes on the Western Shore and Eastern Shore would increase to eight total lanes. On the Western Shore, widening would occur to the outside in both directions to provide the eight-lane section: four lanes per direction plus shoulders. On the Eastern Shore, widening would occur first to the inside in both directions, and then to the outside where there is not sufficient space in the median for the full typical section.

For the purposes of this NOI and NOI Additional Project Information Document, the MDTA has assumed the typical sections for Alternative D (8-8-8 North) as shown in **Figure 5.3**. The lanes and shoulders would be 12 feet wide, and the median width would vary. In order for the shoulder to be used as a lane during congested periods, the shoulder must be at least 12 feet wide with an offset to the median barrier. For the purposes of the Tier 2 Study as shown in the typical section, the PTSU lane would be 12 feet wide with a 2-foot offset to the concrete median barrier.

Preliminary footprints for an eight-lane bridge approach connecting with a north bridge location on the Western Shore and the Eastern Shore are shown in **Figures 4.2 and 4.3**, respectively. The footprints show one potential alignment for the north bridge location, but it is not the only potential alignment. The alignment was used to determine a preliminary magnitude of impacts.

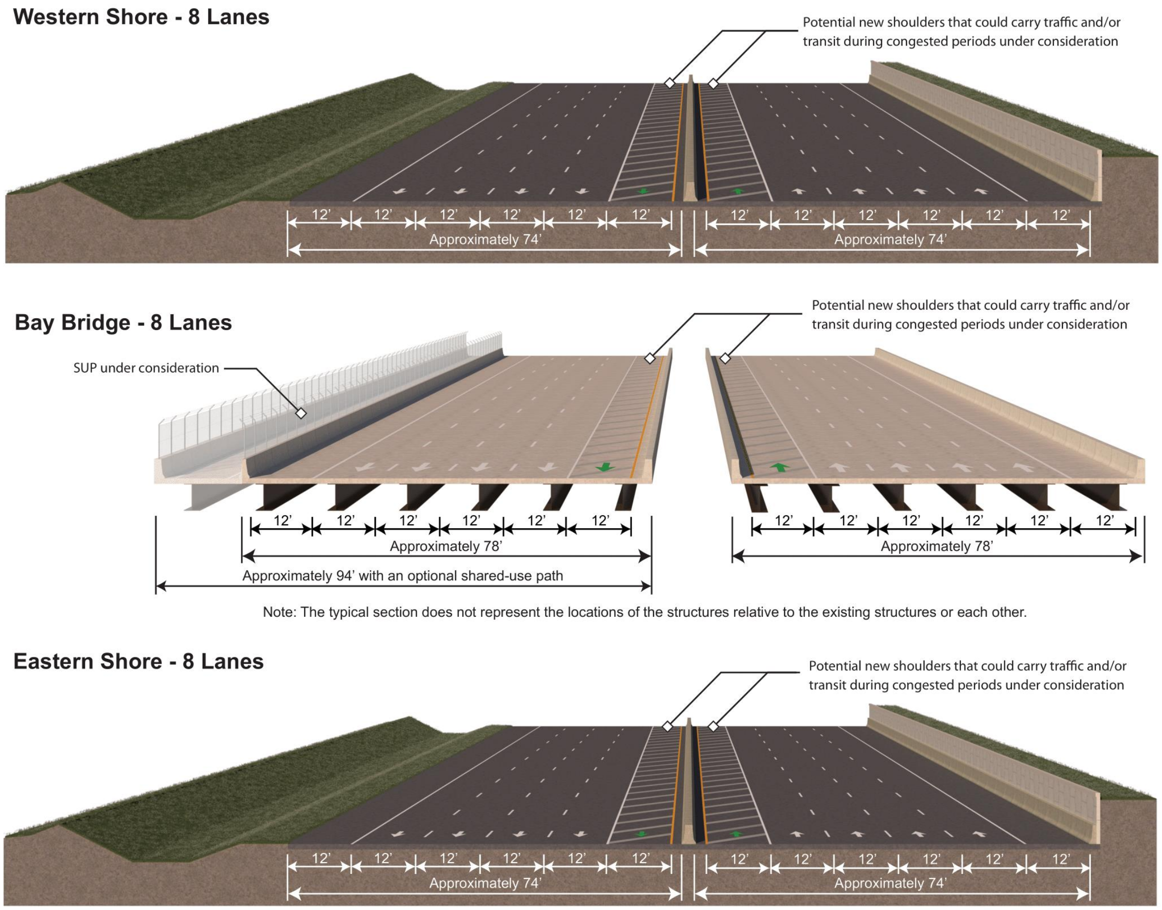
5.6 Alternative E (8-8-8 South)

As described above for all proposed build alternatives, Alternative E would replace the existing Bay Bridge spans with two new bridge spans. Unlike Alternatives B and C, Alternative E (8-8-8 South) would increase the number of lanes along the U.S. 50/301 approaches to eight lanes. Thus, the alternative would consist of eight lanes along U.S. 50/301 on the Western Shore (four per direction), eight lanes crossing the Bridge (four per direction) south of the existing bridge, and eight lanes along U.S. 50/301 on the Eastern Shore (four per direction). This proposed alternative retained for detailed study will be further evaluated in the EIS.

With Alternative E (8-8-8 South), the five existing bridge lanes would be increased to eight bridge lanes. The number of lanes on the Western Shore and Eastern Shore would increase to eight total lanes. On the Western Shore, widening would occur to the outside in both directions to provide the eight-lane section: four lanes per direction plus shoulders. On the Eastern Shore, widening would occur first to the inside in both directions, and then to the outside where there is not sufficient space in the median for the full typical section. For the purposes of this NOI and NOI Additional Project Information Document, the MDTA has assumed the typical sections would be the same as the typical sections for Alternative D, as shown in **Figure 5.3**.

Preliminary footprints for an eight-lane bridge approach connecting with a south bridge location on the Western Shore and the Eastern Shore are shown in **Figures 4.4 and 4.5**, respectively. The footprints show one potential alignment for the south bridge location, but it is not the only potential alignment. The alignment was used to determine a preliminary magnitude of impacts.

Figure 5.3. Alternatives D and E (8-8-8) Typical Sections



5.7 Alternative F (8-10-8 North)

As described above for all proposed ARDS, Alternative F would replace the existing Bay Bridge spans with two new bridge spans. However, unlike Alternatives D and E, Alternative F (8-10-8 North) would increase the number of lanes across the Bay to ten lanes. Thus, the alternative would consist of eight lanes along U.S. 50/301 on the Western Shore (four per direction), ten lanes crossing the Bridge (five per direction) north of the existing bridge, and eight lanes along U.S. 50/301 on the Eastern Shore (four per direction). This proposed alternative retained for detailed study will be further evaluated in the EIS.

On the Western Shore, widening would occur to the outside in both directions to provide the eight-lane section: four lanes per direction plus shoulders. On the Eastern Shore, widening would occur first to the inside in both directions, and then to the outside where there is not sufficient space in the median for the full typical section.

For the purposes of this NOI and NOI Additional Project Information Document, the MDTA has assumed the typical sections for Alternative F (8-10-8 North) as shown in **Figure 5.4**. The lanes and shoulders would be 12 feet wide, and the median width would vary. For the shoulder to be used as a lane during congested periods, the shoulder must be at least 12 feet wide with an offset to the median barrier. For the purposes of the Tier 2 Study as shown in the typical section, the PTSU lane would be 12 feet wide with a 2-foot offset to the concrete median barrier.

Preliminary footprints for a ten-lane bridge approach connecting with a north bridge location on the Western Shore and the Eastern Shore are shown in **Figures 5.5 and 5.6**, respectively. The footprints show one potential alignment for the north bridge location, but it is not the only potential alignment. The alignment was used to determine a preliminary magnitude of impacts. The location of the transition between ten lanes across the bridge and eight lanes on the approaches has not yet been determined.

5.8 Alternative G (8-10-8 South)

As described above for all proposed ARDS, Alternative G would replace the existing Bay Bridge spans with two new bridge spans. However, unlike Alternatives D and E, Alternative G (8-10-8 South) would increase the number of lanes across the Bay to ten lanes. Thus, the alternative would consist of eight lanes along U.S. 50/301 on the Western Shore (four per direction), ten lanes crossing the Bridge (five per direction) south of the existing bridge, and eight lanes along U.S. 50/301 on the Eastern Shore (four per direction). This proposed alternative retained for detailed study will be further evaluated in the EIS.

On the Western Shore, widening would occur to the outside in both directions to provide the eight-lane section: four lanes per direction plus shoulders. On the Eastern Shore, widening would occur first to the inside in both directions, and then to the outside where there is not sufficient space in the median for the full typical section. For the purposes of this NOI and NOI Additional Project Information Document, the MDTA has assumed the typical sections for Alternative G (8-10-8 South) would be the same as the typical sections for Alternative F, as shown in **Figure 5.5**.

Preliminary footprints for a ten-lane bridge approach connecting with a south bridge location on the Western Shore and the Eastern Shore are shown in **Figures 5.7 and 5.8**, respectively. The footprints show one potential alignment for the south bridge location, but it is not the only potential alignment. The alignment was used to determine a preliminary magnitude of impacts. The location of the transition between ten lanes across the bridge and eight lanes on the approaches has not yet been determined.

Figure 5.4. Alternatives F and G (8-10-8) Typical Sections

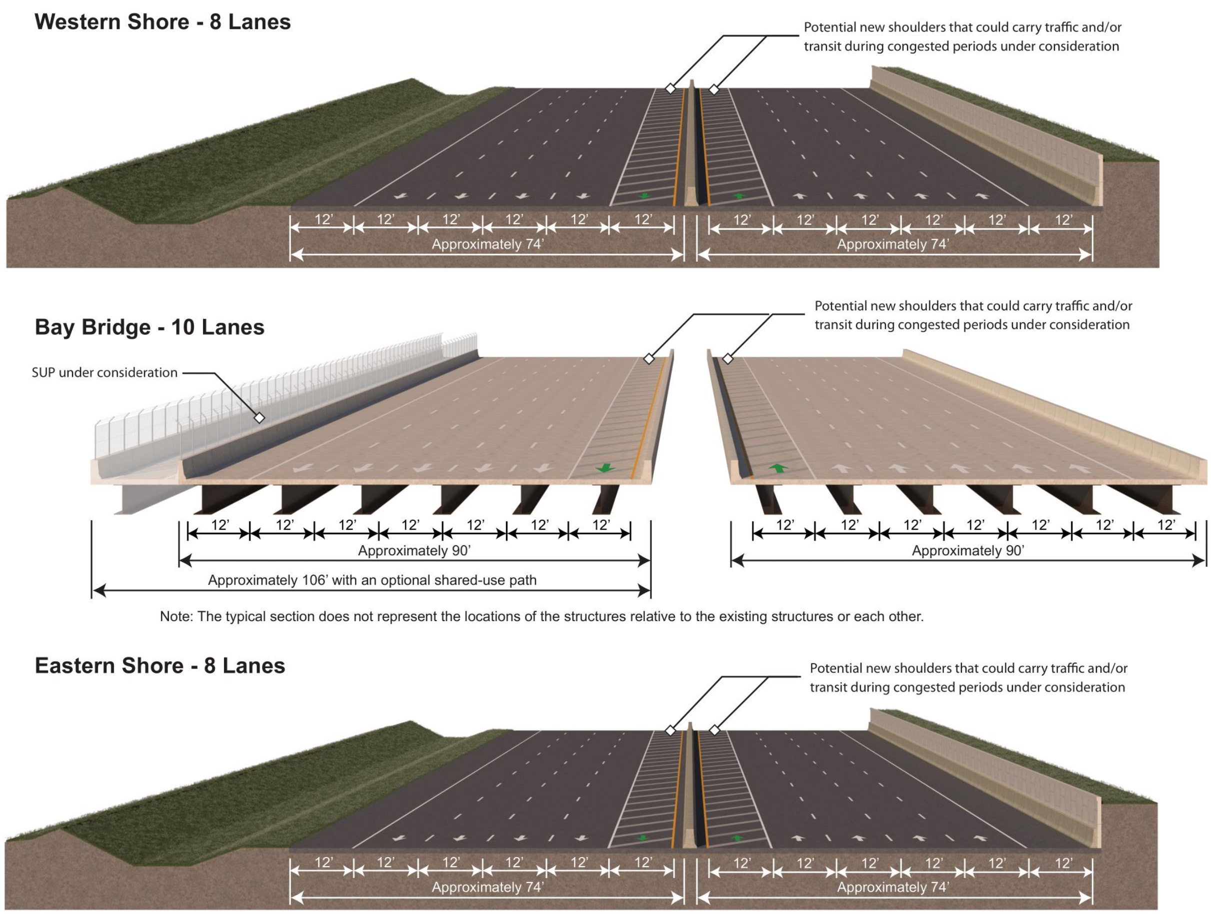


Figure 5.5. Western Shore Approach, Northern Alignment, 10-Lane Bridge

Figure 5.6. Eastern Shore Approach, Northern Alignment, 10-Lane Bridge

Figure 5.7. Western Shore Approach, Southern Alignment, 10-Lane Bridge

Figure 5.8. Eastern Shore Approach, Southern Alignment, 10-Lane Bridge

5.9 Summary

A preliminary evaluation of the proposed ARDS and how they relate to the Purpose and Need is provided in **Table 5-2**. Preliminary cost estimates for the proposed ARDS are provided in **Table 5-3**. Additional study will be performed on the proposed ARDS in the EIS.

Table 5-2. Potential to Address Purpose and Need – Proposed Build Alternatives (Alternatives B-G)

Needs	
Adequate Capacity and Reliable Travel Times	All proposed ARDS would provide additional capacity across the bridge, and Alternatives D through G would provide additional capacity on the approaches. All proposed ARDS will be evaluated to determine the degree to which they have the ability to provide adequate capacity and improve reliability relative to the No-Build Alternative. Enhancements to bus service and transit priority treatments could provide greater transit capacity and improve reliability for transit users. TSM/TDM improvements such as part-time shoulder use could provide additional capacity and greater reliability, particularly during peak periods. Reduced congestion compared to the no-build condition could reduce the rate of crashes during high-volume periods.
Mobility	By providing additional capacity and reducing congestion on U.S. 50/301, the proposed build alternatives could improve mobility for users across the Chesapeake Bay and potentially alleviate spillover traffic in local communities. Enhancements to bus service and transit priority treatments could improve mobility for transit users. Bus, TSM/TDM, and pedestrian/bicycle facility improvements could improve mobility for other travel modes.
Roadway Deficiencies	The proposed ARDS would include new bridge spans that would have wider lanes and shoulders than the existing bridge spans. This could provide safer conditions for drivers, the MDTA workers, and first responders by providing a space for vehicles to pull over. The proposed ARDS would provide an equal number of lanes in each direction, eliminating the need for frequent contraflow operations.
Existing and Future Maintenance Needs	The proposed ARDS would all include a newly constructed bridge, which would require substantially less major maintenance than the existing bridge. Wider shoulders would provide more room for maintenance workers and may not necessitate lane closures for regular maintenance.
Navigation	The proposed ARDS would all involve construction of a new bridge that could have a higher vertical clearance than the existing Bay Bridge. The new bridge could better accommodate maritime transport through the Chesapeake Bay and to the Port of Baltimore.
Objectives	
Environmental Responsibility	The proposed ARDS would result in environmental effects to resources within the Chesapeake Bay and along the tie-ins to the U.S. 50/301 roadway on both shores. Bus enhancements could also reduce a small number of vehicles crossing the Chesapeake Bay and provide greater access to transportation modes that cause less air pollution. A summary of expected impacts for the approach roadways of each proposed ARDS for the north bridge location and the south bridge location can be seen in **Section 6**.
Cost and Financial Responsibility	The proposed ARDS would have costs associated with construction of two new bridge spans over the Chesapeake Bay and the approach roadways. There would also be costs associated with the demolition of the existing Bay Bridge, enhancements to bus service, transit priority treatments, and TSM/TDM improvements such as part-time shoulder use. Preliminary cost estimates for the proposed ARDS are provided in **Table 5-3**.

Table 5-3. Preliminary Cost Estimates for the Proposed ARDS

Alternative	Estimated Cost (2024$)
Alternative A (No-Build)	$3.8 billion*
Alternative B (6-8-6 North)	$8.6 – $9 billion
Alternative C (6-8-6 South)	
Alternative D (8-8-8 North)	$10.4 – $11.1 billion
Alternative E (8-8-8- South)	
Alternative F (8-10-8 North)	$11.6 – $12.3 billion
Alternative G (8-10-8 South)	

*Estimated cost of maintenance and rehabilitation of the existing bridge spans from 2024 through 2065, see **Figure 4.1**.

6 EXISTING ENVIRONMENTAL CONDITIONS AND EXPECTED EFFECTS

The MDTA, in coordination with the FHWA, has initiated data collection, preliminary resource evaluations, and agency coordination to identify the possible environmental, cultural, and socio-economic resources present in the Tier 2 Study EIS limits. These resources could potentially incur direct, indirect, or cumulative impacts from the proposed action. Information on existing environmental conditions in this section is preliminary in nature and has been obtained from the Tier 1 Study EIS and early Tier 2 Study investigations. Methodologies for data collection and evaluation of environmental conditions and impacts in the EIS have received concurrence from an interagency team as described in **Section 1.4** of this report. Based on preliminary review of existing conditions within and in proximity to the study limits, the proposed action could affect the following resources and environmental considerations:

- Socioeconomic resources and land use (including communities and land use; economics and employment; and visual resources);
- Minority and low-income populations;
- Cultural and historic resources;
- Section 4(f) and Section 6(f) properties (including parks and recreational areas);
- Natural resources (such as wetlands and waters, floodplains, water quality, and Chesapeake Bay Critical Areas (CBCAs); aquatic and terrestrial habitat and biota; rare, threatened, and endangered species; and unique and sensitive areas; and hydrodynamics);
- Hazardous materials;
- Air quality;
- Greenhouse gas and climate change; and
- Noise.

Direct, indirect, and cumulative impacts to these resources and environmental considerations will be assessed in the EIS. Based on data collection, evaluation, and coordination with regulatory agencies and the public to date, it is anticipated that potential impacts to natural resources, socioeconomic resources and land use, minority and low-income populations, cultural and historic resources, noise, and Section 4(f) and Section 6(f) properties will be the focus of the Tier 2 Study EIS. This section describes the existing environmental conditions and summarizes the expected effects to the environment. Overall impacts are quantified in **Table 6-3** at the end of this section.

The following sections highlight environmental resources that are prevalent along U.S. 50/301 within the study limits, have heightened regulatory protections, or have the potential to be significantly impacted by the proposed action. Based on investigations to date, the MDTA has identified these environmental conditions as within the scope of important issues to be addressed in the EIS. Additional environmental resources that may be impacted by the proposed ARDS will be identified during EIS scoping and development of the EIS.

Natural Resources

Significant natural resources along or adjacent to the corridor include surface water resources; CBCAs; aquatic and terrestrial habitat (including forested areas) and biota; rare, threatened, and endangered (RTE) species; and unique and sensitive areas. The proposed build alternatives cross portions of eight watersheds including Severn River, Magothy River, Lower Chester River, Lower Chesapeake Bay, Eastern Bay, Kent Island Bay, Kent Narrows, and Wye River, and many of their tributary streams, wetlands, and floodplains. Impacts caused by the discharge of dredged or fill material in Waters of the U.S., including wetlands, are subject to regulatory jurisdiction under Section 404 of the Clean Water Act (CWA) (33 U.S.C. § 1344) and Section 10 of the Rivers and Harbors Act (33 U.S.C. § 403).

There are CBCAs near the Tier 2 Study EIS limits. CBCAs are designated to protect the ecological health and water quality of the Chesapeake Bay and its tributaries. The MDTA will coordinate with the Critical Area Commission as avoidance, minimization, and mitigation concepts are developed.

The terrestrial environment of the area around the study limits is characterized by a mix of diverse habitats. Wildlife and habitat data, including species of mammals, amphibians, reptiles, birds, and fish will continue to be gathered from literature review, online resources, and coordination with the regulatory and resource agencies. The MDTA will continue to coordinate with federal and state agencies to identify RTE species presence and habitats and prepare impact analyses and best management practices to minimize and mitigate impacts to these species from Tier 2 Study alternatives. The flow of water within the Chesapeake Bay and between the Bay and its tributaries is important for maintaining water quality and the overall health of the ecosystem. Hydrodynamic investigations will be conducted and will be used to assess the impacts of the proposed action.

The need to develop Biological Assessments is anticipated once a preferred alternative is selected and coordination with USFWS and NMFS will continue as the project moves forward. Wetlands and water resources, as well as terrestrial environment, could be impacted by the proposed ARDS.

Socioeconomic Resources and Land Use

The population within the Census tract block groups intersected by or immediately adjacent to the study corridor (the socioeconomic analysis area) is approximately 73,000 people. The corridor includes the following communities in AAC and QAC: Arnold, Broadneck, Cape St. Claire, Chester, Grasonville, Kent Narrows, Queenstown, Romancoke, and Stevensville.

For the EIS, a Socioeconomic Analysis Area will be developed that enables the evaluation of reasonably foreseeable impacts related to the ARDS based on U.S. Census Tract (2020) block group boundaries (when available) that include or are within one-quarter mile of the eventual ARDS. Block groups will be matched up with the municipality or Census Designated Place (CDP) in which they are primarily located to define individual Analysis Area communities. Due to the unique geography of the area, there are communities on peninsulas that must travel through the study corridor to access workplaces, goods, and services. The Analysis Area will be expanded to include block groups geographically isolated on peninsulas. Social and economic conditions within the Socioeconomic Analysis Area will be described and analyzed including:

- Population and Demographics,
- Communities and Land Use (Existing and Future/Planned), and
- Economics, Employment, and Commuting Patterns.

There are 12 public parks, 13 schools, three fire stations, three police facilities, 26 places of worship, and four post offices field verified within the socioeconomic analysis area. Information regarding community facilities is based on state and county GIS data, County plans, Google Maps, Google Earth, local knowledge, and field reconnaissance. Land use along U.S. 50/301 within the AAC portion of the study limits is primarily low-density residential use, with areas of institutional and commercial land use dispersed throughout. Dense residential development and institutional uses such as schools are located north of U.S. 50/301, along Cape St. Claire Road, College Parkway, and Bay Dale Drive. Commercial and industrial uses are primarily located adjacent to U.S. 50/301 and other main roadways. Land use in QAC within the study corridor includes a mix of low to medium-density residential use, farmland, institutional, and commercial uses. There is one airport, the Bay Bridge Airport, directly adjacent to the study corridor. Further information on existing and future/planned Priority Funding Areas, land use, and sustainable growth management areas will be obtained from a variety of sources depending on availability. These may include Maryland Department of Planning (MDP) 2020 statewide Land Use GIS data, Queen Anne County Comprehensive Plan (PlanQAC 2022), and AAC community-based Region Plans.

Visual resources are those physical features that comprise the visual landscape, including land, water, vegetation, and man-made elements. Notable visual and aesthetic resources within the study corridor include historic structures, parks, undeveloped open space/natural areas and most prominently, the Bay Bridge. Replacement of the existing structure would result in a visual change that would affect neighbors viewing the existing Bay Bridge and travelers viewing it from U.S. 50/301. Effects to aesthetics will be assessed at site visits and through review of local planning documents, which will help to identify the effects of the action on the surrounding viewshed. Because the corridor is within a developed urban area, the viewshed for this visual and aesthetic resource assessment is primarily limited to adjacent land uses.

Potential effects to socioeconomics and land use include conversion of commercial, residential, agricultural, and industrial parcels adjacent to the U.S. 50/301 roadway to right-of-way. Similarly, neighborhoods and community facilities, including open space, forests, and parks, could be affected by roadway widening. Sensitive viewers may perceive a visual change.

Minority and Low-Income Populations

Executive Order (EO) 12898 (February 11, 1994) *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* directs Federal agencies to identify and address disproportionately high and adverse human health and environmental impacts of its programs, policies, and activities on EJ populations. Additional EOs have underscored the national commitment to advancing EJ and equity, including EO 14096 (April 26, 2023) *Revitalizing Our Nation's Commitment to Environmental Justice for All.* Executive Order (E.O.) 14096 is currently implemented through DOT Order 5610.2C and FHWA Order 6640.23A. This implementation will continue until further guidance is provided regarding the implementation of the E.O. 14096 on environmental justice.

Minority and low-income populations are present within and along the study limits. Minority populations are defined as all persons identifying as a minority race and/or ethnicity. Just over 15,000 individuals identify as being part of a minority race/ethnicity within block groups intersected by or immediately adjacent to the study corridor. Low-income populations are defined by the Department of Health and Human Services poverty guidelines. One block group within the study corridor was identified as a potential low-income population, experiencing a median household income at or below $80,500 for a three-person household. It is anticipated that underserved and disadvantaged populations, communities, and stakeholders are also present, and the Tier 2 Study EIS will further identify these protected groups through data collection supplemented with results from stakeholder engagement. The proposed ARDS have been screened to avoid significant impacts to local communities. Potential effects to minority and low-income populations due to construction of a build alternative include, but are not limited to, conversion of commercial, residential, and industrial properties adjacent to the roadway ROW, as well as other potential environmental effects such as from noise and air quality that could affect these populations. Any disproportionate unavoidable impacts will be identified.

Cultural and Historic Resources

Section 106 of the National Historic Preservation Act, and its implementing regulations as defined by 36 CFR Part 800, require Federal agencies to take into account the effects of their undertakings on historic properties. The FHWA and the MDTA initiated Section 106 consultation during the Tier 1 Study EIS and began the phased identification of historic properties. The Section 106 consultation initiated during the Tier 1 Study EIS is continuing during the Tier 2 Study.

The history of human habitation of the U.S. 50/301 corridor spans over 10,000 years and includes Native American villages, colonial settlement, and early twentieth-century development. An analysis has identified 26 previously documented archaeological sites along U.S. 50/301 within the study limits that reflect the breadth of that history. Of these previously documented sites, three were determined to be eligible for listing in the National Register of Historic Places (NRHP), 22 have not been evaluated, and one was determined not eligible. The MDTA will conduct an evaluation of potentially affected archaeological sites that have not yet been evaluated. The analysis also identified nine known historic cemeteries and burial grounds.

The MDTA has also identified areas along U.S. 50/301 within the study limits that have high or moderate potential to contain terrestrial and underwater archaeological sites. The MDTA will conduct Phase I archaeological survey of areas with high or moderate terrestrial archaeological potential that could be affected by the proposed ARDS as well as areas proposed for direct impacts to the bottom of the Chesapeake Bay.

The built environment along the U.S. 50/301 corridor is shaped by the Chesapeake Bay and its many tributaries and contains buildings constructed in the eighteenth through twenty-first centuries. The area was predominantly agricultural with water-based industries, such as oystering and shipbuilding, along the region's copious waterways. As the Baltimore and Washington, D.C., regions grew after World War II, the region became suburbanized. Farms were developed into residential communities, and commercial development followed along the main transportation corridors. Summer resort communities along the western edge of the Bay were converted to full time use, and new communities were constructed along the waterfront. The opening of the first span of the Chesapeake Bay Bridge in 1952 quickly changed the rural character of QAC, as developers rushed to subdivide newly accessible waterfront land. The opening of the second span of the bridge in 1973, combined with continued growth in the region, brought a new wave of permanent residents to QAC who were willing to commute long distances for work in exchange for a waterfront lifestyle. Today, the U.S. 50/301 corridor reflects this late-twentieth-century suburbanization. The road is lined with commercial and industrial developments, as well as residential communities of varying types.

Architectural survey efforts to date have been prioritized to focus on the areas closest to the proposed ARDS within the study limits, within approximately 400 feet of U.S. 50/301 ROW. Field survey to record and evaluate the architectural resources will continue as part of the consultation process required by Section 106 of the National Historic Preservation Act. To date, there are nine NRHP-listed or eligible architectural historic properties that have been identified that may be affect by the proposed ARDS (**Table 6-1**). Additional historic properties may be identified as properties are further evaluated during EIS development.

Table 6-1. NRHP Listed and Eligible Architectural Resources

MIHP No	Resource Name	Address	Town	Build Date	Eligibility Status
AA-47 AA-48	William Preston Lane, Jr. Memorial Bridge, Eastbound and Westbound (Chesapeake Bay Bridge)	U.S. 50/301 Eastbound and Westbound over Chesapeake Bay	Annapolis	1949-1952 1969-1973	Eligible (2001)
AA-0074	Holly Beach Farm	1800 Holly Beach Farm Road	Annapolis	1909 and later	Eligible
AA-2305	Sandy Point State Park	1100 E. College Parkway	Annapolis	1949 and later	Eligible
AA-2592	Westinghouse Ocean Research and Engineering Center (Westinghouse Oceanic Division)	892 and 897 Oceanic Drive	Annapolis	1966	Eligible
QA-125	Eareckson House (Nathan Morris House)	214 Pier One Road	Stevensville	ca. 1850	Eligible
QA-222	White's Heritage (Stoopley-Gibson)	142 Carriage Heath	Chester	Eighteenth century	Eligible
QA-463	Stevensville Historic District	Multiple	Stevensville	1850-1930	NRHP Listed (1986)
QA-542	SHA Bridge No. 1700600	Main Street (MD 18B) over Kent Island Narrows	Grasonville vicinity	1951	Eligible (2011)

Potential effects to cultural and historic resources along the study corridor include replacement of the historic eastbound and westbound spans of the Bay Bridge. Other cultural, historic and archaeological resources may be identified Tier 2 Study EIS, and will be evaluated for potential adverse effects from the proposed build alternatives.

Section 4(f) and Section 6(f) Properties

Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 (49 U.S.C. 303(c)) is a federal law that protects significant publicly owned parks, recreation areas, wildlife and/or waterfowl refuges, and publicly or privately owned historic sites listed or eligible for listing on the NRHP. Section 6(f) is part of the Land and Water Conservation Fund (LWCF) Act of 1965, which provides funds to Federal, state, and local governments for the acquisition of land and water for recreational purposes and provides further protection to these properties. Analysis of potential impacts to properties protected by Section 6(f) will be conducted to determine whether a conversion of any Section 6(f) property would occur.

A preliminary Section 4(f) resource inventory has been compiled for resources within the study limits. Section 4(f) properties that could be affected by the proposed ARDS are included in **Table 6-2**. These identified properties are subject to change as properties are further identified and evaluated during EIS development, through Section 106 consultation, and during alternatives development.

Table 6-2. Potential Section 4(f) Properties

Property	Official with Jurisdiction	Type of Property
Broadneck Peninsula Trail*	AAC Recreation and Parks	Trail/Planned Facility
Sandy Point State Park**	Maryland DNR	Public Park
William Preston Lane Jr. Memorial Bridge, Eastbound	MHT	Historic Site
William Preston Lane Jr. Memorial Bridge, Westbound	MHT	Historic Site
Terrapin Nature Park	QAC Parks & Recreation	Public Park
Eisinger Property	QAC Parks & Recreation	Planned Facility
Stevensville Middle School	QAC Parks & Recreation	Public Park
Cross Island Trail*	QAC Parks & Recreation	Trail
Kent Island Water Trails	QAC Parks & Recreation	Water Trail
Kent Narrows Bridge (SHA Bridge No. 1700600)	MHT	Historic Site
Kent Narrows Landing	QAC Parks & Recreation	Recreation Area
Holly Beach Farm**	Maryland DNR	Public Park
Captain John Smith National Historic Trail*	National Park Service	Water Trail
Star Spangled Banner National Historic Trail*	National Park Service	Water Trail

* Pursuant to 23 CFR 774.13(f), certain trails, paths, and bikeways, including National Historic Trails established under the National Trails System Act, are excepted from Section 4(f) requirements unless the affected trail section(s) are defined as historic sites. The MDTA will perform further evaluation to determine whether or not these trails qualify for the exception.
**Sandy Point State Park and Holly Beach Farm are also Section 6(f) properties.

Due to the proximity of known Section 4(f) properties within the study limits, Tier 2 Study alternatives could require permanent or temporary acquisition of Section 4(f) properties. A Section 4(f) Evaluation will be prepared to assess the potential permanent, temporary, constructive or *de minimis* use of Section 4(f) property(s). The Section 4(f) Evaluation will also include a property inventory and an avoidance analysis that will evaluate avoidance alternatives and minimization measures. Analysis of potential impacts to Section 6(f) resources will also be conducted to determine whether a conversion of any Section 6(f) property would occur and to identify mitigation measures to avoid or minimize impacts.

Hazardous Materials

The MDTA has conducted an Initial Site Assessment to identify recognized environmental conditions (REC) within the study limits. A REC is defined by the American Society for Testing Materials as: (1) the presence of hazardous substances or petroleum products in, on, or at the subject property; (2) the likely presence of hazardous substances or petroleum products in, on, or at the subject property due to a release or likely release to the environment; and (3) the presence of hazardous substances or petroleum products in, on, or at the subject property under conditions that pose a material threat of a future release to the environment. There are 50 sites along the study limits within close proximity that could be impacted by the proposed ARDS.

Air Quality

The Clean Air Act is the Federal law that regulates pollutant emissions from stationary sources, such as power plants, and mobile sources, such as cars and trucks. On-road mobile sources, including cars, vans, trucks, and buses primarily contribute to carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), and particulate matter 2.5 ($PM_{2.5}$) and 10 (PM_{10}). EPA requires a "transportation conformity determination" for projects involving Federal funding or approval that are within designated "nonattainment" and/or "maintenance" areas.

The Tier 2 Study EIS will include an air quality analysis to document potential short- and long-term differences in air quality resulting from factors such as construction, forecasted changes in emissions from mobile and marine traffic, changes in vehicle numbers, and patterns of congestion. Since both AAC and QAC are currently classified as attainment areas for the CO and $PM_{2.5}$ National Ambient Air Quality Standards, no conformity determination for these pollutants is required. The MDTA will continue to coordinate with the MDE and EPA regarding the new $PM_{2.5}$ Federal standard adopted in February 2024. Should this new standard be implemented prior to the completion of the Tier 2 Study Air Quality Technical Report, the methodology would be modified to include a $PM_{2.5}$ hotspot analysis.

Greenhouse Gas and Climate Change

In January 2023, the CEQ released new guidance titled *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*. Through this guidance, CEQ recommends that agencies evaluate: 1) the potential effects of a proposed action on climate change, as well as 2) the effects of climate change on a proposed action and its environmental impacts. Other major Federal regulations and guidance that apply to the potential greenhouse gas (GHG) emissions and climate change impacts of transportation projects include Executive

Orders and other legislation for reducing GHG emissions and building infrastructure resilience. State regulations include the Maryland GHG Reduction Act and updated Maryland's Climate Solutions Now Act, as well as various climate pollution and GHG reduction plans.

Existing GHG emission sources include daily traffic; bridge maintenance activities; boat, barge, and ship traffic passing under the bridge; and any electricity use associated with buildings or auxiliary facilities operating along the corridor. The Tier 2 Study EIS will include a comparison of relevant GHG emissions among alternatives.

Noise

Approximately half of the land uses along U.S. 50/301 within the study limits were identified as noise sensitive areas (NSA). A noise impact analysis will be conducted to identify impacted NSAs. Noise abatement will then be investigated at all NSAs where build traffic noise levels approach or exceed levels for the defined land use, or where there are substantial increases over peak ambient noise levels. Where noise abatement is warranted for consideration, additional criteria will be examined to determine if the abatement is feasible and reasonable. The results of all highway traffic noise analyses will be presented at public meetings and included in the EIS documentation. There is a potential for increased noise from implementing the proposed ARDS.

Indirect and Cumulative Effects

Indirect effects are those that are caused by the action and are experienced later in time or farther removed in distance, but still reasonably foreseeable (40 CFR 1508.1(g)(2)). Indirect effects can include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.1(g)(2)).

Cumulative effects are the incremental or combined impacts to a resource when added to other past, present, or reasonably foreseeable actions (40 CFR 1508.1(g)(3)). Cumulative effects consider all incremental actions regardless of what agency or person undertakes an action, whether it be a local, state, or Federal action.

The MDTA will complete an Indirect and Cumulative Effects (ICE) Analysis as part of the Tier 2 Study EIS. The analysis will begin by establishing an ICE Analysis Boundary to assess the potential for ICE within the study area. The ICE Analysis Boundary will consist of watershed boundaries, U.S. Census Tracts, induced growth study areas, and an Area of Traffic Influence. The Tier 2 analysis will include a detailed evaluation of these potential effects from the Tier 2 Study's alternatives, including the No-Build Alternative, that could be caused by induced growth, changes to population growth rate, development pressure on vulnerable land uses, downstream effects to air and water resources, and changes in development patterns in conjunction with other development. These impacts are anticipated to be experienced in areas that are not currently within a reasonable commute time but would be within a reasonable commute time because of the time savings created by an improved crossing. Areas currently within a reasonable commute could experience impacts due to intensification of current or future development.

Inventory of Resources within the Chesapeake Bay Crossing Locations

The MDTA has completed an inventory of areas where the two new bridge spans could be located across the Chesapeake Bay. However, potential impacts to Chesapeake Bay resources from the crossing structure have not been quantified. Environmental impacts to resources within the Chesapeake Bay would be dependent upon number of bridge piers, pier placement, construction techniques and other factors which have not yet been evaluated.

The following resources were identified within the bridge crossing locations. The values indicate the prevalence and possible magnitude of impacts within each location, but actual impacts to these resources would likely be much less. Actual impacts of the ARDS bridge spans will be identified in the EIS.

- Surface Waters – Chesapeake Bay Tidal Area: 400 acres
- Public Shellfishery Areas: 50 acres
- Benthic Habitat: 70 acres (north location) and 60 acres (south location)
- Historic Oyster Bottom: 110 acres
- Waterfowl Nesting Areas: 20 acres (north location) and 10 acres (south location)

Overall Potential Effects from the Proposed ARDS

Table 6-3 presents the quantified potential environmental effects from the proposed ARDS. These are impacts caused by the approach roadways, not the proposed new bridge spans, and include effects to community resources, historic resources, natural resources, and preservation areas. The impact values provided are estimated based on approximate footprints of the proposed ARDS on the Eastern Shore and Western Shore. As the ARDS are evaluated in the EIS, the expected effects will be further refined and identified in greater detail.

Table 6-3. Potential Effects from the Proposed ARDS on the Approaches

Resource Type	Resource	Unit	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G
			No-Build	6-8-6 North	6-8-6 South	8-8-8 North	8-8-8 South	8-10-8 North	8-10-8 South
Community Resources	Total Area of Additional ROW	acres	0	10-40	10-40	60	60	60-70	60-70
	Residential Property Area	acres	0	0-5	0-5	8	8	8-11	8-11
	Commercial Property Area	acres	0	1-7	2-8	15	16	15-18	16-19
	Number of Community Facilities	#	0	3-6	1-6	8	7	8	8
	Community Facility Property Area	acres	0	7-8	6	8	6	8-9	6-7
	Number of Parks	#	0	2-4	0-3	5	4	5-6	5-6
	Park Property Area	acres	0	5-6	0-1	7	2	7	2-3
	Number of Minority or Low-Income Populations (Block Groups)	#	0	2-5	2-5	11-12	11-12	11-12	11-12
Historic Resources	Number of Historic Properties*	#	0	3	3	4	4	4	4
	Historic Property Area	acres	0	6-7	1	7	2	7	2
Natural Resources	SSPRA Habitat	#	0	2-4	2-4	7-8	7-8	7-8	7-8
	FIDS Habitat	acres	0	7-9	7-9	20	20	20-21	20-21
	Forest Areas	acres	0	20-30	10-30	100	90-100	100-110	100
	Agricultural Land	acres	0	0	0	1	1	1	1
	Critical Areas	acres	0	80-200	80-190	400	390-400	400-410	390-400
	Critical Area (100-ft) Buffer	acres	0	19-24	15-21	36	32	36	32-33
	Wetlands (Field Delineated)	acres	0	7-15	5-12	28	25	28	25-26
	100-Year Floodplain Area	acres	0	30	20	60	50	60	50
	Surface Waters - Non-tidal Area	acres	0	7-8	8	10	10	10	10

Resource Type	Resource	Unit	Alt A No-Build	Alt B 6-8-6 North	Alt C 6-8-6 South	Alt D 8-8-8 North	Alt E 8-8-8 South	Alt F 8-10-8 North	Alt G 8-10-8 South
	Surface Waters - Tidal Area	acres	0	2-3	1	7	5	7	5-6
	Benthic Habitat	acres	0	0	0	3	3	3	3
	Submerged Aquatic Vegetation	acres	0	3	1	3	1	3	1
	Horseshoe Crab Habitat	linear ft	0	3,200	700	3,200	700	3,200	700
	Public Shellfishery Areas	acres	0	0	0	4	4	4	4
	Oyster Sanctuaries	acres	0	0-1	0-1	1	1	1-2	1-2
	Historic Oyster Bottom	acres	0	0	0	4	4	4	4
Other Resources/ Preservation Areas	Number of Section 4f Properties	#	0	5-7	3-6	9	8	9-10	9-10
	Number of Section 6f Properties	#	0	2	2	2	2	2	2
	Section 6f Properties	acres	0	6-7	1	7	1	7	1
	Conservation Easements	acres	0	20-40	20-30	40	30	40	30
	Green Infrastructure	acres	0	0-1	0-1	18	18	18	18
	Local Protected Land	acres	0	1	1	2	2	2	2
	Environmental Trust Easements	acres	0	0-1	0-1	6	6	6	6

* Historic properties include two bridges, the Chesapeake Bay Bridge and the MD 18 Kent Narrows Bridge. These historic bridges are not included in impact area calculations.

7 ANTICIPATED PERMITS AND OTHER AUTHORIZATIONS

The MDTA does not anticipate submitting applications for permits and approvals that require design-level detail as part of NEPA or immediately following completion of the NEPA environmental review process. Per 23 U.S.C. 139(d)(10), the aforementioned permits and authorizations should be completed by no later than 90 days after the issuance of the Record of Decision. However, for this project the MDTA has requested in accordance with 23 U.S.C. 139(d)(10)(C)(ii) that those permits and authorizations follow a different timeline because the construction date is not expected until 2032. The development and review of applications for permits and other approvals will be completed as more detailed design and construction engineering progresses beyond the Tier 2 Study EIS. The NEPA study will be coordinated with the federal and state regulatory agencies based on their role as Cooperating and Participating Agencies.

During development of the Tier 2 Study EIS, the MDTA and the FHWA will analyze the types and degree of environmental effects to likely result from the Tier 2 Study build alternatives. This analysis will be used to identify the specific permits that will likely be needed. The impact assessment will also inform potential avoidance, minimization, and mitigation strategies.

The permits and regulatory approvals that are anticipated to be required prior to the commencement of construction are listed in **Table 7-1**. As the EIS is developed, it may be determined that some of these permits and authorizations may not be needed. Regulatory changes in the future may add or reduce regulatory requirements. **Table 7-1** also presents the anticipated timing of permits and authorization decisions. The overall schedule for permits and authorization decisions is as follows:

- Final EIS/ROD (November 2026)
- Procurement for Final Design (Fall 2026 – Spring 2028)
- Commence Final Design (Spring 2028)
- Permit Applications/Authorization Requests Submitted (Spring 2030)
- All Permit Decisions and Authorizations Issued (Spring 2031)
- Commence Construction (Summer 2032)

Table 7-1. Permits and Regulatory Approvals

<table>
<tr><th>Permit/Approval</th><th>Authority</th><th>Agency</th><th>Schedule</th></tr>
<tr><td>Smart Growth Areas Act</td><td>State</td><td>MDP</td><td>November 2026 – Authorization with ROD</td></tr>
<tr><td>LWCF Act</td><td>Federal</td><td>NPS</td><td>November 2026 – Authorization with ROD</td></tr>
<tr><td>Farmland Protection Policy Act</td><td>Federal</td><td>USDA NRCS</td><td>November 2026 – Authorization with ROD</td></tr>
<tr><td>Section 4(f) of the USDOT Act</td><td>Federal</td><td>FHWA</td><td>November 2026 – Authorization with ROD</td></tr>
<tr><td>Migratory Bird Treaty Act</td><td>Federal</td><td>USFWS</td><td>November 2026 – Authorization with ROD</td></tr>
<tr><td>Nongame and Endangered Species Conservation Act</td><td>State</td><td>DNR</td><td>November 2026 – Authorization with ROD</td></tr>
<tr><td>MHT Act and National Historic Preservation Act, Section 106</td><td>State / Federal</td><td>MHT, ACHP, FHWA</td><td>November 2026 – Authorization with ROD (Programmatic Agreement)</td></tr>
<tr><td>Fish and Wildlife Coordination Act</td><td>Federal</td><td>USFWS, NMFS, DNR</td><td>November 2026 – Authorization with ROD</td></tr>
<tr><td>EO 11990: Protection of Wetlands</td><td>Federal</td><td>FHWA</td><td>November 2026 – Authorization with ROD</td></tr>
<tr><td>EO 11998: Floodplain Management</td><td>Federal</td><td>FHWA</td><td>November 2026 – Authorization with ROD</td></tr>
<tr><td>Endangered Species Act and Marine Mammal Act</td><td>Federal</td><td>USFWS and NOAA Fisheries</td><td>November 2026 – Authorization (Biological Opinion) with ROD</td></tr>
<tr><td>CWA, Section 401 (Water Quality Certification)</td><td>Federal</td><td>MDE</td><td rowspan="6">Spring 2030 – Joint Permit Application
Spring 2031 – Permits</td></tr>
<tr><td>CWA, Section 404/River and Harbors Act – Section 10</td><td>Federal</td><td>USACE</td></tr>
<tr><td>Nontidal Wetlands Protection Act & Program</td><td>State</td><td>MDE</td></tr>
<tr><td>Tidal Wetlands Act & Program</td><td>State</td><td>BPW</td></tr>
<tr><td>Waterways Construction Statute</td><td>State</td><td>MDE</td></tr>
<tr><td>Coastal Zone Consistency & Coastal Zone Management Program</td><td>Federal</td><td>DNR</td></tr>
<tr><td>Civil Works Projects, CWA Section 408 / River and Harbors Act – Section 14</td><td>Federal</td><td>USACE</td><td>Spring 2030 – Permit Application
Spring 2031 – Permit</td></tr>
<tr><td>Bald and Golden Eagle Protection Act</td><td>Federal</td><td>USFWS</td><td>November 2026 – Authorization with ROD</td></tr>
<tr><td>Essential Fish Habitat – Magnuson-Stevens Fishery and Management Act</td><td>Federal</td><td>NOAA Fisheries</td><td>November 2026 – Authorization with ROD</td></tr>
</table>

Permit/Approval	Authority	Agency	Schedule
General Bridge Act/River and Harbors Act – Section 9	Federal	USCG	Spring 2030 – Bridge Permit Application Spring 2031 – Permit
National Flood Insurance Program	Federal	FEMA	Spring 2030 – Authorization
Obstruction Evaluation / Airport Airspace Analysis 14 CFR 77	Federal	FAA	Spring 2031 – Authorization
Obstruction Evaluation / Airport Airspace Analysis COMAR 11.03.05	State	MAA	Spring 2031 – Authorization
Chesapeake Bay Critical Area Law	State	DNR Critical Area Commission	Spring 2030 – Authorization
Forest Conservation Act, Reforestation / Roadside Tree Laws	State	DNR	Spring 2030 – Applications Spring 2031 – Permits
Sediment & Erosion Control Program	State	MDE	Spring 2030 – Application Spring 2031 – Permit
Stormwater Management Act	State	MDE	Spring 2030 – Application Spring 2031 – Permit

8 STUDY SCHEDULE

Key milestones for the Tier 2 Study EIS have been developed to meet the requirements of 40 CFR 1501.10(b)(2), which stipulates that the NEPA review for an EIS should be completed two years after the date on which the NOI is issued. Following the issuance of this NOI, the FHWA and the MDTA will coordinate with the Participating and Cooperating Agencies to develop study documentation and the EIS. The anticipated schedule is included in **Table 8-1**.

Table 8-1. Study Milestones

Milestone	Description	Anticipated Timing
NOI and report published in the Federal Register	The NOI alerts agencies and the public of the intent to prepare an Environmental Impact Statement.	November 2024
Scoping Meetings	Public scoping meetings will be held to collect information on location-specific issues, concerns about and hopes for the Tier 2 Study EIS, and feedback on proposed ARDS.	December 2024
ARDS	The MDTA will identify the ARDS, or the reasonable range of alternatives for evaluation in the EIS. The ARDS will be carried forward for detailed analysis.	February 2025
ARDS Evaluation	The MDTA will use the Purpose and Need, and objectives, to screen alternatives and evaluate environmental effects of the alternatives.	February 2025 – June 2025
The MDTA's Recommended Preferred Alternative	The MDTA will select a Recommended Preferred Alternative, or an alternative it thinks will best address the Tier 2 Study EIS purpose, needs, and objectives.	July 2025
Draft EIS Notice of Availability (NOA)	The Draft EIS analyzes potential environmental effects resulting from alternatives (including the preferred alternative) to the proposed action. The NOA announces the start of the public review and comment period.	November 2025
Draft EIS Public Hearings	Public hearings will be held to provide the public with an opportunity to learn more about the Draft EIS, ask questions, and submit oral testimony related to the Tier 2 Study EIS.	December 2025
Final EIS/ROD NOA	The Final EIS will address comments on the Draft EIS and will discuss the basis for selection of the Preferred Alternative. The ROD will be published simultaneously and will state the decision, identify alternatives considered by the agency in reaching its decision, and specify the alternative considered environmentally preferable. Avoidance and minimization measures for the selected alternative will be discussed.	November 2026

9 REQUEST FOR INPUT AND CONTACT INFORMATION

The MDTA and the FHWA are requesting comments from agencies, non-governmental organizations, and the public regarding all aspects of the project. Agencies and the public are encouraged to submit comments regarding the proposed ARDS and information regarding anticipated important issues or environmental effects and analyses relevant to the proposed action for consideration in the EIS. Please submit comments via mail, email, phone, or the study website:

- *Mail:* Federal Highway Administration, Maryland Division, Attention: Chesapeake Bay Crossing Study: Tier 2 NEPA (PIN EISX---XMD-1729253019), George H. Fallon Federal Building, 31 Hopkins Plaza, Suite 1520, Baltimore, Maryland 21201.

- *Mail:* Maryland Transportation Authority, Division of Planning & Program Development, Bay Crossing Study, 2310 Broening Highway, Baltimore, Maryland 21224.

- *Email*: info@baycrossingstudy.com

- *Call*: 667-203-5408

- *Online*: baycrossingstudy.com

A series of Public Open Houses will be held in December 2024 to present information from this report, including existing environmental conditions and proposed ARDS for evaluation in the EIS. One virtual and two in-person meetings will be held as part of the Open Houses. The virtual meeting will be held on December 4, 2024. An in-person meeting will be held at Broadneck High School in AAC on December 9, 2024, and a second at the Kent Island High School in QAC on December 11, 2024.

Comments must be received by January 13, 2024. Comments received will be published in the EIS.

10 REFERENCES

Council on Environmental Quality (CEQ). 1997. Environmental Justice Guidance Under the National Environmental Policy Act. Retrieved August 2020: https://www.epa.gov/environmentaljustice/ceq-environmental-justice-guidance-under-national-environmental-policy-act

CEQ. 2023. *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*. Retrieved March 2024: https://ceq.doe.gov/guidance/ceq_guidance_nepa-ghg.html

Federal Highway Administration (FHWA). 1987. Guidance for Preparing and Processing Environmental and Section 4(F) Documents. FHWA Technical Advisory T 6640.8A (October 30). Washington, D.C.: U.S. Department of Transportation.

FHWA. 1993. *NEPA Implementation*. Retrieved March 2024:

https://www.environment.fhwa.dot.gov/legislation/nepa/guidance_project_termini.aspx

FHWA. 2012. *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. Retrieved June 2020: https://www.fhwa.dot.gov/legsregs/directives/orders/664023a.cfm

FHWA. 2017. *Noise Measurement Handbook* https://www.fhwa.dot.gov/environment/noise/measurement/fhwahep18065.pdf

FHWA. 2011. Federal Highway Administration's *Highway Traffic Noise Analysis and Abatement Guidance, 2011.* *https://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf*

FHWA. *Benefits of Access Management Brochure*. Retrieved March 2024: https://ops.fhwa.dot.gov/access_mgmt/docs/benefits_am_trifold.htm

FHWA. *Use of Freeway Shoulders for Travel — Guide for Planning, Evaluating, and Designing Part-Time Shoulder Use as a Traffic Management Strategy*. Retrieved March 2024: https://ops.fhwa.dot.gov/publications/fhwahop15023/ch1.htm

Friedland, et al. 2020. *Trends and change points in surface and bottom thermal environments of the U.S. Northeast Continental Shelf Ecosystem*. Retrieved March 2024: https://doi.org/10.1111/fog.12485

Hinson, et al. 2022. *Extent and Causes of Chesapeake Bay Warming*. Retrieved March 2024: https://doi.org/10.1111/1752-1688.12916

Maryland Department of the Environment (MDE). 2022. *Greenhouse Gas Inventory*. Retrieved March 2024: https://mde.maryland.gov/programs/Air/ClimateChange/Pages/GreenhouseGasInventory.aspx

Maryland Department of Natural Resources (MDNR). 2024. *MyCoast Maryland*. Retrieved March 2024: https://mycoast.org/md

Maryland iMAP GIS Catalog. Retrieved March 2024: https://imap.maryland.gov/

Maryland Transit Administration (MTA). 2022. *Maryland Statewide Transit Plan*. Retrieved March 2024: https://s3.amazonaws.com/mta-website-staging/mta-website-staging/files/Transit%20Projects/Statewide%20Transit%20Plan/Maryland%20Statewide%20Transit%20Plan_DRAFT_January%202022.pdf

Maryland Transportation Authority (MDTA). 2015. *U.S. 50/301 William Preston Lane Jr. Memorial (Bay) Bridge: Life Cycle Cost Analysis*. Retrieved March 2024: https://mdta.maryland.gov/sites/default/files/Files/Bay_Bridge_LCCA_Report_12-2015.pdf

MDTA. 2020. Chesapeake Bay Crossing Study: Tier 1 NEPA. Retrieved March 2024: https://baycrossingstudy.com/images/nepa_process/Appendix%20B%20-%20BCS%20Tier%201%20NEPA%20-%20Transit%20Service%20Evaluation.pdf

MDTA. 2023. Chesapeake Bay Crossing Study: Tier 2 NEPA. *Coordination Plan.* Retrieved March 2024: https://www.baycrossingstudy.com/images/documents/November_2023_BCST2_Coordination_Plan.pdf

Metropolitan Transportation Commission. 2024. *San Francisco-Oakland Bay Bridge*. Retrieved July 2024: https://mtc.ca.gov/operations/programs-projects/bridges/san-francisco-oakland-bay-bridge

National Oceanic and Atmospheric Administration (NOAA). 2024. *Sea Level Rise*. Retrieved March 2024: https://www.climate.gov/maps-data/dataset/sea-level-rise-map-viewer

New York State. 2024. *Half Moon Overlook.* Retrieved July 2024: https://mariomcuomobridge.ny.gov/explore-bridge-path-half-moon

Northeast Reginal Climate Center. 2024. Retrieved March 2024: https://www.nrcc.cornell.edu/

Program for Climate Model Diagnosis & Intercomparison. 2019. Coupled Model Intercomparison Project (CMIP6). Retrieved March 2024: https://pcmdi.llnl.gov/CMIP6/

State Highway Administration (SHA). 2020. *Highway Noise Abatement Planning and Engineering Guidelines*. https://www.roads.maryland.gov/OHD2/SHA_Noise_Policy.pdf

SHA. 2022. *Easing Congestion of the Broadneck Peninsula*. Retrieved March 2024: https://maryland.maps.arcgis.com/sharing/rest/content/items/bdee1cca2a8d4eceb2032c326063b960/data

Tuckey, et al. 2021. 2021 Annual Report Estimating Relative Juvenile Abundance of Ecologically Important Finfish in the Virginia Portion of Chesapeake Bay. Retrieved March 2024: https://scholarworks.wm.edu/cgi/viewcontent.cgi?article=3468&context=reports

US Drought Monitor. 2024. Retrieved March 2024: https://droughtmonitor.unl.edu/CurrentMap.aspx

United States Census Bureau. 2022. Census 2022 TIGER/Line Shapefiles. Retrieved March 2024: https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.2022.html#list-tab-790442341

United States Census Bureau. 2022. 2018-2022 American Community Survey 5-year Estimates. Retrieved March 2024: https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2022/5-year.html

Chesapeake BAY CROSSING STUDY
TIER 2 NEPA

NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT

ADDITIONAL PROJECT INFORMATION DOCUMENT

EISX---XMD-1729253019

APPENDIX A: PRELIMINARY PURPOSE AND NEED REPORT

Maryland Transportation Authority

MDTA

November 2024

Chesapeake
BAY CROSSING STUDY
TIER 2 NEPA

PRELIMINARY PURPOSE AND NEED REPORT

MDTA Maryland Transportation Authority

U S DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

NOVEMBER 2024

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

PRELIMINARY PURPOSE AND NEED REPORT

Maryland Transportation Authority

November 2024

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ABBREVIATIONS AND ACRONYMS

AET	All Electronic Tolling
ALCS	Automated Lane Closure System
B&A	Baltimore & Annapolis (Trail)
BTS	Bureau of Transportation Statistics
C&D	Chesapeake & Delaware (Canal)
CHART	Coordinated Highways Action Response Team
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
LOS	Level of Service
MDOT	Maryland Department of Transportation
MDTA	Maryland Transportation Authority
MPA	Maryland Port Administration
MPH	Miles per hour
MTA	Maryland Transit Administration
MVM	Million Vehicle Miles
MWCOG	Metropolitan Washington Council of Governments
NEPA	National Environmental Policy Act
NOI	Notice of Intent
O-Ds	Origins-Destinations
PHFS	Primary Highway Freight System
PNCD	Preliminary Navigational Clearance Determination
PPX	Post Panamax
PTI	Planning Time Index
ROD	Record of Decision

RPCA	Recommended Preferred Corridor Alternative
SHA	State Highway Administration
TEU	Twenty-foot Equivalent Unit
VPHPL	Vehicles per hour per lane
U.S.	United States
USCG	United States Coast Guard
USDOT	United States Department of Transportation

1 INTRODUCTION

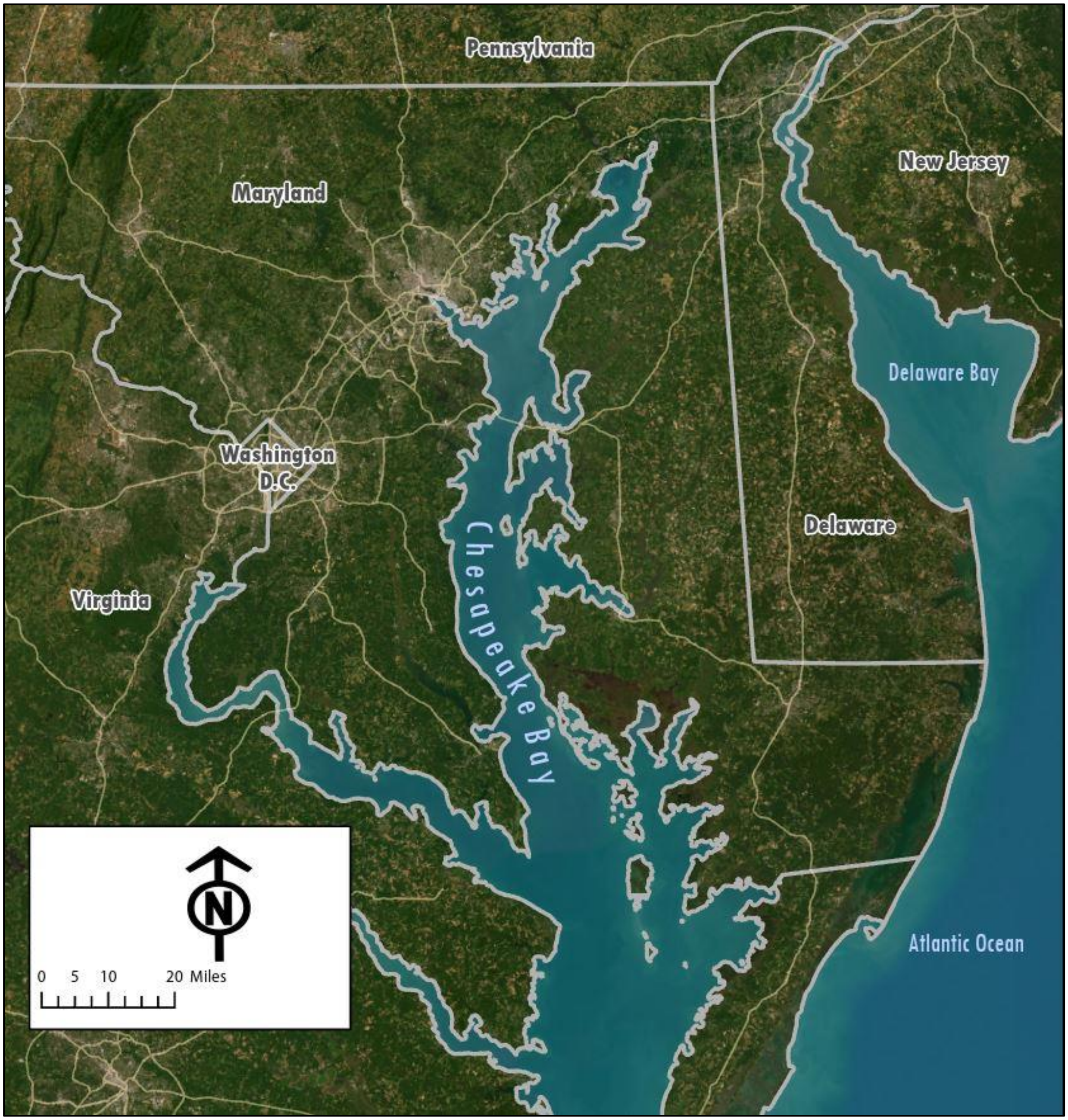
The Chesapeake Bay Crossing Study (Bay Crossing Study) is a two-tiered engineering and environmental study being advanced by the Maryland Transportation Authority (MDTA) in coordination with the Federal Highway Administration (FHWA) to address existing and future transportation issues at the William Preston Lane, Jr. Memorial Bridge (Bay Bridge) and its approaches along U.S. 50/301. Each tier of the Bay Crossing Study involves development of an Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) to describe potential significant environmental effects and inform the evaluation of alternatives. Tier 1 of the Bay Crossing Study (Tier 1 Study) was completed in April 2022. At that time, the FHWA issued a Final Environmental Impact Statement/Record of Decision (FEIS/ROD) identifying Corridor 7, the corridor including the Bay Bridge and its approaches as the Selected Corridor Alternative for further evaluation.

Tier 2 of the Bay Crossing Study (Tier 2 Study) was launched in June 2022 to focus on project-level (site-specific) analysis within the Tier 1 Selected Corridor Alternative (Corridor 7). As part of the NEPA process, the Tier 2 Study includes an analysis of purpose and need, alternatives, and anticipated environmental impacts. This Preliminary Purpose and Need Report for the Tier 2 Study provides the foundation for decision-making throughout the NEPA process. It guides development, analysis, and basis for evaluating alternatives by stating what the project or study is intended to do and outlining the issues it seeks to address. It also establishes the reasons for moving forward with the project or study. This report describes existing and anticipated future conditions of the Bay Bridge and its approaches, presents the purpose of the Tier 2 Study, and identifies the needs and additional objectives.

1.1 Background

The Chesapeake Bay, displayed in **Figure 1**, is one of Maryland's most important natural, economic, and cultural resources and the largest estuary in the United States. The 64,000-square-mile watershed that flows into the Bay spans six states and the District of Columbia and includes 150 major rivers and over 100,000 tributaries. The Bay has historically shaped the region's identity, culture, and traditions. Due to the ecological resources and geographical location, the Chesapeake Bay area has a rich archaeological history that spans thousands of years and has also played an important role in the founding and development of the United States of America. The Eastern Shore of Maryland is now best known for its farming and agricultural enterprises, seafood and waterfront industries, as well as tourism and recreational activities in coastal areas, influenced by the Bay.

Figure 1: Aerial of the Chesapeake Bay



The Western Shore is characterized by its major metropolitan employment centers and surrounding communities in the Baltimore-Washington region, complemented by agricultural, seafood, and waterfront industries.

The Bay Bridge is a two-span structure that crosses the Chesapeake Bay from Anne Arundel County on the Western Shore to Queen Anne's County on the Eastern Shore. The original span was built in 1952 to connect the communities on both sides of the Bay (**Figure 2**). Within ten years of opening, the traffic volumes on the original span had nearly doubled. Planning began for a new structure that would provide additional capacity and a parallel span directly north of the original Bay Bridge was opened in 1973. The Bay Bridge has become one of Maryland's most iconic and recognizable landmarks, used by millions of Marylanders and other travelers. As Maryland's only crossing of the Chesapeake Bay, the Bay Bridge plays a major role in the State's regional transportation system and is vital in facilitating transportation, commerce, and tourism in the region.

Figure 2: Construction of the Original Bay Bridge Span in 1952

In 1974, (the first full year that both the first and second span were open to traffic), 7.5 million vehicles crossed the bridge. By 2002, that number had more than tripled, to 25.0 million. Annual volumes have been above 25.0 million each year since, except for the COVID-19 pandemic year of 2020. Today, the Bay Bridge structures have inadequate capacity for current volumes, particularly during summer weekends. Queues longer than one mile routinely occur, and can persist for as long as eight hours. During those eight hours, queues have been observed to extend to nearly five miles. Based on regional and statewide estimates for population growth and travel demand patterns, it is projected that traffic volumes across the Bay Bridge will continue to increase over time (see **Section 3.1** for information related to future conditions). Increases in congestion reduce regional mobility and reliability, which is needed for accessing employment and recreation areas, moving commerce, and providing capacity for emergencies or evacuation events. Congestion also increases during instances of infrastructure maintenance and incident management, both of which can result in closed lanes and are expected to exacerbate conditions as the structures age and risk of congestion-related traffic incidents rises.

1.2 The Tiered NEPA Process

Through the years, the Bay Bridge and its approaches have been the subject of many studies and subsequent transportation improvements, some of which are described in **Section 1.3**. Despite these improvements, transportation issues at the Bay Bridge and its approaches have persisted. To study possible solutions that could address these continued issues, the MDTA and FHWA are conducting the Bay Crossing Study as a tiered NEPA Study. The tiered approach to NEPA allowed the MDTA and FHWA to focus on broader, planning-level decisions related to the preferred location of a potential new Bay crossing in the Tier 1 NEPA EIS, and then analyze more specific, project-level alternatives and potential impacts in the subsequent Tier 2 NEPA EIS. NEPA regulations issued by the Council on Environmental Quality, 40 Code of Federal Regulations (CFR) Parts 1500-1508, and the FHWA, 23 CFR Part 771.111(g), recognize tiering as a reasonable approach for complying with NEPA.

The tiered approach has been implemented for the Bay Crossing Study due to the broad nature of needs being addressed, the large study area, the multiple crossing possibilities and potential alternatives over nearly 100 miles of the Chesapeake Bay, and the potential for large-scale environmental impacts. In the Tier 1 Study, the MDTA narrowed the area under consideration to an approximately two-mile-wide corridor located around the existing Bay Bridge and its approaches. This smaller geographic area for the Tier 2 Study allows for a more detailed evaluation and more efficient environmental review.

1.2.1 Tier 1

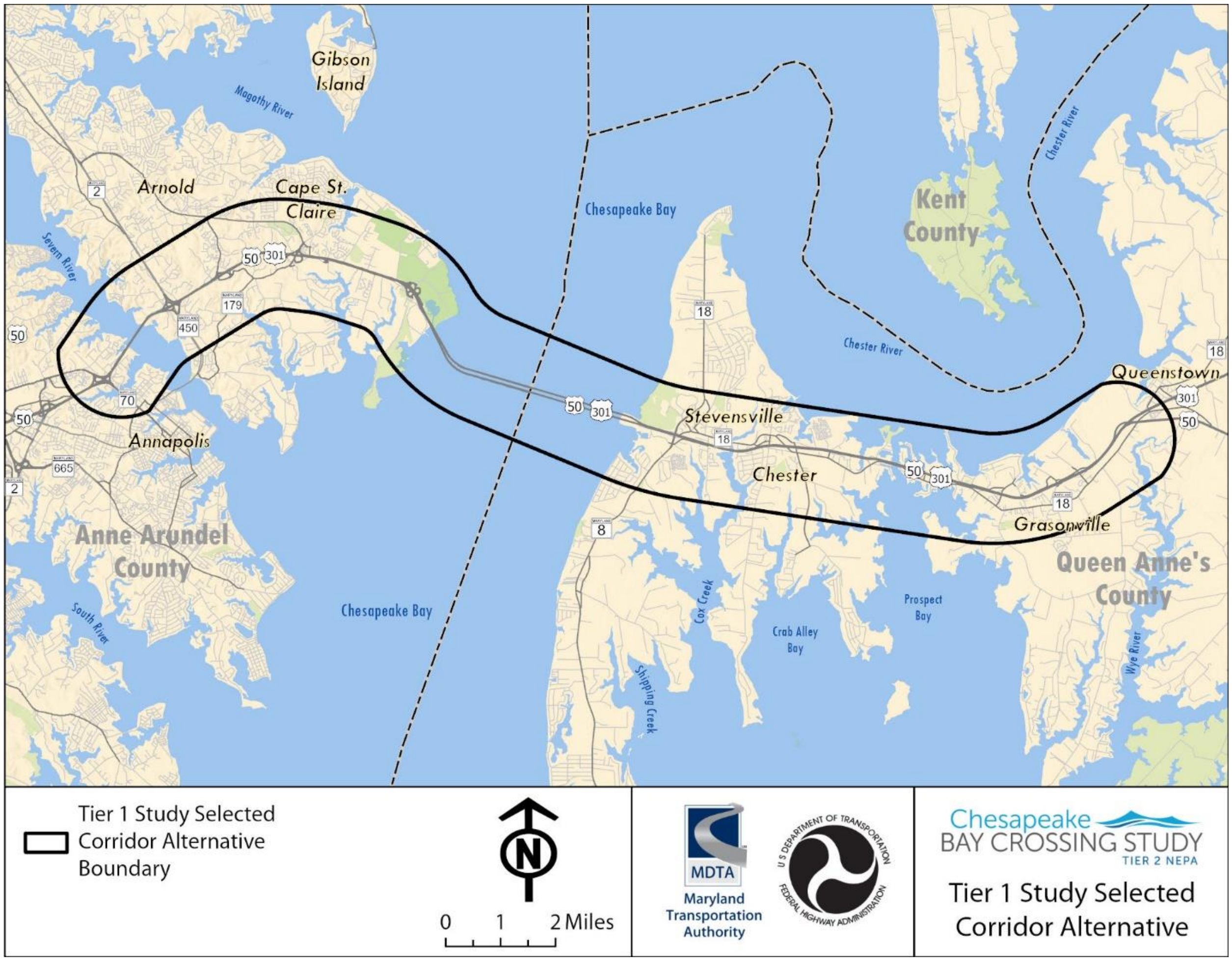
The MDTA and FHWA initiated the Tier 1 Study in 2016. The Tier 1 Study encompassed a broad geographic area that spanned nearly 100 miles of the Chesapeake Bay between Harford and Cecil counties to the north, and St. Mary's and Somerset counties to the south. The Tier 1 Study EIS defined existing and future transportation conditions and needs at the existing Bay Bridge, identified broad corridor alternatives (including a "No-Build" alternative), documented the corridor alternative screening process, and concluded with the identification of a Selected Corridor Alternative in the Tier 1 Study FEIS/ROD in April 2022.

The purpose stated in the Tier 1 Study was to consider corridors for providing additional capacity and access across the Chesapeake Bay in order to improve mobility, travel reliability, and safety at the existing Bay Bridge. The evaluation of potential corridors included assessments 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. Three primary needs were identified in the Tier 1 Study and were the basis for evaluating corridor alternatives: adequate capacity; dependable and reliable travel times; and flexibility to support maintenance and incident management in a safe manner.

The Tier 1 Study evaluated 14 possible corridor alternative locations in total. Corridor 7 was identified as the MDTA-Recommended Preferred Corridor Alternative (MDTA-RPCA). After close coordination with regulatory and resource agencies, the public and other stakeholders to identify critical resources and determine potential impacts, the Tier 1 FEIS/ROD was approved by the FHWA on April 14, 2022.

The Tier 1 Study Selected Corridor Alternative (Corridor 7), depicted in **Figure 3**, is a two-mile-wide and 22-mile-long corridor that follows existing U.S. 50/301 and includes the location of the existing Bay Bridge. On the Western Shore, the western limit of the corridor is west of the Severn River near the MD 70 (Rowe Boulevard) interchange, north of Downtown Annapolis. On the Eastern Shore, the eastern limit of the corridor is the U.S. 50/301 split near Queenstown.

Figure 3: Tier 1 Study Selected Corridor Alternative



The Selected Corridor Alternative was chosen because it would provide the greatest congestion relief at the existing bridge crossing, particularly at peak hours, thus having the greatest ability to meet the purpose and need identified in the Tier 1 Study. Corridor 7 was also the least costly corridor due to the ability to utilize existing infrastructure, particularly the U.S. 50/301 roadway and associated right-of-way. Additionally, this location is the shortest distance across the Chesapeake Bay between the Western and Eastern Shores. The Tier 1 Study also concluded that Corridor 7 would likely have the least adverse impacts to sensitive natural areas and less indirect effects than the other corridors. A full summary of the Tier 1 Selected Corridor Alternative analysis is included in Chapter 6 of the Tier 1 FEIS/ROD.

1.2.2 Tier 2

The Tier 2 Study was launched in June 2022 to focus on project-level (site-specific) analysis within the Tier 1 Selected Corridor Alternative (Corridor 7). It includes detailed engineering of alternatives and the assessment of potential environmental impacts associated with alternatives within Corridor 7 such as alignments, structure types, and modal and operational alternatives.

In this Preliminary Purpose and Need Report for the Tier 2 Study, the transportation issues identified during the Tier 1 Study have been further developed and refined to better describe the specific needs associated with Corridor 7. Tier 2 Study alternatives within the Selected Corridor Alternative will be evaluated based on this refined purpose and need in the Tier 2 Study EIS. The Tier 2 Study EIS will also include a "No-Build" alternative, which consists of no significant proposed action and would provide a baseline for which the impacts of other alternatives can be compared. Consistent with NEPA requirements, agency and public involvement is an essential part of the Tier 2 NEPA process. Engineering and environmental impact analyses will be conducted with robust public and agency involvement.

1.2.3 Tier 2 Study Limits

To determine the appropriate study limits for the Tier 2 Study, the MDTA analyzed the traffic volumes along Corridor 7 and its interchanges. As with the Tier 1 Study, the traffic analysis included the collection of traffic volume data on both non-summer weekdays and summer weekends. Traffic counts were collected beyond the limits of Corridor 7, which were used to ensure identification of appropriate endpoints. The MDTA obtained traffic volume data for the Bay Bridge and the U.S. 50/301 corridor covering the period from April 1, 2022, through December 31, 2022.

On the Western Shore, the analysis showed that 42 to 65 percent of the traffic crossing the Severn River traveling westbound enters U.S. 50/301 from the Broadneck Peninsula and approximately 55 to 71 percent of the traffic crossing the Severn River traveling eastbound exits U.S. 50/301 to the Broadneck Peninsula. Eastbound traffic across the Severn River Bridge is higher than across the Bay Bridge by approximately 39 percent on a non-summer weekday and 23 percent on a summer Friday. Approximately 1/3 of the traffic crossing the Bay Bridge traveling westbound exits from U.S. 50/301 to the Broadneck Peninsula. Traffic volumes across the Bay Bridge are lower than volumes across the Severn River Bridge on both non-summer weekdays and summer weekends. The analysis of the traffic volumes demonstrates that the Severn River Bridge and the Chesapeake Bay Bridge have independent traffic volumes. Thus, there is a clear distinction between traffic volumes associated with the Bay Bridge and traffic volumes on U.S. 50/301 west of the MD 2/MD 450 interchange at the Severn River Bridge. a western study limit beyond the eastern end of the Severn River Bridge would therefore go beyond the scope of addressing issues related to crossing the Chesapeake Bay.

On the Eastern Shore, the traffic analysis shows that the westbound traffic across the Kent Narrows Bridge is approximately the same as across the Bay Bridge, and westbound traffic just west of the U.S. 50/301 split is also similar to westbound traffic across the Kent Narrows Bridge. Eastbound, traffic across the Kent Narrows Bridge is similar to traffic crossing the Bay Bridge and also similar to traffic just west of the U.S. 50/301 split. The U.S. 50/301 split is a major highway decision point for traffic heading north or south on the Eastern Shore with nearly 60 percent of the traffic using U.S. 50 and approximately 40 percent of the traffic using U.S. 301 on non-summer weekdays. On summer weekends, the traffic split is approximately 70 percent using U.S. 50 and approximately

30 percent using U.S. 301. Traffic volume graphics with additional supporting information are available in the **Notice of Intent Additional Project Information Document**.

As a result of the analysis described above, the Tier 2 western study limit has been identified as the MD 2/MD 450 interchange, and the Tier 2 eastern study limit has been identified as the U.S. 50/301 split, as both interchanges provide logical termini given the possible extent of transportation improvements and are rational end points for a comprehensive review of environmental impacts that could result from additional transportation capacity across the Chesapeake Bay.

1.3 Other Related Actions and Studies

The MDTA has adopted transportation management operation practices to improve traffic flow at the Bay Bridge and manage the growing travel demand. However, congestion has persisted despite these practices. Major efforts have included:

- Allowing for two-way traffic during peak periods: With completion of the second span in 1973, the MDTA was able to implement a reversible traffic lane that could be changed to accommodate heavier traffic in either direction.

- Elimination of the westbound toll plaza: Due to increases in traffic volumes, the MDTA eliminated the westbound toll plaza and increased the prices at the eastbound plaza in 1989. This was completed to encourage the free flow of westbound traffic without reducing revenue from toll collection at the Bridge.

- Implementation of all-electronic (cashless) toll collection and removal of the eastbound toll plaza: All-electronic tolling was completely implemented in May 2020. Travelers without an electronic tolling device are tolled through video tolling, "Pay-by-Plate" or third-party tolling apps.

- Implementation of an Automated Lane Closure System (ALCS) Project: This project allows two-way operations on either span to be initiated or discontinued remotely. The ALCS began full operation in March 2023 with the goal of improving safety for motorists and MDTA employees.

- Extensive promotional and education efforts: The MDTA encourages travelers to take trips during off-peak periods through a variety of methods which include website updates, news releases, social media updates, and traffic advisories. The MDTA also provides live traffic cameras that show current traffic conditions.

Since 2004, the MDTA has completed a number of studies that are related to the Bay Crossing Study, as described below. Information and findings from these previous MDTA studies will be considered during the Tier 2 NEPA evaluation where applicable.

- 2004 Transportation Needs Report: The MDTA initiated a study of transportation and safety needs associated with the existing Bay Bridge in 2001, which resulted in the 2004 Transportation Needs Report. The study found that the lack of roadside shoulders impacts the vehicular capacity of the bridge during incident management activities. The study also determined that the bridge carried approximately 53 percent more traffic on an average summer weekend day than on an average weekday.

- 2006 Task Force Report: In 2005, the MDTA formed a Task Force to examine a range of issues to help educate stakeholders about the need for additional capacity across the Bay. As a result of the Task Force's recommendation for more detail study, subsequent studies were conducted to evaluate the potential for transit or ferry service across the Bay to provide capacity and alleviate congestion on the Bay Bridge, including the September 2007 Analysis of Transit Only Concepts to Address Traffic Capacity Across the Chesapeake Bay.

Figure 4: Existing Bay Bridge spans, looking east

- 2007 Transit Study: The MDTA conducted a study in response to input received from the Task Force to assess the role of transit in addressing the capacity needs at the Bay Bridge without additional highway capacity. It concluded that at the time of the study, transit as a standalone alternative would not provide significant relief to summer weekend or peak period weekday traffic. While transit service would reduce some vehicle travel on the Bay Bridge, the reduction would be very small relative to the overall volume of traffic that used the bridge.

- 2015 Life Cycle Cost Analysis: The 2015 Life Cycle Cost Analysis was conducted to evaluate the travel operations and structural condition of the Bay Bridge, understand the costs and time frame associated with implementing future Bay Bridge improvements, and evaluate complementary improvements that would be needed if/when (a) new structure(s) were built including mainline U.S. 50/301 improvements. Build recommendations were not given in the analysis but a NEPA study was recommended for reviewing any proposed improvements.

- 2020 Public Operated Ferry Service for the Chesapeake Bay Crossings: The MDTA conducted a study examining the feasibility of electric ferry service as an alternative to additional roadway capacity across the Chesapeake Bay, at the request of the Maryland

General Assembly. The study found that an electric ferry service would not be a feasible standalone option to alleviate congestion at the Bay Bridge.

2 PURPOSE

In the NEPA environmental review process, the "purpose" is the specific intent of the agency's activity.

The purpose of the Chesapeake Bay Crossing Study: Tier 2 NEPA is to address existing and future transportation capacity needs and access across the Chesapeake Bay and at the Chesapeake Bay Bridge approaches along the U.S. 50/301 corridor. The Tier 2 Study is evaluating measures to reduce congestion; improve travel times and reliability, mobility, and roadway deficiencies; and accommodate maintenance activities and navigation, while minimizing impacts to local communities and the environment.

3 NEEDS

The "needs" presented in a NEPA environmental review process are the elements and supporting data substantiating that a problem exists or is likely to occur. The MDTA has identified five needs for the Tier 2 Study, which have been updated since the Tier 1 FEIS/ROD was issued by the FHWA. These updates are based on the most recent available information and reflect the project-level (site-specific) focus of the Tier 2 Study.

The needs of the Tier 2 Study are:

- Adequate capacity and reliable travel times,
- Mobility,
- Roadway Deficiencies,
- Existing and future maintenance needs, and
- Navigation.

In addition to identifying needs, the MDTA has also identified two objectives for consideration:

- Environmental Responsibility
- Cost and Financial Responsibility.

These supporting objectives will be considered during alternatives development and screening. Both environmental and cost and financial responsibility, are fundamental to the planning process and an integral part of evaluating alternatives. However, including them as objectives in this Tier 2 Study will lead to heightened scrutiny and greater attention to these issues and will allow for greater efficiency in the early stages of alternatives development. Ultimately, this will allow for earlier and clearer communication with stakeholders and the public about high-quality, reasonable, and feasible alternatives and the decision-making process. The integration of these objectives also recognizes the importance of these issues given the sensitivity of the Chesapeake Bay and likely substantial cost of a proposed action. More information on the objectives is available in **Section 4** of this report.

The MDTA intends to develop alternatives that have the potential to meet the study needs and will evaluate the reasonableness of alternatives based on their overall ability to meet the needs and objectives. An alternative may be deemed reasonable even if it does not address every need completely. Therefore, it is possible that the alternative selected from the NEPA environmental review process may not eliminate all future congestion.

While much of this information, such as traffic and crash data, was identified during the Tier 1 Study, it has been updated to reflect more recent travel conditions and refined for the Tier 2 Study to focus on the more specific needs of the corridor and the project-level NEPA review process.

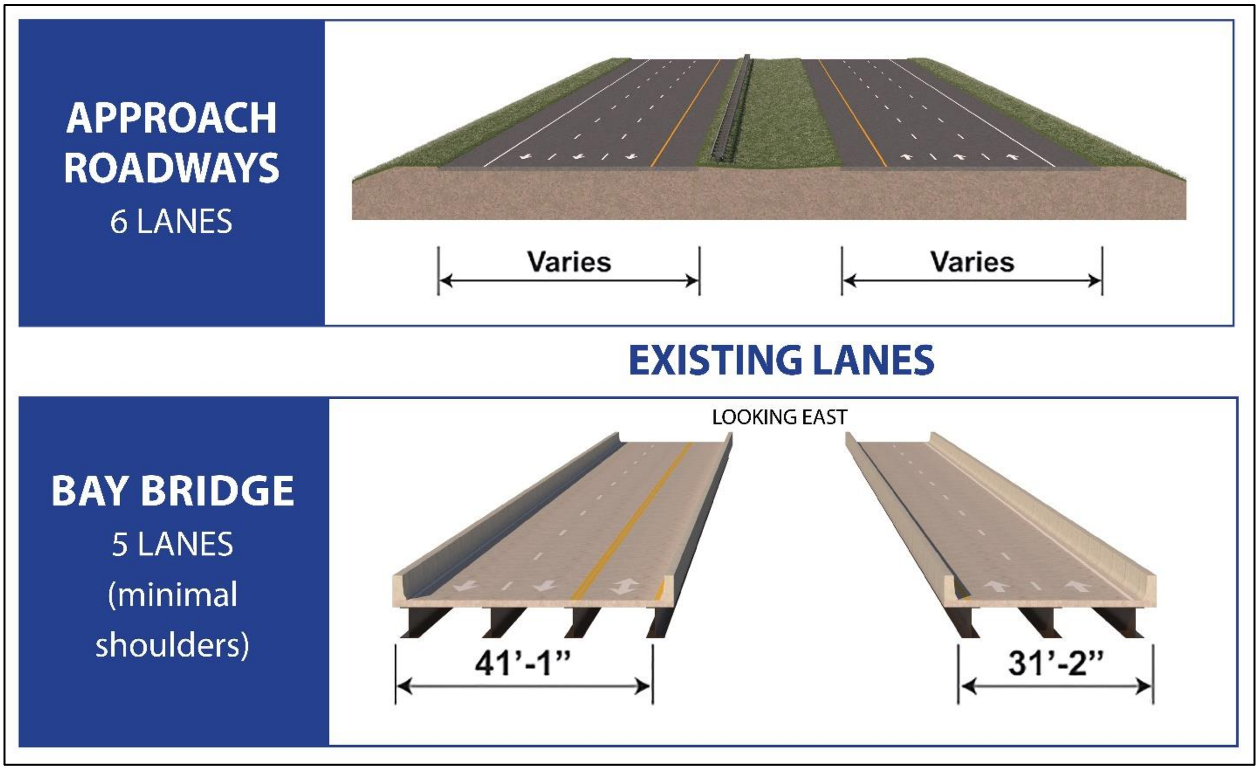
3.1 Adequate Capacity and Reliable Travel Times

The MDTA obtained traffic data for the Bay Bridge and the U.S. 50/301 corridor covering the period from April 1, 2022, through December 31, 2022. Traffic counts were collected during this period for the purposes of having post-pandemic data that would most accurately represent the existing conditions. This period also includes the summer months, which typically experience the highest overall traffic volumes, in order to provide a comparison between summer weekend and non-summer weekday conditions. Additional traffic data was also collected at a small number of locations in 2023 and 2024. Based on the data and analysis presented in this section, the capacity of the Bay Bridge and its approaches on U.S. 50/301 are not sufficient to accommodate existing and anticipated travel demand, resulting in traffic congestion on the Bay Bridge and adjacent roadway network.

3.1.1 Capacity

While the approaches on the Eastern and Western shores have six lanes with three lanes of traffic in each direction, the Bay Bridge has five lanes of traffic total. The southern span has two lanes that typically carry eastbound traffic and the northern span has three lanes that typically carry westbound traffic. During periods of heavy travel, construction, emergencies, or other incidents that require lane closures, traffic on either span can be reversed. For example, one lane on the northern span is often reversed during periods of high eastbound congestion to provide a third eastbound lane. This reverse travel flow condition is called “contra-flow” or “two-way” operation. Although two-way traffic can be implemented on either span, the northern span is referred to as the “westbound span” and the southern span is referred to as the “eastbound span,” both colloquially and throughout this report. **Figure 5** depicts a cross section of the number of lanes on the Bay Bridge and its approaches.

Figure 5: Roadway Cross Section of Bay Bridge and Approaches



On the Eastern Shore, at the U.S. 50/301 split near Queenstown, the number of lanes reduces to two lanes in each direction along both U.S. 50 and U.S. 301. On the Western Shore, the number of lanes on U.S. 50/301 to the west of the MD 2/MD 450 interchange is variable, with as many as five lanes in one direction being provided in some sections between interchanges.

The existing approach roadways are classified as freeways with posted speed limits of 55 miles per hour (mph) on the Eastern and Western Shores. Between the Oceanic Drive interchange on the Western Shore and the toll gantry on the Eastern Shore, the speed limit for all eastbound traffic is reduced to 40 mph then increases to 50 mph mid-way across the eastbound span and the speed limit for all westbound traffic is reduced to 50 mph. On the Bay Bridge, the individual lane widths range from approximately 11 feet to 12 feet, but each lane is a consistent width across the length of the bridge. The maximum shoulder width on the Bay Bridge is approximately two feet.

The existing Bay Bridge carries large volumes of travelers and frequently approaches or exceeds its capacity for long durations. These travel volumes have increased over time and are expected to continue increasing in the future. They contain a high percentage of trucks during weekdays. The increasing volumes correlate with increases in regional population and employment, and result in greater congestion. Queues begin to develop when traffic volumes approach capacity. While the observed capacity of the Bay Bridge in either direction is approximately 1,500 vehicles per hour per lane (vphpl), queues from traffic congestion have been observed to begin forming at demand levels at or less than 1,150 vphpl.

Due to the reduction in the total number of lanes on the Bay Bridge compared to its approaches, the capacity of the bridge is lower than the other segments of U.S. 50/301. Furthermore, the reduced lane and shoulder widths encourage slower driving speeds and further constrict the free flow of traffic. This leads to a condition where traffic levels that are free flowing on the approaches can result in slow-moving and congested traffic levels on the bridge. As discussed in **Section 3.3**, bridge heights and substandard lane and shoulder widths along the Bay Bridge can also cause anxiety among users and slower driving speeds. Therefore, the bridge itself is the constraining factor to travel flow.

3.1.1.1 Historic and Existing Volumes

Figure 6 displays the annual number of vehicle trips across the Bay Bridge and illustrates the historical increase of travel volumes. Before the second span opened in 1973, annual crossings rose gradually to approximately 6 million crossings per year. In the following decades, the number of crossings grew to over 10 million in 1979, over 20 million in 1995, and peaked in 2019 with 27.6 million crossings. Despite the reduction in crossings during the COVID-19 pandemic, travel patterns have since adjusted and the number of crossings exceeded 26 million in 2021 and 2022.

In 2022, average daily eastbound traffic volumes on the Bay Bridge were 34,857 vehicles per day during a non-summer weekday and 52,751 vehicles per day on summer Fridays. The average daily westbound traffic volume in 2022 was 34,731 vehicles per day for non-summer weekdays and 51,533 vehicles per day for summer Sundays.

The increase in crossings has accompanied a steady increase in the population of the state of Maryland, Anne Arundel and Queen Anne's counties, the other Eastern Shore counties south of Cecil County, and the southern Delaware counties of Kent and Sussex. Population data by decade starting from when the Bay Bridge opened is located in **Table 1.**

Figure 6: Annual Crossings of the Bay Bridge

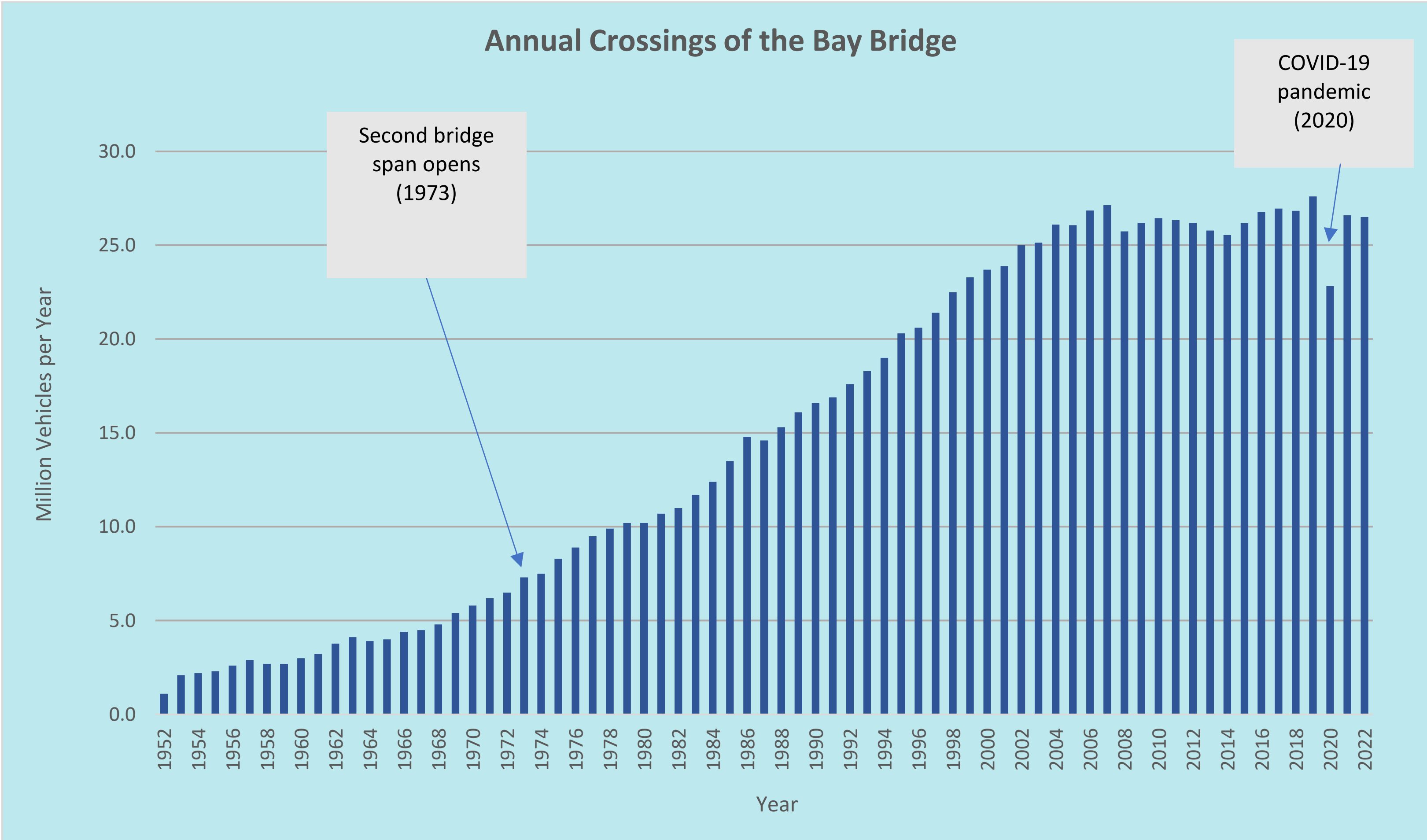


Table 1: Regional Population Growth

	Population				
Year	**Maryland (in millions)**	**Anne Arundel County, MD**	**Queen Anne's County, MD**	**Other MD Eastern Shore Counties***	**Southern Delaware Counties****
1952 (original span of Bay Bridge opens)***	2.5	117,392	14,579	162,688	99,206
1973 (second span of Bay Bridge opens)***	4.1	297,539	18,422	186,616	162,248
1980	4.2	370,775	25,508	210,682	196,223
1990	4.8	427,239	33,953	238,469	224,222
2000	5.3	489,656	40,563	269,389	283,335
2010	5.8	537,656	47,798	300,320	359,455
2022	6.1	593,286	51,711	306,487	442,902

*"Other MD Eastern Shore Counties" consists of Kent, Caroline, Talbot, Dorchester, Wicomico, Worcester, and Somerset Counties

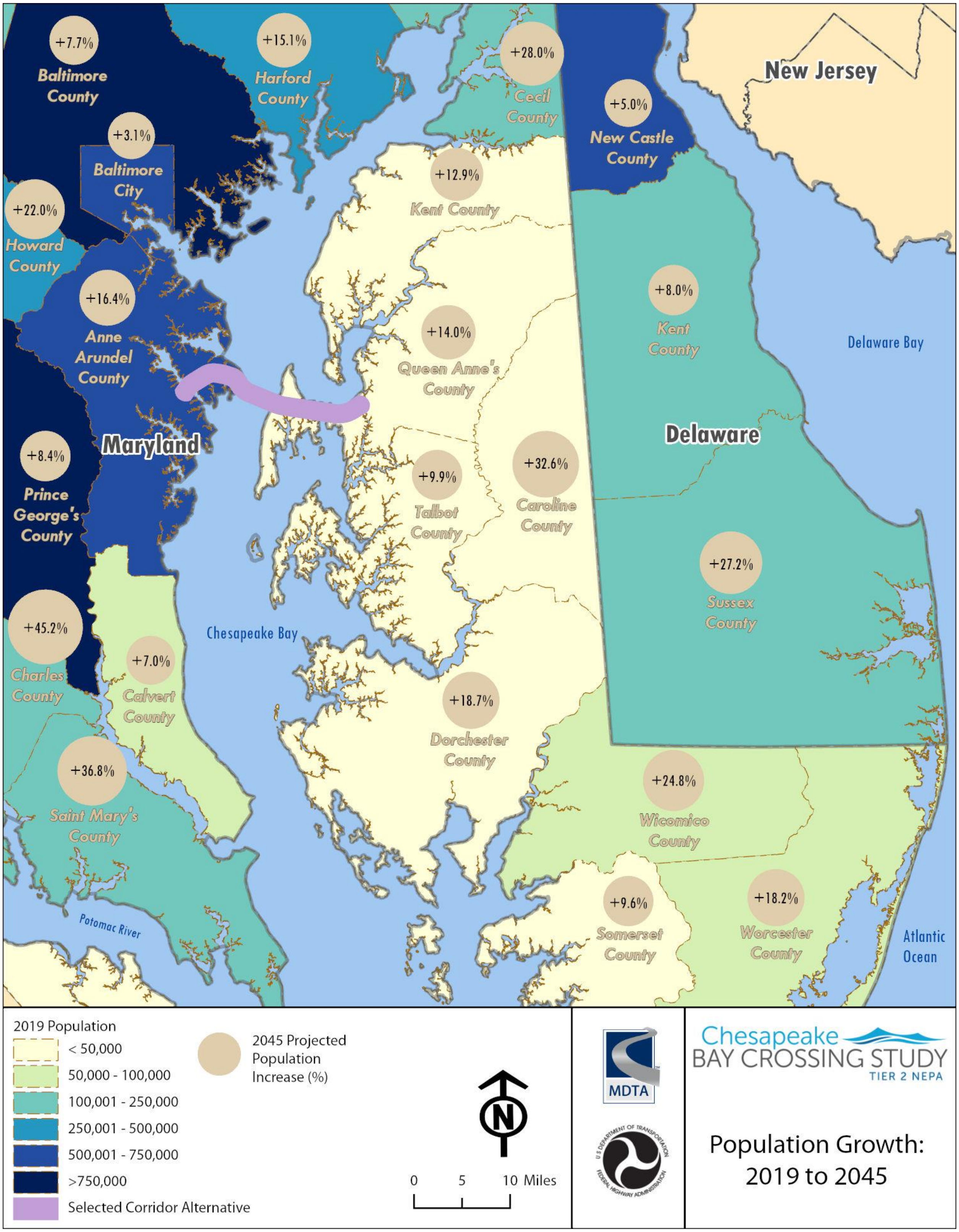
**"Southern Delaware Counties" consists of Kent and Sussex Counties

***County population data from the counties was taken from nearest U.S. Decennial Census (1950 and 1970)

3.1.1.2 Projected Population Growth

Through 2045, population in the state of Maryland is expected to increase by 892,384 people, which represents an approximate 15 percent increase in population compared to 2019 levels. This data is based on the Round 9A Baltimore Regional Transportation Board-endorsed cooperative forecast and Metropolitan Washington Council of Governments land use model Round 9.0. Telework has been accounted for in projections based on the data that was collected in 2019. This projected growth is depicted in **Figure 7**.

Figure 7: 2019 Population and Projected Growth to 2045 by County



By 2045, Anne Arundel County is expected to grow by approximately 16 percent with 94,650 new residents and the population of Queen Anne's County is expected to increase by approximately 14 percent, with 6,900 new residents. Other areas in the vicinity of the State of Maryland are expected to see similar population increases during that period. The population of the State of Delaware is expected to grow by approximately 11 percent with 106,150 new residents by 2045. The District of Columbia is also expected to see an approximate 39 percent increase in population with 262,056 new residents.

Since projected population growth remains one of the industry standards for projecting future trip and travel demand, this anticipated growth is expected to increase demand for trips across the Bay during the average weekday, as well as weekends during summer months. Despite fluctuations in annual vehicle crossings in recent years, under "No-Build" conditions, traffic volumes at the Bay Bridge are expected to grow by 31 percent on non-summer weekdays and by approximately 25 percent on summer weekend days, as shown in **Table 2**.

Table 2: Daily Trips Across the Bay Bridge (vehicles per day)

Day Type	2022	2045 No-Build	Percent Change (%)
Typical Non-Summer Weekday	69,588	91,150	31
Typical Summer Weekend Day	104,284	130,500	25

3.1.2 Levels of Service

Quantifying congestion is an important analytical step when evaluating potential alternatives and comparing their ability to accommodate traffic. In a study like the Tier 2 Study, this quantification is typically established by using the Highway Capacity Manual (3) (HCM) to evaluate 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 volatile, and travel times can vary widely. Capacity is the breakpoint between LOS E and LOS F. Accepted transportation planning and traffic engineering expertise and practice suggest that achieving at least a LOS D is preferred, but LOS E or even LOS F may be all that is possible for some facilities. At the Bay Bridge, field observations conducted during 2022 revealed that queues begin to form on the Bridge, and thus on its approach roadways, at a volume of approximately 1,150 vehicles per lane per hour. This volume corresponds to an LOS in the lower half of the D range on the bridge, and to an LOS in the lower half of the C range on the approach roadways.

A summary of the 2022 directional hourly LOS for both average typical non-summer weekday and summer weekend conditions across the Bay Bridge is presented in **Table 3**. Under "With Two-way" traffic conditions, a lane is reversed on the westbound span to temporarily increase the capacity for eastbound travel.

As depicted in **Table 3**, "With Two-way" values for a non-summer weekday indicate the best-case LOS in the eastbound direction at any given hour during which eastbound congestion would otherwise occur, even while reducing capacity for westbound travel. Values in the "With Two-Way" column provide LOS for a summer weekend that assume three lanes eastbound throughout Friday and three lanes westbound throughout Sunday. With two-way operations, traffic does not typically exceed LOS D during average weekdays. However, during summer weekends, traffic approached bridge capacity for five hours in the eastbound direction and three hours in the westbound direction. Thus, while implementing two-way operations is helpful in allowing the MDTA the ability to manage and alleviate congested conditions, volumes regularly approach the available capacity on the bridge, resulting in periods of congestion. The MDTA continually strives to optimize the level of service on the Bay Bridge, modifying the implementation of two-way operations in response to changing travel conditions. However, the five lanes available on the Bay Bridge simply do not provide sufficient capacity to avoid congestion in one or both directions at all times.

Under 2045 no-build conditions, hourly travel demand is predicted to approach or even exceed the capacity of the Bay Bridge in at least one direction for nine hours on an average non-summer weekday and 11 hours on a summer weekend day with two-way operations. Further information is displayed in **Table 4**.

Table 3: 2022 Hourly Levels of Service across the Bay Bridge

Time of Day	With Two-way				Without Two-way			
	Non-Summer Weekday		Summer Weekend		Non-Summer Weekday		Summer Weekend	
	EB	WB	EB	WB	EB	WB	EB	WB
12-1AM	A	A	A	A	A	A	A	A
1-2AM	A	A	A	A	A	A	A	A
2-3AM	A	A	A	A	A	A	A	A
3-4AM	A	A	A	A	A	A	A	A
4-5AM	A	A	A	A	A	A	A	A
5-6AM	A	B	A	A	A	B	A	A
6-7AM	B	C	C	A	B	C	C	A
7-8AM	C	D	D	A	C	D	D	A
8-9AM	C	C	C	B	C	C	D	B
9-10AM	C	C	C	C	C	C	E	C
10-11AM	C	C	D	D	C	C	F	D
11AM-12PM	D	B	E	D	D	B	F	D
12-1PM	D	B	E	E	D	B	F	E
1-2PM	D	C	E	E	D	C	F	E
2-3PM	C	D	D	E	E	C	F	E
3-4PM	D	D	D	D	F	C	F	D
4-5PM	D	D	E	D	F	C	F	D
5-6PM	D	D	E	D	F	B	F	D
6-7PM	C	C	D	D	D	B	F	D
7-8PM	B	B	D	D	D	A	E	D
8-9PM	B	A	D	D	D	A	D	D
9-10PM	B	A	B	D	B	A	D	D
10-11PM	A	A	B	B	A	A	D	B
11PM-12AM	A	A	A	A	A	A	D	A

Note: Levels of service were computed using hourly volumes, which were developed by using MDTA toll system volumes for eastbound traffic and using MDTA permanent count station volumes for westbound traffic. The period April 1, 2022 – December 31, 2022, was used. For the purposes of analysis, summer conditions were defined as beginning on Thursday May 26 (the start of Memorial Day Weekend) and ending on Monday September 5 (the end of Labor Day weekend). The remainder of the data collection period comprised non-summer conditions. Non-summer weekday volumes were an average of Tuesday and Wednesday volumes during the non-summer period, with outlier days (such as the Tuesday and Wednesday of Thanksgiving week) removed. Summer weekend volumes in the eastbound direction were from Fridays; summer weekend volumes in the westbound direction were from Sundays, with outlier days (such as the Sunday of Labor Day weekend) removed. Summer weekends are measured by summer Friday conditions for eastbound traffic and summer Sunday conditions for westbound traffic.

Table 4: 2045 No-Build Hourly Levels of Service across the Bay Bridge

Time of Day	With Two-way				Without Two-way			
	Non-Summer Weekday		Summer Weekend		Non-Summer Weekday		Summer Weekend	
	EB	WB	EB	WB	EB	WB	EB	WB
12-1AM	A	A	A	A	A	A	A	A
1-2AM	A	A	A	A	A	A	A	A
2-3AM	A	A	A	A	A	A	A	A
3-4AM	A	A	A	A	A	A	A	A
4-5AM	A	B	A	A	A	B	A	A
5-6AM	A	C	B	A	A	C	B	A
6-7AM	C	D	C	A	C	D	C	A
7-8AM	D	E	C	B	D	E	E	B
8-9AM	D	D	D	C	D	D	E	C
9-10AM	D	D	D	D	D	D	F	D
10-11AM	C	E	E	E	D	C	F	E
11AM-12PM	C	E	F	E	E	C	F	E
12-1PM	C	E	F	F	E	C	F	F
1-2PM	D	E	F	F	E	C	F	F
2-3PM	D	E	F	F	F	C	F	F
3-4PM	E	E	F	F	F	C	F	F
4-5PM	E	E	F	E	F	C	F	E
5-6PM	E	E	F	F	F	C	F	F
6-7PM	D	D	E	E	E	B	F	E
7-8PM	D	D	D	E	D	B	F	E
8-9PM	C	A	D	E	D	A	E	E
9-10PM	B	A	D	D	D	A	D	D
10-11PM	B	A	D	D	D	A	C	D
11PM-12AM	A	A	D	D	D	A	B	D

Source: Calculations based on 2022 counts and Maryland Statewide Travel Model.
Note: Summer weekends are measured by summer Friday conditions for eastbound traffic and summer Sunday conditions for westbound traffic.

3.1.3 Queue Lengths

Increasing travel demand at the Bay Bridge has resulted in growing congestion and vehicle queues. Despite implementation of two-way traffic on the eastbound span, queue lengths of up to four miles eastbound and two and a half miles westbound during summer weekends have been continually observed since the beginning of the Tier 1 Study (**Figure 8**). In 2022, these queues regularly reached up to nearly five miles eastbound and three and half miles westbound. Queues longer than one mile can last for up to eight hours during a summer weekend afternoon and evening.

Figure 8: Eastbound queue forming near Oceanic Drive

Due to projected increases in travel demand volumes at the Bay Bridge, the current summer weekend vehicle queues are projected to increase to over ten miles in both the eastbound and westbound direction by 2045. During average weekdays, current evening eastbound queues are expected to increase to over four miles long by 2045, while westbound morning queues up to five miles in length are expected to form by 2045. **Table 5** shows the existing 2022 and anticipated 2045 maximum length and duration of queue lengths at least one mile while utilizing two-way operation.

Table 5: 2022 and Anticipated 2045 Max. Queue Lengths and Durations with Two-Way Operations

Year	Conditions	Eastbound		Westbound	
		Max. Queue (miles)	Duration of Queue >1.0 Mile (Hours)	Max. Queue (miles)	Duration of Queue >1.0 Mile (Hours)
2022	Non-summer weekday	0	0	0	0
	Summer weekend	4.8	8	3.5	8
2045 No-Build	Non-summer weekday	4.1	4	4.9	11
	Summer weekend	>10.0	14	>10.0	14

Furthermore, as noted in **Table 5**, even with contra-flow operations intended to minimize queuing in the eastbound direction, queues in excess of one mile in length are expected for up to four hours eastbound and eleven hours westbound on a non-summer weekday, and for fourteen hours in each direction on summer weekend days in 2045. This increase in queue length and duration will further decrease the LOS and travel reliability of the roadway.

3.1.4 Crash Rates

Rear-end, sideswipe and opposite direction type crashes occurred in this corridor at a rate significantly higher than the Maryland Statewide Average rate for urban freeways/expressways. Rear-end type crashes, which occurred at the highest rate along this segment of U.S. 50/301, and sideswipe crashes are typically experienced during congested conditions because of the fluctuating vehicle speeds and the desire to change lanes to advance more quickly. Additionally, most of these incidents occurred during the summer months, the part of the year where traffic volumes across the bridge increase and congested conditions are most severe. In 2019, for example, over 55 percent of all crashes occurred within the four-month period from May to August.

In March of 2020, the COVID-19 pandemic led to sudden and dramatic changes in both traffic volumes and numbers of crashes. While traffic volumes at the Bay Bridge have generally recovered since that time and now closely resemble pre-pandemic conditions, crash rates are continuing to evolve. Additionally, the conversion to cashless tolling on the eastbound span in March 2020 and the subsequent removal of the toll plaza in 2021 have changed traffic operations approaching the Bay Bridge. These improvements have also likely had an impact on crash rates.

To account for these changes, six years of crash data were obtained and reviewed, as shown in **Table 6**. This data was obtained for the segment of U.S. 50/301 between Oceanic Drive and Maryland Route 8 and includes the entire Bay Bridge.

Table 6: Number of Crashes and Crash Rates at the Bay Bridge (2017-2022)

Year	2017	2018	2019	2020	2021	2022
Number of Crashes	52	81	111	101	92	82
Million Vehicle Miles (MVM) of Travel	140.13	143.65	147.94	122.21	142.58	142.04
Crash Rate (Crashes per 100 MVM)	37.1	56.4	75	82.6	64.5	57.7

Crash rates for the Bay Bridge were higher than statewide freeway crash rates for four of the six reported years. Per data from SHA, the crash rates on the Bay Bridge exceeded statewide freeway crash rates in 2018, 2019, 2020, and 2021. The total number of crashes at the Bay Bridge peaked in 2019. However, the crash rate was at its highest in 2020, due to a sharp decrease in the number of vehicles crossing the Bay Bridge compared to a proportionally small decrease in the number of crashes. In 2021 and 2022, both the number of crashes and the crash rate decreased. **Figure 9** shows the types of crashes most frequently reported for this segment of U.S. 50/301.

Figure 9: Percentages of Crashes by Reported Type at the Bay Bridge (2017-2021)

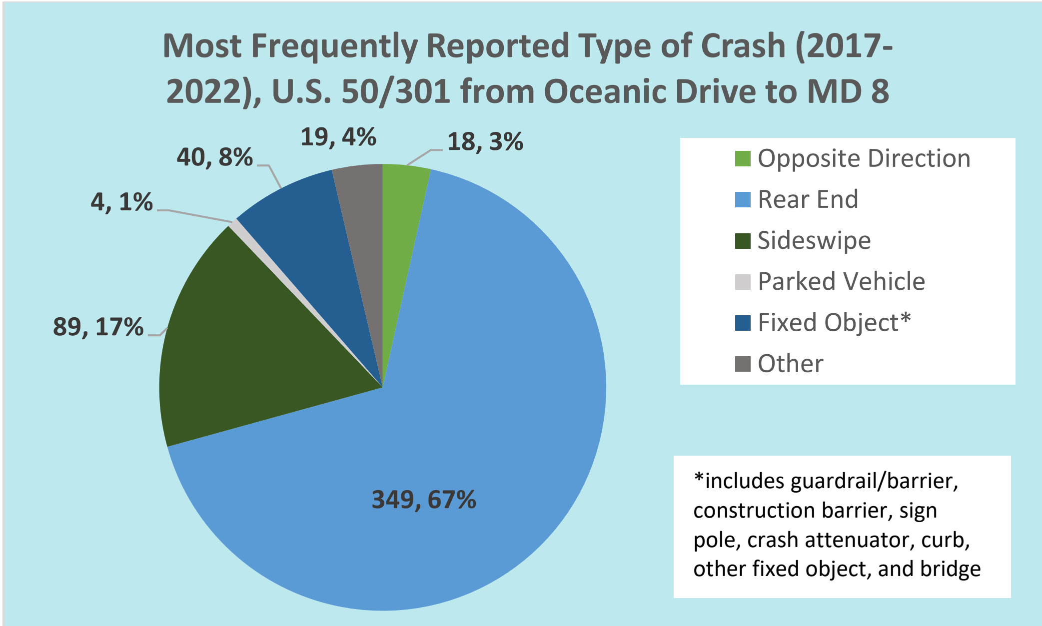


Table 7 shows the relative frequency with which eastbound and westbound vehicles were involved in crashes.

Table 7: Percentages of Crashes Involving Eastbound and Westbound Vehicles (2017-2022)

Direction of Vehicles	Number of Crashes	Percentage of Crashes
EB Vehicles Only	367	70.7%
WB Vehicles Only	131	25.2%
EB and WB Vehicles	21	4.0%

According to **Table 7**, crashes involving only eastbound vehicles occurred at a higher rate than crashes where westbound vehicles were involved. Specifically, crashes involving only eastbound vehicles accounted for over 70 percent of all crashes at the Bay Bridge. Incidents involving both eastbound and westbound vehicles represented less than five percent of the total percentage of crashes at the Bay Bridge. While incidents involving vehicles heading in opposite directions during two-way operations have not yielded any fatalities from 2017 to 2022, these collisions could be fatal and could cause serious injury and property damage. Bay Bridge traffic congestion also affects traffic on the adjacent U.S. 50/301 corridor. As congestion increases on the bridge, traffic backs up along the adjacent corridor and the likelihood of incidents on the approaches increases.

3.1.5 Travel Reliability

Beyond congestion due to high travel demand, events along a transportation facility such as vehicle breakdowns, crashes, weather events, and maintenance activities reduce usable capacity and affect the reliability of the facility. These nonrecurring events add to the variability of trip times provided by the transportation system, making trip planning difficult.

The annual State Highway Mobility Report, published by the Maryland State Highway Administration (SHA), accounts for non-recurring events in trip reliability using the measurement of the Planning Time Index (PTI). The PTI represents the 95th percentile travel time for a section of the freeway/expressway system and is considered the total time travelers should allow for trips on these corridors to assure on-time arrival at destinations. If free-flow conditions allow a five-minute trip, a traveler should allow 15 minutes when the PTI is 3.0. If free-flow conditions allow a five-minute trip, a traveler should allow five minutes when the PTI is 1.0. Thus, the higher the number, the more unreliable the corridor is during that hour for users and the greater likelihood that a typical trip may take longer than normally anticipated. The lower the PTI, the more reliable the trip planning time. Statewide PTI are categorized as follows:

PTI less than 1.5 – Reliable
PTI between 1.5 and 2.5 – Moderately Unreliable
PTI above 2.5 – Highly to Extremely Unreliable

The PTI for a trip along U.S. 50/301 between the MD 2/MD 450 interchange in Anne Arundel County and the U.S. 50/301 split in Queen Anne's County for each travel direction was calculated for 2022 during average weekdays and Fridays and Sundays during the summer. **Table 8** presents the PTI findings. Times with PTI above 2.5 are shaded.

The highest PTI for an eastbound trip in 2022 occurs on a summer Sunday between 2 PM and 3 PM with a measurement of 3.52. On average, there are four hours during weekdays, 14 hours on summer Fridays, and 12 hours on summer Sundays that have PTIs at or greater than 1.5. For westbound traffic, the highest PTI for a 2022 westbound trip occurs on a summer Friday between 7 PM and 8 PM with a measurement of 4.83. On average, there are six hours during weekdays, 12 hours on summer Fridays, and nine hours on summer Sundays that have PTIs at or greater than 1.5.

Table 8: Planning Time Index for Eastbound Trips on U.S. 50/301 in Study Area

Time of Day	2022 Average Weekday		2022 Summer Friday		2022 Summer Sunday	
	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound
12-1AM	1.17	1.50	1.80	1.72	1.67	1.49
1-2AM	1.26	1.50	1.33	1.60	1.55	1.30
2-3AM	1.32	1.54	1.26	1.61	1.89	1.23
3-4AM	1.29	1.49	1.31	1.62	1.79	1.30
4-5AM	1.26	1.15	1.06	1.26	1.30	1.29
5-6AM	1.03	0.96	1.01	1.00	1.13	1.17
6-7AM	1.03	0.99	1.00	1.00	1.05	1.06
7-8AM	1.03	1.09	1.02	1.00	0.97	0.98
8-9AM	1.02	1.35	2.12	1.01	1.00	0.98
9-10AM	1.12	1.20	1.93	1.04	1.47	0.99
10-11AM	1.18	1.05	1.71	1.19	1.81	1.03
11AM-12PM	1.28	1.09	1.94	1.31	2.78	1.40
12-1PM	1.27	1.34	1.85	1.57	3.08	2.07
1-2PM	1.29	1.49	2.10	2.13	3.33	2.74
2-3PM	1.34	1.14	2.79	2.54	3.52	4.13
3-4PM	1.63	1.08	3.21	3.83	2.91	4.60
4-5PM	1.98	1.18	3.03	2.53	2.67	4.60
5-6PM	1.80	1.29	2.73	2.08	2.17	4.05
6-7PM	1.37	1.27	1.51	3.05	1.46	3.59
7-8PM	1.06	1.08	1.89	4.83	1.15	2.81
8-9PM	1.46	1.25	1.70	1.16	1.02	1.88
9-10PM	1.52	1.57	1.06	1.19	1.04	1.28
10-11PM	1.22	1.53	1.00	1.45	1.04	1.06
11PM-12AM	1.26	1.57	1.01	1.10	1.06	1.05

The poor reliability of trip travel times across the Chesapeake Bay supports the need for additional capacity. With expected growth in vehicle queue length, duration, and a predicted increase in the number of hours of unsatisfactory LOS, trip reliability is expected to decrease.

Planning Time Index is retroactively developed and cannot be reliably forecasted into the future, given the numerous variables that could alter potential travel times. As a result, PTI can only be provided based on existing data.

3.1.6 Truck Traffic

The current rates of truck traffic traveling across the Bay Bridge affect capacity on the bridge. Trucks occupy a larger amount of space and do not accelerate as quickly as smaller vehicles, particularly when climbing grades such as those on the existing Bay Bridge. On the eastbound span, the Bay Bridge rises for approximately 1.5 miles to the high point of the bridge; the steepest grade in that section is 3.5 percent. On the westbound span, the westbound uphill grade is less steep, but longer; in the approximately two-mile ascent, the steepest grade is 1.9 percent.

The average daily truck percentage obtained from the data collection period ranged from a low of approximately three percent to a high of approximately ten percent. During the hour of peak flow on the bridge, the truck percentage was approximately four percent. On an average non-summer weekday, truck traffic on the Bay Bridge exceeds the Maryland Statewide average of five percent for urban freeway/expressways. The number of trucks traveling across the Bay Bridge is expected to rise in the future, as shown in **Table 9**.

Table 9: Existing and Forecasted Truck Volumes and Percentages across the Bay Bridge

Conditions	Existing (2022) Conditions			2045 No-Build Conditions		
	Total Traffic (vehicles per day)	Truck Percentage	Daily Truck Volumes	Total Traffic (vehicles per day)	Truck Percentage	Daily Truck Volumes
Non-Summer Weekday	69,588	5.4	3,758	91,150	5.7	5,200
Summer Weekend Day	104,284	3.9	4,067	130,500	4.0	5,200

3.1.7 Recent and Planned Improvements

Since the original Bay Bridge was constructed, the MDTA has introduced several projects to improve traffic flow and prevent traffic delays at the bridge as described in **Section 1.3**. These projects include contra-flow, implementation of electronic toll collection at the toll plaza, removal of the toll booths at the toll plaza and conversion to high-speed tolling, implementation of an ALCS, and extensive promotional and education efforts.

In 2013, safety improvements such as a buffer zone between the westbound left lane and center lane with additional signage, modified pavement markings, and rumble strips were implemented. These improvements allow for more effective two-way management to relieve eastbound traffic congestion during peak times and provide overall flexibility for varying capacities of traffic throughout the day. However, during peak times, the Bay Bridge and its approaches still experience severe traffic back-ups and congestion.

In May 2020, the MDTA began permanently utilizing highway-speed all electronic (cashless) tolling (AET) at the Bay Bridge, which allows all users to cross without stopping at a toll facility. The gantry, installed on the Eastern Shore between the Bay Bridge and MD 8, uses video tolling, "Pay-by-Plate" or third-party tolling apps for users who do not have an *E–ZPass*®. Despite the benefit of uninterrupted traffic flow afforded by AET, congestion remains during peak periods and during periods of incident management or maintenance along the Bay Bridge, due to the reduced capacity of the Bay Bridge itself. The MDTA also recently implemented the ALCS project. This project allows two-way operations to be initiated or discontinued remotely, reducing the on-site operations required by maintenance crews. Work to install ALCS included reconfiguring the former toll plaza area and installing overhead lane-use signals, dynamic message signs, horizontal swing gates, and illuminated pavement markers. The MDTA began the transitional period of phasing in the implementation to familiarize drivers in Fall 2022. Though the project enhances two-way operations, it does not impact current traffic volumes and has had little effect on congestion.

Despite the many projects the MDTA has implemented to improve traffic flow and alleviate congestion since the construction of the original Bay Bridge, the bridge remains a bottleneck with limited capacity. Traffic volumes continue to increase and cause congestion during peak periods, which limits mobility and increases travel time.

3.2 Mobility

There is a lack of mobility for all modes of travel, including vehicles, trucks, and transit services, caused by existing and anticipated future conditions at the Bay Bridge. Congestion at the Bay Bridge and its approaches and subsequent spillover effects on local roadways limit the movement of people, goods, and services across the Chesapeake Bay and in adjacent communities.

3.2.1 Regional Mobility

The connection provided by the existing Bay Bridge is critical to the overall mobility, accessibility, and economic prosperity of the region. Regionally, many communities throughout Maryland and neighboring states, particularly communities on the Delaware-Maryland-Virginia (Delmarva) peninsula, rely on the Bay Bridge for travel across the Chesapeake Bay.

U.S. 50/301 is also a part of the Primary Highway Freight System (PHFS), a network of highways managed by the FHWA Office of Freight Management and Operations that has been designated as the most critical highway portions of the United States freight transportation system. However, the corridor was also identified as one of the top truck bottlenecks in the State, according to the 2021 Mobility Report.[1] Additionally, according to the Maryland State Freight Plan, the eastbound route approaching the Bay Bridge was ranked the least reliable corridor for truck travel in the State of Maryland; westbound was ranked the second most unreliable. This has particularly hindered agricultural transport from local areas.

While the bottleneck at the Bay Bridge impacts commerce going to and from Queen Anne's County, Anne Arundel County, and other neighboring counties and jurisdictions, it also contributes to larger freight mobility and supply chain issues that affect the entire Mid-Atlantic region. In 2022, the state of Delaware had the second highest delay per mile for corridors included in the PHFS with 6,198 truck hours, while the state of Maryland had the third highest delay per mile at 6,109 truck hours; Washington, DC ranked fifth at 5,809 truck hours. Since U.S. 50/301 is

[1] *Maryland State Highway Mobility Report*, Tenth Edition (2021), p. 54.

an important freight route for cargo moved via trucks, current and forecasted increases in traffic volume will increase travel times and decrease travel reliability, decreasing the efficient movement of goods and impeding commerce to and from communities around the Chesapeake Bay.

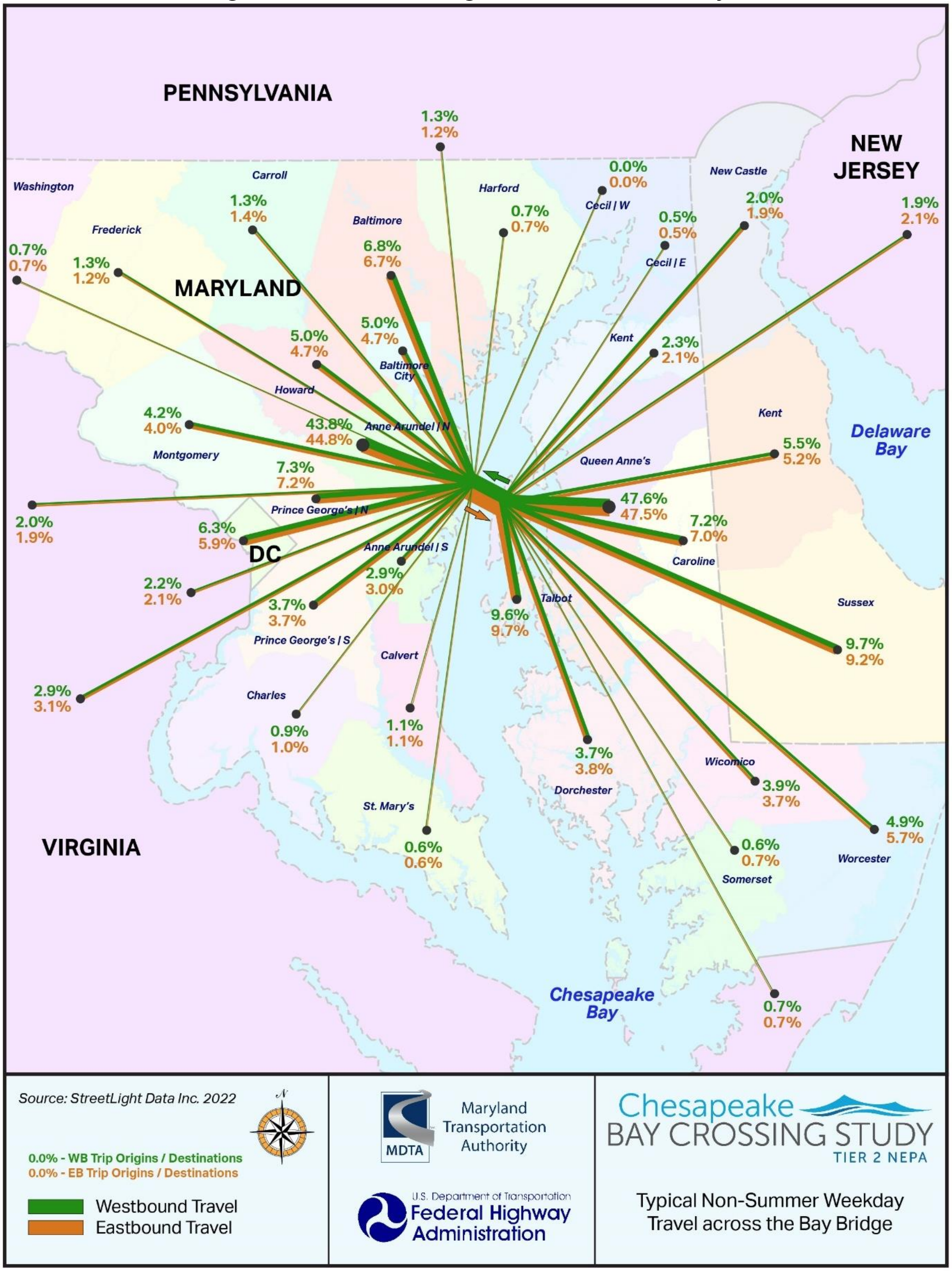
As an evacuation route, the Bay Bridge is a critical connection during emergencies. Most of the counties on the Eastern Shore have communities that lie within a storm evacuation zone, including Queen Anne's, Dorchester, Wicomico, Kent, Somerset, Talbot, and Worcester counties, as well as other communities throughout Southern Delaware. For residents within these communities, the Bay Bridge provides a crucial connection to the Western Shore during evacuations due to storms. Certain weather conditions can also affect the operation of the Bay Bridge. For example, truck traffic is prohibited during wind warnings and restrictions and complete closures may occur in the event of extreme weather conditions. Thus, the ability of the current span to efficiently move high volumes of traffic can vary, particularly during weather events when many travelers may specifically depend on the bridge.

The current Bay Bridge provides the only roadway connection across the Chesapeake Bay over a distance of nearly 200 miles; Elkton, Maryland to the north is over 50 miles away from the current Bay Bridge and the Chesapeake Bay Bridge Tunnel, which provides an additional connection across the Chesapeake Bay, is over 130 miles to the south in Virginia. Without the connection provided by the Bay Bridge, travelers would need to take these alternate routes and trips to and from destinations on the opposite side of the Chesapeake Bay could take two or three times as long in duration. However, increased congestion has constrained the mobility of this important connection and could also lead to congestion at the alternative routes throughout the region.

3.2.2 Origins and Destinations

The Bay Bridge supports local trips (e.g., work related and discretionary trips) with origins and destinations (O-Ds) relatively close to the shores of the Chesapeake Bay, and regional trips (e.g., commerce, recreation, regional travel) with O-Ds throughout and beyond Maryland. **Figure 10** shows the O-Ds for average non-summer weekdays.

Figure 10: O-Ds for Average Non-Summer Weekdays



During typical non-summer weekdays, approximately 48 percent of trips crossing the Bay Bridge begin or end in Queen Anne's County while approximately 48 and 47 percent of trips crossing the Bay Bridge respectively begin or end in Anne Arundel County. These are typical origins and destinations for local or commuter trips. More information on non-summer weekday trip origins and destinations is shown in **Table 10** and **Table 11**, using vehicular volumes in lieu of percentages. In the last two columns of both tables, green cells are above zero and result from higher summer weekend volumes compared to non-summer weekdays; red cells are below zero and result from lower summer weekend volumes compared to non-summer weekdays.

Table 10: Daily Vehicular Trips across the Bay Bridge to and from Locations on the Eastern Shore

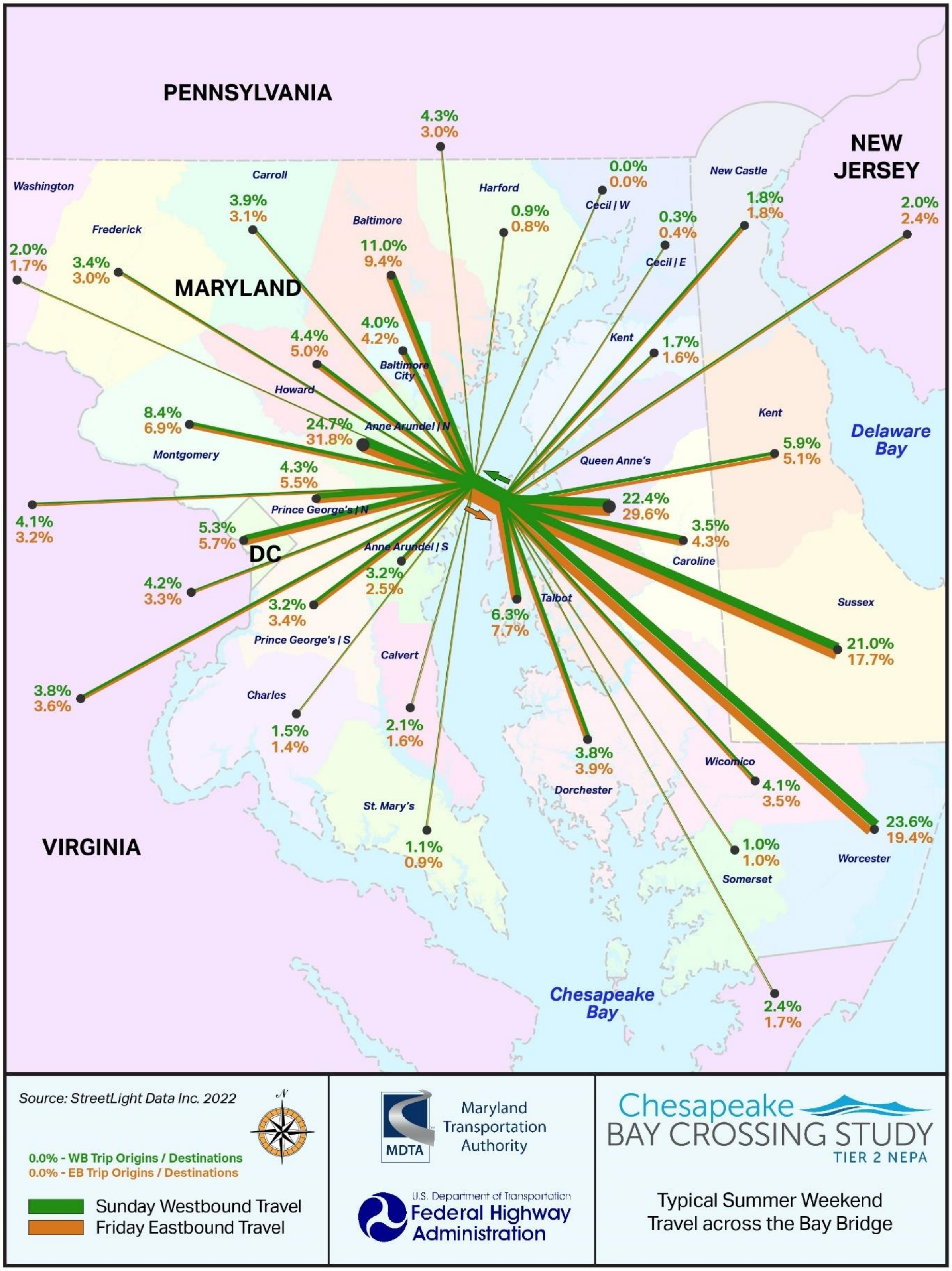
Location	Non-Summer Weekday		Summer Weekend		Summer Weekend - Non-Summer Weekday	
	Eastbound Trips	Westbound Trips	Eastbound Trips (Fri)	Westbound Trips (Sun)	Eastbound Trips (Fri)	Westbound Trips (Sun)
Caroline County, MD	2,440	2,501	2,268	1,804	-172	-697
Cecil County, MD | E	174	174	211	155	37	-19
Dorchester County, MD	1,325	1,285	2,057	1,958	733	673
Eastern PA, NJ and Beyond	732	660	1,266	1,031	534	371
Kent County, DE	1,813	1,910	2,690	3,040	878	1,130
Kent County, MD	732	799	844	876	112	77
New Castle County, DE	662	695	950	928	287	233
Queen Anne's County, MD	16,557	16,532	15,614	11,543	-943	-4,989
Somerset County, MD	244	208	528	515	284	307
Southeast VA and Beyond	244	243	897	1,237	653	994
Sussex County, DE	3,207	3,369	9,337	10,822	6,130	7,453
Talbot County, MD	3,381	3,334	4,062	3,247	681	-88
Wicomico County, MD	1,290	1,355	1,846	2,113	557	758
Worcester County, MD	1,987	1,702	10,234	12,162	8,247	10,460
Totals	**34,857**	**34,731**	**52,751**	**51,533**	**17,894**	**16,801**

During summer weekends, there is a higher percentage of trip destinations beyond the western and eastern ends of the bridge, as compared to weekday trips. By comparison, approximately 34 and 28 percent of trips respectively begin or end in Anne Arundel County and approximately 22 and 30 percent of trips respectively begin or end in Queen Anne's County. Percentages of origins and destinations for trips crossing the bridge during the summer weekends are shown in **Figure 11**. More information on summer weekend origins and destinations is also shown in **Table 8** and **Table 9**.

Table 11: Daily Vehicular Trips across the Bay Bridge to and from Locations on the Western Shore

Location	Non-Summer Weekday		Summer Weekend		Summer Weekend - Non-Summer Weekday	
	Eastbound Trips	Westbound Trips	Eastbound Trips (Fri)	Westbound Trips (Sun)	Eastbound Trips	Westbound Trips
Anne Arundel County, MD | N	15,616	15,212	16,775	12,729	1,159	-2,484
Anne Arundel County, MD | S	1,046	1,007	1,319	1,649	273	642
Baltimore City, MD	1,638	1,737	2,216	2,061	577	325
Baltimore County, MD	2,335	2,362	4,959	5,669	2,623	3,307
Calvert County, MD	383	382	844	1,082	461	700
Carroll County, MD	488	452	1,635	2,010	1,147	1,558
Cecil County, MD | W	0	0	0	0	0	0
Central PA and Beyond	418	452	1,583	2,216	1,164	1,764
Charles County, MD	349	313	739	773	390	460
Fairfax County, VA	732	764	1,741	2,164	1,009	1,400
Frederick County, MD	418	452	1,583	1,752	1,164	1,301
Harford County, MD	244	243	422	464	178	221
Howard County, MD	1,638	1,737	2,638	2,267	999	531
Montgomery County, MD	1,394	1,459	3,640	4,329	2,246	2,870
Prince George's County, MD | N	2,510	2,535	2,901	2,216	392	-319
Prince George's County, MD | S	1,290	1,285	1,794	1,649	504	364
Southern VA and Beyond	1,081	1,007	1,899	1,958	818	951
St. Mary's County, MD	209	208	475	567	266	358
Washington, DC, Arlington, VA and Alexandria, VA	2,057	2,188	3,007	2,731	950	543
Western MD and Beyond	244	243	897	1,031	653	788
Western VA and Beyond	662	695	1,688	2,113	1,026	1,418
Totals	**34,856**	**34,729**	**52,747**	**51,533**	**17,891**	**16,803**

Figure 11: O-Ds for Summer Weekend Days



Percentages for other counties that are located further from the Bay Bridge also increase on the summer weekends, indicating that increases in volumes on summer weekends are likely due to non-local travel. For example, on non-summer weekdays, approximately five and six percent of trips respectively start or end in Worcester County, which is located on the Atlantic Ocean and is home to Ocean City. On summer weekends, the percentages increase to approximately 19 percent of trips crossing the Bay Bridge on summer Fridays with Worcester County as a destination, and approximately 24 percent of trips crossing the Bay Bridge on Summer Sundays with Worcester County as an origin. As the region's population and employment levels grow, the demand for all trip types will increase, requiring more travel capacity across the Chesapeake Bay.

3.2.3 Local Mobility

Higher levels of congestion can produce spillover traffic onto the local roadway network. The Kent Narrows Community Plan, the Queen Anne's County Comprehensive Plan, and the Anne Arundel County Comprehensive Plan, Plan2040, have cited several priority issues within the roadway network surrounding the Bay Bridge due to pass-through traffic, local roadway congestion, and lack of connectivity. Congestion can limit mobility and connectivity within local communities and can inhibit access to employment, healthcare, and other important resources, whether nearby or across the Chesapeake Bay. Not only can heavy traffic cause delays in response times for emergency service providers managing incidents on U.S. 50/301, but it also prohibits residents within the adjacent local communities from accessing necessary emergency services when needed. Communities like Broadneck, Arnold, and Cape St. Claire on the Western Shore and Stevensville, Chester, Kent Narrows, and Grasonville on the Eastern Shore often experience the worst side effects of the congestion on U.S. 50/301.

During peak periods of congestion, traffic from U.S. 50/301 has frequently resulted in spillover traffic onto local roadways of adjacent communities in the Study Area. Many motorists will divert away from U.S. 50/301 to avoid congestion, inadvertently causing other traffic backups. Mobile apps and other technology programmed to help users avoid congested roadways can also contribute to this issue. This diversion of traffic impacts the reliability and level of service of the local roadway network and the motorists who utilize them.

Additionally, congested conditions also make merging onto the roadway difficult, causing traffic congestion at local roadways with connections to on-ramps. Impacted roadways on the Western Shore include:

- Oceanic Drive,
- College Parkway,
- Whitehall Road, and
- St. Margarets Road (MD 179).

In recent years, Queen Anne's County has led efforts to reduce diversions onto local roadways. However, congestion on the Eastern Shore resulting from traffic on the Bay Bridge, especially on Kent Island, remains an ongoing issue and has been identified by Queen Anne's County as a priority concern. On the Eastern Shore, impacted roadways include:

- Main Street (MD 18),
- Romancoke Road (MD 8),
- Kent Narrows Road,
- Cox Neck Road, and
- Dominion Road.

Local roadways typically experience spillover traffic most frequently during periods of high queuing on U.S. 50/301, meaning it is most severe during rush-hour traffic in late afternoons and particularly during summer weekends. Since queues are anticipated to increase in length and duration, local diversions are also anticipated to increase and worsen in the future.

3.2.4 Transit Services

Four public agencies operate transit service across and adjacent to the Bay Bridge, including:

- The Maryland Transit Administration (MTA), which provides Commuter Bus Service and includes three routes depicted in **Figure 12**, with limited stop service from various Park and Ride lots on Kent Island to points west of the Bay Bridge in Annapolis, south to Davidsonville and Washington, DC, and to the north to Baltimore;

- Annapolis Transit, which operates eight fixed routes within the City of Annapolis and paratransit service for people with disabilities who are not able to ride the fixed-route public transportation;

- Anne Arundel County Transit, which operates 12 fixed routes throughout the County depicted in **Figure 13**, and two on-demand or Call N' Ride zones: one in north county and one in south county; and

- Queen Anne's County Ride, which operates four deviated fixed routes, which provide paratransit trips that deviate up to three quarters of a mile from fixed routes, and county-wide demand response service.

Figure 12: MTA Commuter Bus Existing Transit Service

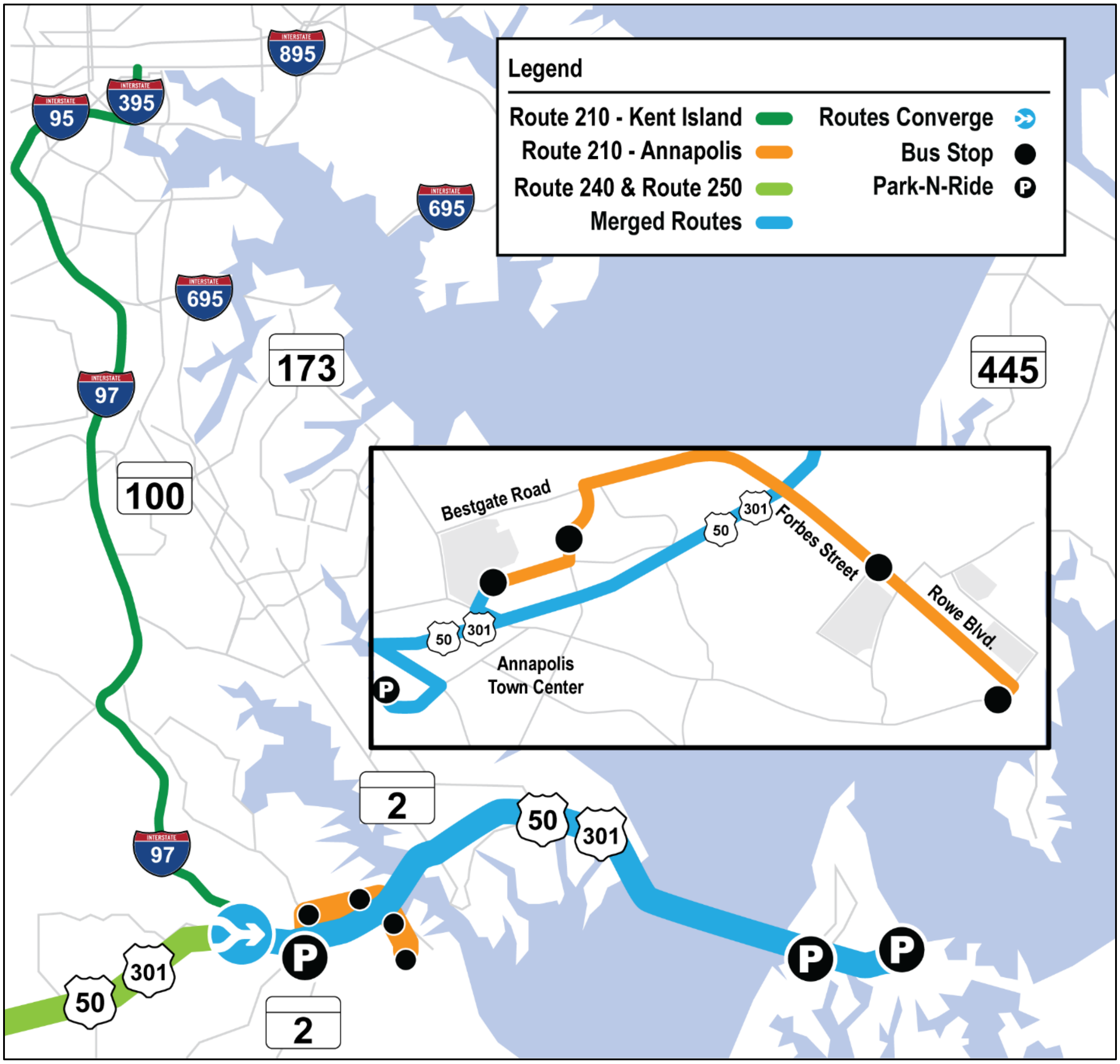
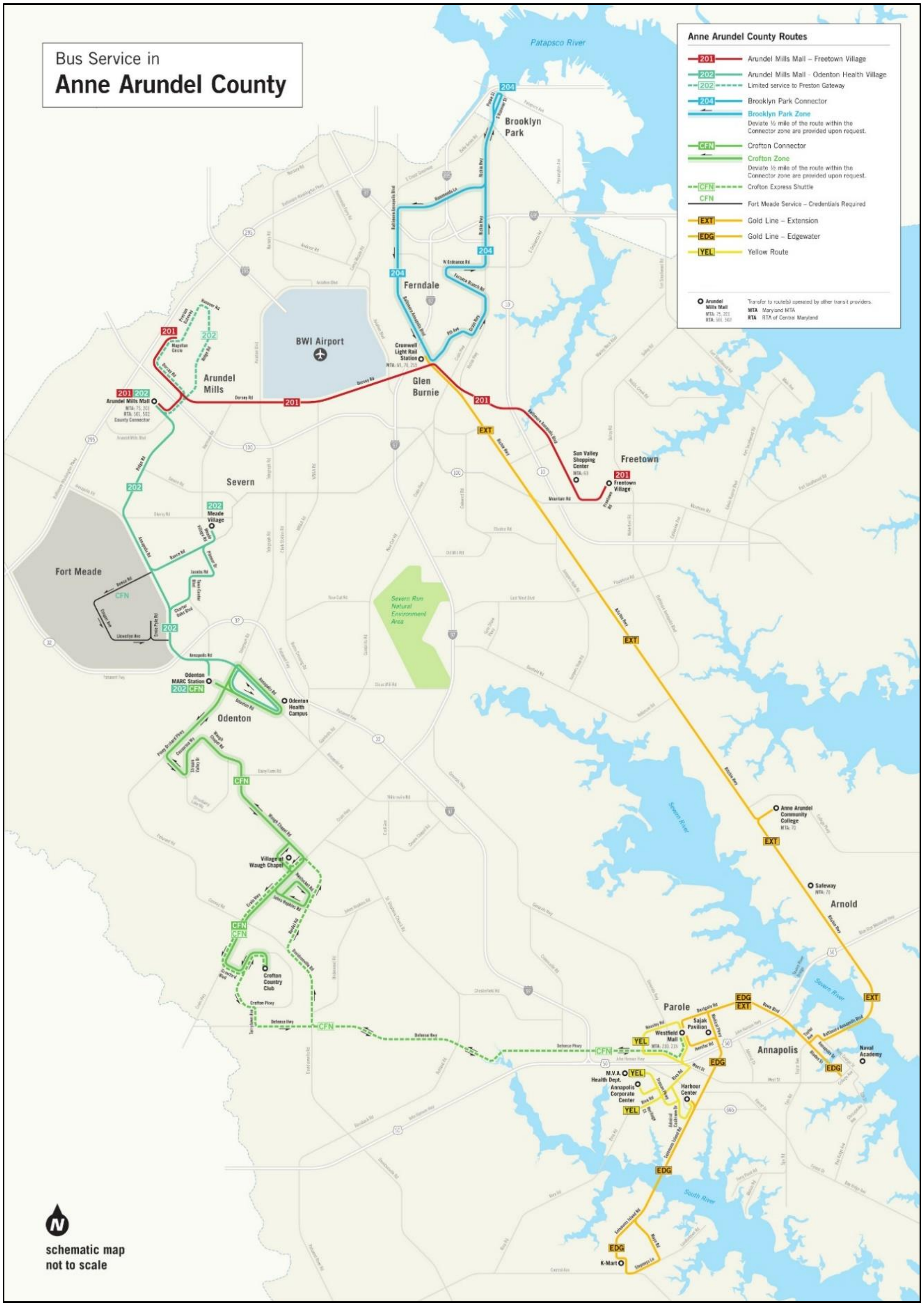


Figure 13: Anne Arundel County Transit Existing Bus Service



The only transit services that cross the bridge are the MTA Commuter Bus Service and the Queen Anne's County Ride Annapolis Route, which has service every two hours starting around 6 AM and ending around 5 PM.

There are two Park and Ride locations within the Study Area for drivers who utilize local bus networks. The Stevensville Park and Ride is located on the southeastern side of the U.S. 50/301 and MD 8 (Romancoke Road) interchange. The Kent Narrows Park and Ride is located beneath U.S. 50/301 at Kent Narrows, between Piney Narrows Road and Main Street.

Ridership on Anne Arundel County Transit and Queen Anne's County Ride went down significantly during the COVID-19 pandemic in 2020 and 2021. After fare decreases and enhancements, Anne Arundel County Transit has reported ridership of approximately 20,000 or more per month, slightly higher than pre-pandemic levels. Queen Anne's County Ride has also decreased fares and the post-pandemic ridership is about 65 to 70 riders per month, a slight decrease from pre-pandemic levels which were between 80 to 100 riders per month.

All transit agencies report congestion is a major issue in keeping transit schedules, specifically on Thursday and Friday afternoons. In addition to transit agencies, local organizations and private operators provide bus service for medical trips as well as senior and disabled individual transport. There are no existing ferries or passenger rail routes across the Chesapeake Bay.

3.2.5 Pedestrian and Bicycle Connectivity

The Chesapeake Bay is a major natural barrier to pedestrian and bicycle travel between the Eastern and Western Shores. The existing Bay Bridge does not include any facilities dedicated for pedestrian or bicycle use. Additionally, due to the type of roadway, limited shoulder widths, and speed limits, safe on-road bicycle use is not possible across the Bay Bridge. U.S. 50/301 also lacks direct connectivity to other pedestrian and bicycle facilities on either side of the Chesapeake Bay.

Although there are no pedestrian and bicycle facilities that cross the Chesapeake Bay, pedestrian and bicycle recreation are popular activities within the Chesapeake Bay region and within the immediate vicinity of the Study Area. On the west side of the Bay, there are bicycle lanes on St. Margaret's Road, Whitehall Road, and Skidmore Drive. The Baltimore and Annapolis (B&A) Trail connects to bicycle lanes on Boulters Way and Ritchie Highway near the Severn River. The Annapolis Connector of the B&A Trail at Boulters Way, near the Severn River, currently provides the only connection between the north and south side of U.S. 50/301. The Broadneck Trail, which is complete between Bay Dale Drive and East College Parkway, is under construction to extend to Sandy Point State Park. Future extension to the west will connect the Broadneck Trail with the B&A Trail near Arnold, MD. While pedestrians and bicyclists still use Oceanic Drive, MD 179, and Bay Dale Drive to travel through the corridor, these roadways do not have dedicated bicycle lanes. Worsening congestion on local roadways caused by spillover traffic creates barriers and safety hazards for pedestrians and bicycle users in the surrounding communities on both sides of the Chesapeake Bay.

On the Eastern Shore, the Cross Island Trail runs for approximately 6.5 miles from Terrapin Nature Park to the Cross County Connector Trail in Grasonville, with portions located adjacent to U.S. 50/301. The Cross Island Trail crosses under U.S. 50/301 at two points: Piney Narrows Road and Kent Narrows Road. The Cross Island Trail also provides a connection to the Chesapeake Heritage and Visitor Center at Kent Narrows. The South Island Trail runs parallel to MD 8, beginning at Matapeake State Park and ending at the Romancoke Fishing Pier. The Kent Island Bike Trail connects with the Cross Island Trail at Terrapin Nature Park and heads south to connect with the South Island Trail at Matapeake Park. East of the Kent Island Bike Trail is the Quiet Kent Bike Route, which is 23 miles long and follows state and county roadways south of Chester. East of Kent Narrows is the 25-mile Grasonville Flatlands Bike Route along rural roadways south of Grasonville. A full map of the existing trails and proposed bike routes under construction on both sides of the Chesapeake Bay near the Bay Bridge is shown in **Figure 14**.

3.3 Roadway Deficiencies

While the MDTA provides safe conditions at the existing Bay Bridge, the bridge does not "adhere to design criteria and/or standards" because of the existing narrow lane widths, lack of shoulders, and other factors. Since existing conditions do not meet current design standards, they do not provide nominal safety, as defined by FHWA and NCHRP Report 480.[2]

3.3.1 Current Cross Section Conditions

Several elements of the existing Bay Bridge cross section are geometrically deficient, including current lane and shoulder widths. Both eastbound and westbound on the Bay Bridge, the lane widths range from approximately 11 feet to 12 feet, but each lane is a consistent width across the bridge. In each direction, there is a maximum two-foot offset on the outside of the travel lanes to the outside barrier. According to the MDOT Policy for Bridge Width and the American Association of State Highway and Transportation Officials A Policy on Geometric Design of Highways and Streets 7th Edition published in 2018, travel lanes should be a minimum of 12 feet wide, and lane and shoulder widths on bridges should match the approach roadway. For bridges longer than 200 feet, shoulder widths can be narrowed but a minimum width of four feet is still recommended. Thus, the Bay Bridge does not meet current design criteria and standards for lane and shoulder width. Additionally, according to SHA Structural Design Guidance, the minimum cross section for a bridge structure should be 32 feet; at 31 feet and two inches, the eastbound bridge does not meet this current standard. These existing dimensions of the lane and shoulder widths create less-than ideal conditions by providing less space for vehicles within the lane; not providing a location for disabled vehicles to pull over; and allowing for drivers to more easily see, feel, and be affected by the height and curvature of the bridge.

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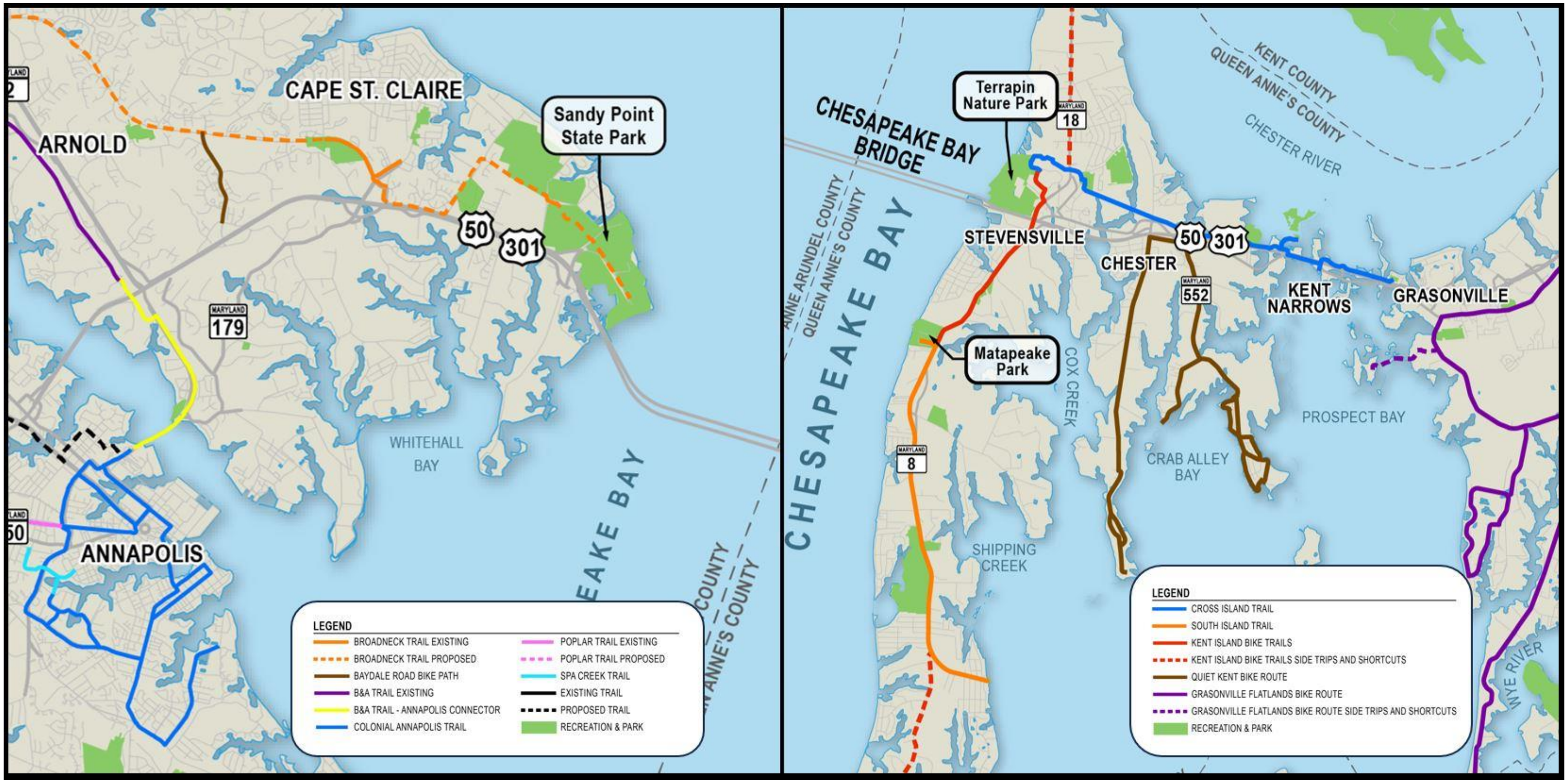
[2] NCHRP Report 480 A Guide to Best Practices for Achieving Context Sensitive Solutions, Transportation Research Board, Washington, D.C., 2002, Page 52.
https://highways.dot.gov/safety/zero-deaths/integrating-road-safety-nepa-analysis-primer-safety-and-environmental-4. U.S. Department of Transportation, Federal Highway Administration,

Figure 14: Existing and Proposed Bicycle Routes Near the Bay Bridge



Due to the height of the bridge, a fall from the Bay Bridge into the Chesapeake Bay could be fatal. While the Bay Bridge has concrete barriers and steel guardrails to guide motorists across the bridge, the current structures do not prevent incidents involving accidental falls or deter individuals from climbing over the outside of the barriers. There are no physical suicide deterrent systems (like tall barriers or netting) on the Chesapeake Bay Bridge. Suicides and suicide attempts occur on the Bay Bridge every year. Suicide deterrent systems on the bridge are limited to non-physical interventions and include cameras to help identify people in crisis, emergency call boxes, signs with suicide prevention information, and a team of eight MDTA patrol officers that specialize in crisis negotiations.

3.3.2 Incident Management and Maintenance

The MDTA follows specific policies for its bridges as a means of maintaining the safest roadway conditions possible for motorists and minimizing the risk of incidents. During an incident, the MDTA uses state-of-the-art management techniques to detect, verify, respond to, and clear the incident. The primary goal is to save lives and address any injuries, while protecting the public and MDTA employees from any further injury. Once those issues have been addressed, clearing the incident to restore full capacity of the crossing becomes priority.

The MDTA and the MDTA Police are active members of the Coordinated Highways Action Response Teams (CHART) program, which also includes the SHA and the Maryland State Police. This program provides advanced notification to travelers of an incident and the related progress made in clearing the incident. The CHART Program also coordinates evacuations with Maryland local government agencies and agencies in other states during major weather events. Both traffic-related incidents and weather events have the potential to cause lane closures and affect lane direction.

During incidents, the limited shoulder space and narrow lanes make it difficult for emergency responders to reach incidents, conduct incident management procedures, and close lanes if needed, causing delays in response times. Delay in response is exacerbated during periods of high traffic volumes. Additionally, the narrow widths often impede bridge maintenance activities. Current small shoulder widths provide insufficient room for roadway workers who need to conduct maintenance activities. Frequently, the lack of space requires lane closures, which further constrains traffic flow.

3.4 Existing and Future Maintenance Needs

Due to the age and design life of the existing Bay Bridge, substantial maintenance of the facility is needed now and in the future. These maintenance needs lead to lane closures that make incident management more difficult and cause increased traffic congestion and delays.

3.4.1 Cost and Maintenance of Existing Structures

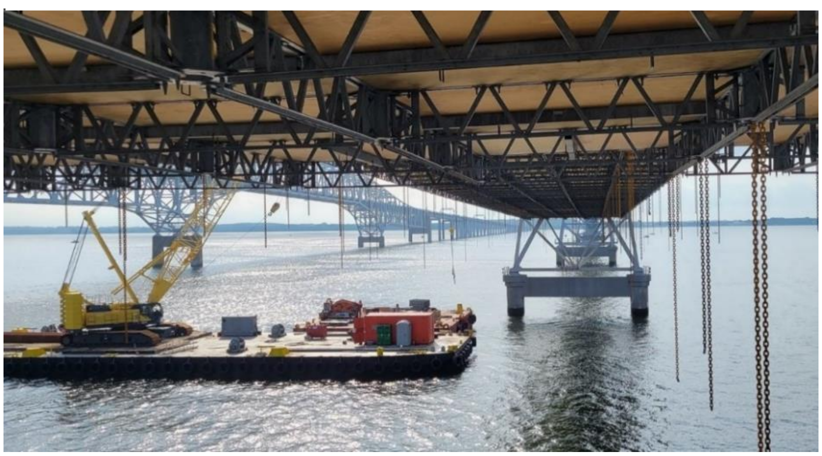
The existing Bay Bridge structures are currently in satisfactory condition and can remain functional for the next several decades until around 2065 with scheduled rehabilitation and maintenance (i.e., painting, deck replacement, suspension cable rehabilitation, and electrical repairs).[3] However, maintenance and rehabilitation activities, as well as incident management (i.e., crash response, debris removal) on the Bay Bridge often require lane closures. These restrictions reduce capacity on the Bay Bridge and increase congestion on the bridge and at its approaches.

The number of maintenance and rehabilitation activities needed will increase as the Bay Bridge ages. Beyond 2023, major superstructure and substructure rehabilitation/replacement work involving short- and long-term lane closures would be required to maintain fair condition of the bridges. The reduced capacity and the projected increase in traffic in the future would create more congestion and even less reliable travel operations across the Chesapeake Bay than exists today.

Since 2015, the MDTA has completed several major maintenance projects. These include the rewrapping and dehumidification of the main cables which was completed in 2016 for $41 million and the installation of supplemental cables and rehabilitation of the superstructure completed in 2020 for $29 million. More recently, the MDTA implemented AET at the Bay Bridge in 2020, the Westbound Lane 1 Overlay and Gantry Replacement in 2022, and the ALCS in 2023 to support tolling at highway and enhance safety during two-way operations.

Moving forward, the MDTA Board approved Phase 1 of the Eastbound Bay Bridge Deck Replacement Project on October 27, 2022, at a cost of $140 million. **Figure 15** depicts Phase 1 work on the eastbound span. The project will include the replacement of the deck floor system, structural rehabilitation of the steel superstructure, barrier upgrades, replacement of lane use signal gantries, relocation of utilities, and off-site stormwater management. Construction for the project began in fall 2023 and is expected to be completed in spring 2025.

Figure 15: Eastbound Bay Bridge Deck Replacement Project



The Eastbound Bay Bridge Deck Replacement project is designed to mitigate impacts to traffic, particularly during peak times. Still, the MDTA expects regular congestion during project construction and will actively monitor and make decisions on travel operations when feasible.

[3] See MDTA. 2015. U.S. 50/301 William Preston Lane Jr. Memorial (Bay) Bridge: Life Cycle Cost Analysis. https://mdta.maryland.gov/sites/default/files/Files/Bay_Bridge_LCCA_Report_12-2015.pdf

Other sections of the bridge will need similar upgrades in subsequent years through additional phases. However, the timing and phasing of the sections will be determined based on funding availability and bridge conditions. Long term, the MDTA anticipates the full eastbound deck replacement and full repainting to be completed between 2030 and 2035, as well as other cable and superstructure work to be completed around 2045. Between 2030 and 2050, the MDTA anticipates the westbound bridge will also need a deck replacement, cable replacement, full repainting, and other various maintenance activities. By 2060, the MDTA estimates future repainting projects and deck replacements will be needed for both spans of the Bay Bridge. All projects would require a lane closure which would worsen congestion over time and compound existing traffic congestion, mobility, and safety issues. While every effort is made for lane closures to occur at night and during off peak hours, the length of closures will extend into peak travel periods. Certain required major rehabilitation, such as beam replacements, will require full-time (24/7) lane closures, which historically have had severe impacts even in winter months. The MDTA anticipates the cost of all future maintenance projects from 2023 through 2065 to be approximately $3.8 billion. The cumulative past costs and projected future costs over time are depicted in **Figure 16**.

3.4.2 Short Term Maintenance Operations

Current capacity across the Chesapeake Bay is inadequate to maintain options for traffic movement during maintenance and for management of incidents on the Bay Bridge. Current lane and shoulder widths provide little room for maintenance activities along the bridge without closing lanes. The lack of shoulders combined with the frequency of required maintenance limits the amount of work that can be done without impacts to travel conditions on the roadway. Additionally, these conditions can put workers and incident responders at greater risk when working near moving traffic.

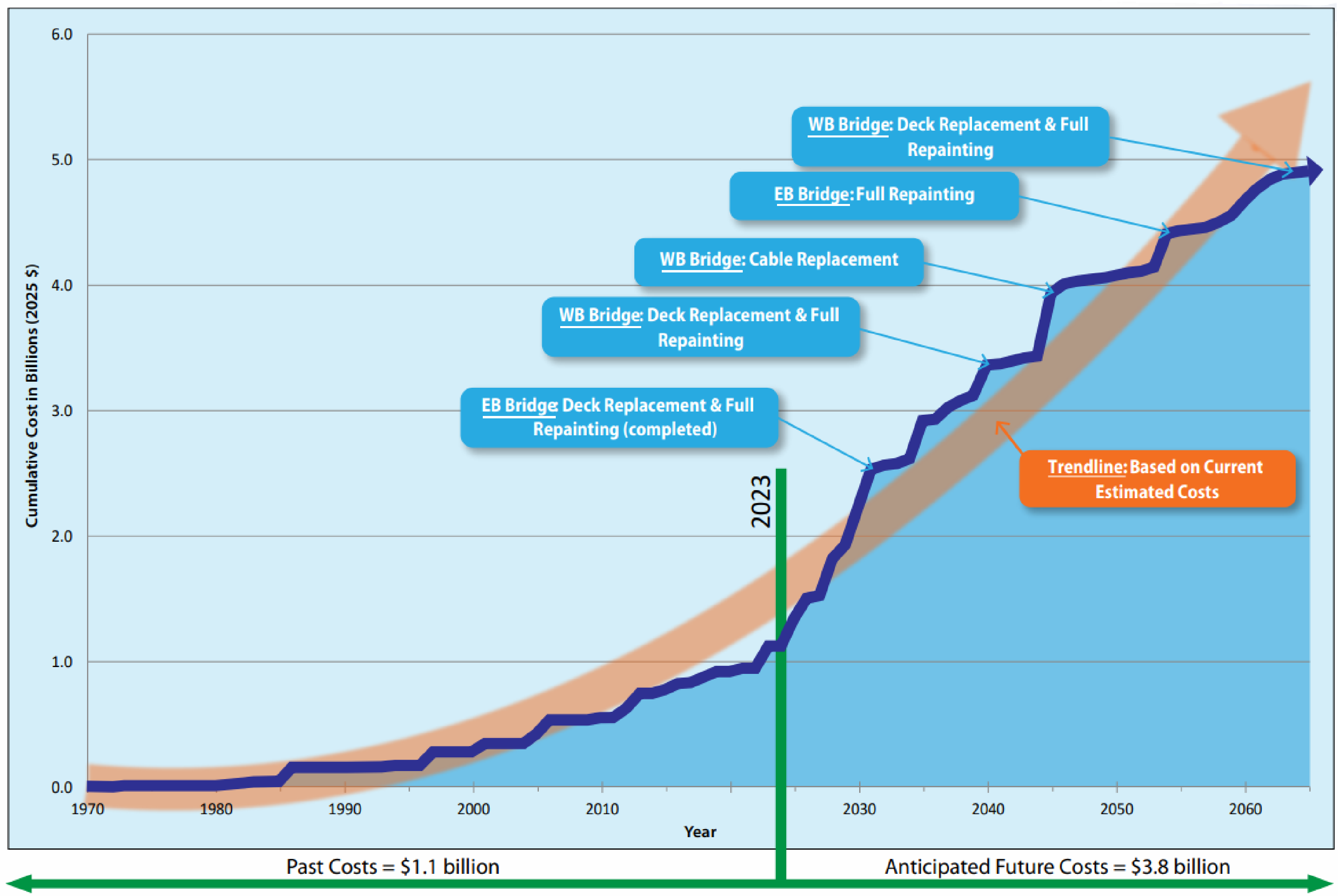
Whenever possible, the MDTA attempts to schedule maintenance activities during periods when they will have the least impact on travel operations. The MDTA utilizes innovative approaches to ensure that maintenance projects do not significantly impact traffic movement, including constructing deck sections off-site and utilizing off-peak lane closures during the day. Many maintenance activities on the Bay Bridge occur during overnight hours when volumes are lowest. Warnings for lane closures (or bridge closures) are displayed on signs on the impacted roadways well in advance of the closures, in accordance with statewide standards for lane/roadway closures. In addition, when possible, the MDTA notifies the public of upcoming maintenance activities through public announcements using various sources (i.e., traditional media and social media).

3.5 Navigation

The existing Bay Bridge serves as a key constraint for ships that travel on the Chesapeake Bay, including to the Port of Baltimore. Accommodating existing and future ship navigation and traffic on the Chesapeake Bay is important to maintaining the vitality of the Port of Baltimore and commerce in Maryland.

Should a build alternative be selected at the end of the Tier 2 Study, bridge permits from the U.S. Coast Guard (USCG) under the General Bridge Act of 1946, 33 USC 525 et seq., and Section 9 of the Rivers and Harbors Appropriation Act of 1899, 33 USC 401, will be required to preserve the public right of navigation and to prevent interference with interstate and foreign commerce along navigable waters. The USCG permits would include the preliminary navigational clearance determination for modified or newly constructed structures over navigable waters, required protective systems, clearance gauges, navigational lighting, and temporary measures for construction.

Figure 16: Future Projected Maintenance and Cost of Existing Spans



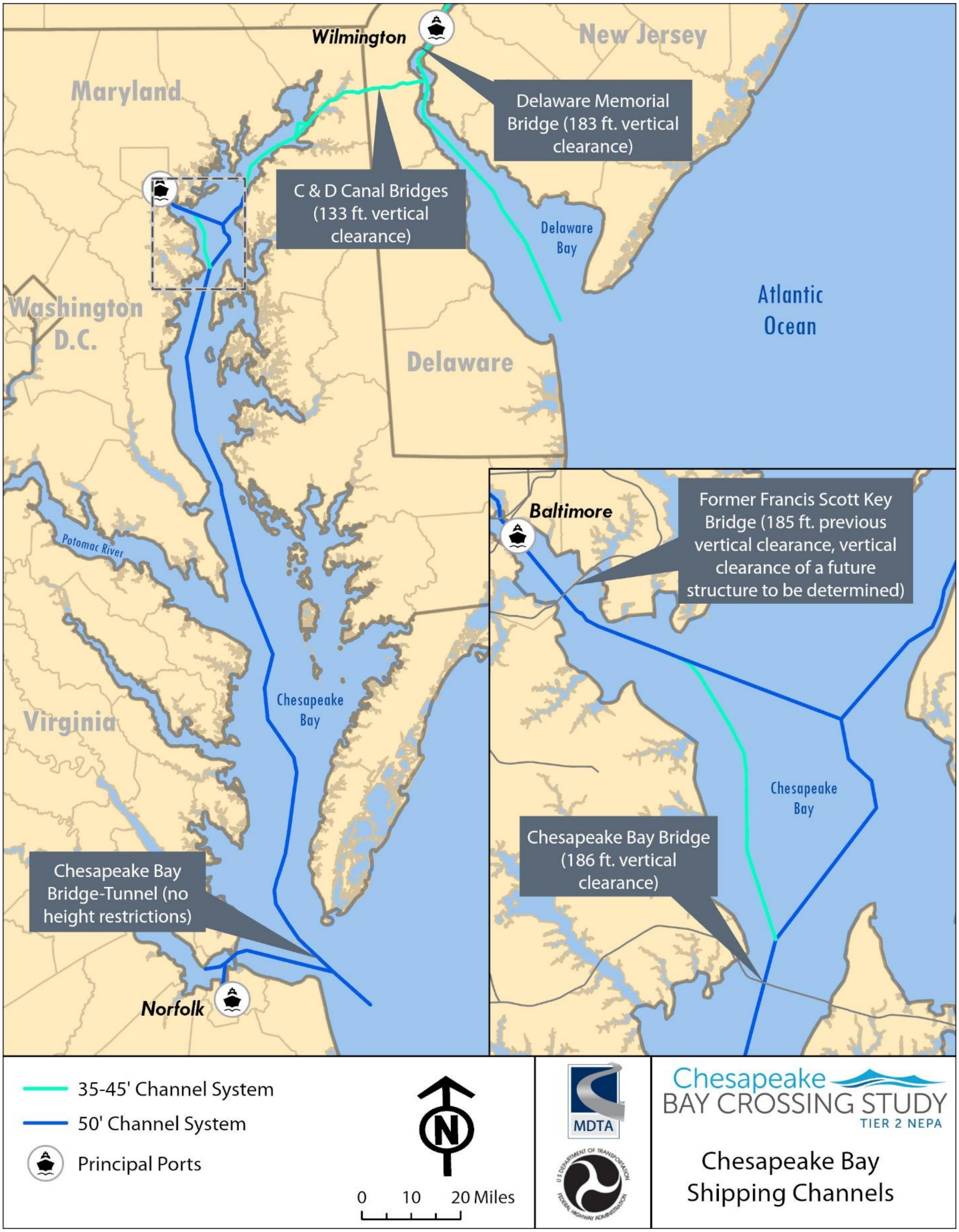
3.5.1 Shipping Operations

The Chesapeake Bay is used by a wide variety of maritime vessels including skiffs, sailboats, fishing boats, research vessels, schooners and other pleasure watercraft. Additionally, it serves as a significant maritime transportation route for cargo and cruise ships accessing Maryland's Port of Baltimore. The Port of Baltimore is recognized as an ideal location for international trade as one of the furthest inland ports on the East Coast of the United States, providing efficient access to nearby metropolitan areas and trade routes to the Midwestern United States. The Port of Baltimore contributes significantly to the local, regional, and national economy.

Figure 17: Freighter passing under the Bay Bridge

The main shipping channel, classified for both shallow and deep draft vessels, extends along the west side of the Chesapeake Bay and under the highest suspension section of the Bay Bridge. The channel is 50 feet deep and generally 800 feet wide with a vertical clearance (i.e., air draft) of 186 feet. There is also a secondary channel under the Bay Bridge that is used by smaller vessels located directly east of the main shipping channel. This secondary channel is 90 feet deep and 725 feet wide. The vertical clearance at the secondary channel is 65 feet. The dredging of the channels is managed by the U.S. Army Corps of Engineers and the Maryland Port Administration (MPA). The shipping channels to the Port of Baltimore are displayed on **Figure 18**.

Figure 18: Shipping Channels and Vertical Clearances to the Port of Baltimore



Aside from the mouth of the Chesapeake Bay, the only other maritime point of access to the Atlantic Ocean from the Port of Baltimore is through the Chesapeake & Delaware (C&D) Canal. The C&D Canal is 14 miles long and located northeast of the Port of Baltimore. It connects the Delaware River and Atlantic Ocean with the Elk River and Chesapeake Bay. As an alternative shipping route for the Port of Baltimore, it carries approximately 9.5 percent of all ship traffic in and out of the Port. Aside from various disadvantages to inland water transport compared to open water shipping, at 35 feet deep and 450 feet wide, the canal presents stricter limitations on the size of cargo ships and the amount of cargo that can navigate through it. Thus, the main shipping channel that runs under the Bay Bridge is the primary and essential trade route for the Port of Baltimore.

In 2022, the Port of Baltimore cargo vessels' import and export tons totaled 43.3 million, and the value of foreign cargo marked a record year with a value of $74.3 billion. Most of the domestic waterborne cargo within the Port of Baltimore consists of coal, petroleum products, sand and gravel moving within the Chesapeake Bay or to nearby ports along the U.S. East Coast. Several cruise lines also utilize the Port of Baltimore, including Royal Caribbean, Carnival, American Cruise Lines, Phoenix Reisen and Norwegian Cruise Line.

3.5.2 Channel Limitations

The existing Bay Bridge spans limit vertical clearance through the Chesapeake Bay to 186 feet. The C&D Canal, which already has stricter limitations due to the shipping channel width and depth, has an even shorter clearance of 133 feet, due to several bridges that cross over it. By comparison, the Verrazzano Bridge has a vertical clearance of 230 feet, providing substantially higher clearances for ships entering and exiting the Port of New York and New Jersey. The vertical clearances to the Port of Baltimore are depicted in **Figure 18** and **Table 12.** At 185 feet, the Francis Scott Key Bridge, located closer to the Port of Baltimore, once had a similar vertical clearance to the Bay Bridge. Tragically, on March 26, 2024, a large shipping vessel struck one of the piers, causing the Francis Scott Key Bridge to collapse. As a result, the vertical clearance of the Bay Bridge is the determining factor for the size of ships that are able to access the Port of Baltimore. Furthermore, it is anticipated that any future structure at the site of the former Francis Scott Key Bridge would be constructed with higher vertical clearance than the previous structure. The USCG issued a Preliminary Navigational Clearance Determination (PNCD) in June 2024 that identified a minimum vertical clearance of 230 feet for a replacement bridge.

At and between the former location of the Francis Scott Key Bridge and the Bay Bridge, the Chesapeake Bay Shipping Channel does not allow for simultaneous two-way traffic. Additionally, there are no anchorage areas north of the Bay Bridge for large vessels. Thus, many ships are required to wait south of the Bay Bridge for traffic to clear in order to pass under the Bay Bridge to Port of Baltimore facilities in and around the Baltimore Harbor. The approved navigable width of the main shipping channel for larger vessels that pass under the Bay Bridge is 800 feet. The edge of the navigable channel is approximately 350 feet from the bridge piers on each side. The piers currently have limited vessel impact protection at both the main and secondary channels, as the bridge was designed and constructed before the adoption of more modern design standards to mitigate the risk of a vessel collision.

Table 12: Bridge Crossing Vertical Clearances near Bay Bridge

Bridge Name	Roadway	Body of Water and Location	Vertical Clearance (ft)
Chesapeake Bay Bridge	U.S. 50/301	Chesapeake Bay near Annapolis, MD and Stevensville, MD	186
Former Francis Scott Key Bridge	MD 695	Patapsco River near Baltimore Harbor	185 (previous vertical clearance)
Future Replacement for Francis Scott Key Bridge	MD 695	Patapsco River near Baltimore Harbor	230 (identified minimum)
Chesapeake Bay Bridge-Tunnel	U.S. 13	Mouth of Chesapeake Bay at Atlantic Ocean in Virginia	No height restrictions (partial tunnel)
Chesapeake City Bridge	MD 213	C&D Canal at Chesapeake City	135
Summit Bridge	U.S. 301/DE 896	C&D Canal south of Glasgow, DE	133
Canal Bridge	Delmarva Central Railroad	C&D Canal south of Kirkwood, DE	133
William V. Roth Jr. Bridge (Senator Roth Bridge)	DE 1	C&D Canal at St. Georges, DE	138
St. George's Bridge	U.S. 13	C&D Canal at St. Georges, DE	133
Reedy Point Bridge	DE 9	C&D Canal near Delaware City, DE	134
Delaware Memorial Bridge	I-295/U.S. 40	Delaware River, south of Wilmington, DE	183
Bridges highlighted in yellow are all located on the C&D Canal and fall under the same callout box titled "C&D Canal Bridges" in **Figure 18**.			

3.5.3 Future Shipping Traffic

Due to the cost savings of utilizing larger ships to move larger quantities of goods, cargo ships are expected to increase in size within the next decade as older vessels are phased out. The largest class of cargo vessel anticipated to call at the Port of Baltimore through 2040 is the Post Panamax (PPX) Generation III Max, which has the following dimensions:

- 16,000 twenty-foot equivalent units (TEU) capacity
- 1,299 ft length overall (LOA)
- 175.6 ft beam
- 52.5 ft design draft
- 175.4 – 181.9 ft air draft

TEUs are standard shipping containers that are 20 feet long, 8 feet wide, and 8.6 feet tall. Studies show a continued increase in total TEUs and an expected increase in the number of PPX III and larger vessels calling at the Port of Baltimore. The estimated number of calls at Seagirt Marine Terminal, within the Port of Baltimore, is expected to increase from 549 in 2030 to 701 by 2040. The total forecasted TEU increase is displayed in **Table 13**.

Table 13: Twenty-Foot Equivalent Unit (TEU) Forecast for Port of Baltimore

	2030	2035	2040
Forecasted Import TEU	859,531	940,512	1,174,405
Forecasted Export TEU	940,512	1,077,154	1,221,111
Forecasted Total TEU	1,800,043	2,017,666	2,395,516

Despite a trend toward even larger vessels, the current cargo vessel forecast is limited to PPX III Max vessels due to limitations imposed by clearance on the existing Chesapeake Bay Bridge. At 186 feet, the Bay Bridge cannot accommodate the navigation of ships exceeding this size. Additionally, the MPA predicts the current vertical clearance of the Bay Bridge may limit PPX III Max vessels starting in 2045 due to sea-level rise.

Currently, there are 12 regularly scheduled container services calling on the Port of Baltimore. Of these services, there are five dedicated to the Asia and South Asia trade routes, four to the Europe/Mediterranean region, two to the Americas, and one to Africa. The largest vessels currently calling Port of Baltimore are approaching the PPX III (14,000 TEU) vessel class. However, Port of Baltimore estimates show that to meet growing demand, three of these services will likely see future upgrades to the average and maximum vessel sizes, including 16,000 TEUs.

Furthermore, cruise ships are also expected to continue to increase in size. Currently only approximately 31 percent of cruise ships have access to the Port of Baltimore due to clearance limitations. Most cruise ships that have been recently built or that are currently under construction exceed the clearance under the existing Chesapeake Bay Bridge and are therefore unable to call at the Port of Baltimore. This trend is expected to continue in the future, as almost all large cruise ships currently under construction exceed the vertical clearance of the Bay Bridge.

3.5.4 Economic Competitiveness and Significance of the Port of Baltimore

The Port of Baltimore annually produces approximately $3.3 billion in total personal income, $395 million in taxes, and $2.6 billion in business income, as well as supporting over 15,300 direct jobs and over 139,000 connected jobs. According to the 2023 Port Performance Freight Statistics Program: Annual Report to Congress from the Bureau of Transportation Statistics, the Port of Baltimore nationally ranks 18th in total tonnage, 13th in dry bulk tonnage, and 15th in TEU. It is one of only five ports in the United States that ranks in the top 25 in each category. In 2022, the Port of Baltimore ranked first nationally in handling automobiles, light trucks, and farm and construction machinery. It also ranked first in imported gypsum, second in exporting coal, and sixth in importing coffee. Over 196,000 passengers departed from Baltimore on cruise ships in 2022 and the MPA estimates the cruise terminal annually brings in over $63 million to Maryland's economy and supports over 400 jobs. In 2022, the Port of Baltimore ranked as the 12th largest port in the United States by foreign cargo tonnage and tenth largest by dollar value.

During the COVID-19 pandemic, the Port of Baltimore played a critical role in the movement of goods along the Eastern United States. Supply chain issues and backups in landside freight transport that were experienced in other large U.S. ports were not experienced at the Port of Baltimore; nearly 100 "ad hoc" ships that were not scheduled to stop at the Port of Baltimore were diverted to there to reduce delays during the pandemic. Maintaining the shipping route through the Chesapeake Bay and providing clearance for large cargo carriers and cruise lines is critical for supporting the present and future needs of the Port and Maryland's economy.

4 ADDITIONAL OBJECTIVES

Beyond the study needs, two objectives will also be considered throughout the process of developing and evaluating NEPA alternatives. The objectives are (1) environmental responsibility and (2) cost and financial responsibility. These objectives provide additional criteria for evaluating the reasonableness of alternatives and represent issues the MDTA has deemed important in light of the sensitivity of the Chesapeake Bay as an environmental resource, the MDTA's goal to balance the potentially substantial benefits and impacts of major infrastructure projects among all users and neighboring communities, and limited availability of funding resources. Including these issues as additional objectives will lead to higher scrutiny and attention to these issues during alternatives development and will allow for greater efficiency in the early stages of alternatives development. Incorporating the objectives in the analysis will help confirm that alternatives evaluated in the EIS are technically feasible and could ultimately be constructed if selected as a result of the NEPA environmental review process. Ultimately, it will also allow for earlier and clearer communication with stakeholders and the public about the decision-making process.

4.1 Environmental Responsibility

The MDTA recognizes the significance of the Bay Bridge and the Chesapeake Bay. "Environmental Responsibility" in the context of this study is understanding the significance of the natural, built, and human environment and endeavoring to make decisions to meet the purpose and needs while limiting negative impacts to these resources.

The inclusion of environmental responsibility as an additional objective will encourage the development and screening of alternatives that reflect the MDTA's commitment to protect the local community and natural environmental resources. The Tier 2 Study EIS will assess a broad range of natural, cultural, and socioeconomic impacts associated with potential alternatives. The objective of environmental responsibility will be considered in evaluating alternatives with potentially divergent direct, indirect, and cumulative effects to sensitive resources. For instance, assume the MDTA was evaluating two alternatives that could both meet the study's transportation needs. One of those alternatives would result in limited usage of high-quality wetlands and/or tidal resources, while the other alternative would result in extensive damage to those same resources. The importance of protecting those resources would provide an important distinguishing factor in making decisions concerning the reasonableness of those alternatives for detailed consideration or identification of a preferred alternative. Similarly, the preliminary design of build alternatives would be reviewed for means to avoid and minimize impacts to sensitive resources. In short, the environmental responsibility objective means that the MDTA will not merely assess potential effects as part of the Tier 2 Study, but will also make decisions aiming to affirmatively advance environmental interests.

The Bay Bridge is an iconic landmark within the built environment. The original span was the world's longest continuous over-water steel structure and, at the time, the third longest bridge in the world. The 3,200 ft. long suspension section makes the bridge distinctive and a beacon for tourists and photographers. With suspension towers that are 354 feet tall on the eastbound span and 379 feet tall on the westbound span, the Bay Bridge is highly visible from many areas and destinations around the Chesapeake Bay, including Sandy Point Park, Matapeake Park, Greenbury Point Conservation Area, and Terrapin Nature Park, as shown in **Figure 20**. The MDTA understands the symbolic nature of the bridge, the value of the bridge's architectural and aesthetic merit and the importance of its visual impact.

The Chesapeake Bay is one of the most biologically diverse estuaries in the world and maintains a functioning ecosystem that filters water and provides a suitable habitat for over 3,600 species of plants and animals. In addition to its ecological importance, the Chesapeake Bay also plays a major role in Maryland's economy, including commercial fishing, recreation, and educational and tourism opportunities. Each year, 500 million pounds of seafood, including blue crabs, clams and oysters, are harvested from the Chesapeake Bay, contributing nearly $600 million to Maryland's economy. Recreational boating and fishing are also popular activities in Maryland. According to the Chesapeake Bay Foundation and the 2009 Economic Impact of Maryland Boating report, the recreational boating industry generates roughly $2 billion and 32,000 jobs each year in Maryland.

The MDTA and FHWA recognize the importance of the Chesapeake Bay and the major role it plays in the lives of those living in its watershed, and beyond. The study will identify potential environmental impacts to the Chesapeake Bay and surrounding areas and develop opportunities to avoid, minimize and mitigate those impacts. Central to the MDTA's environmental stewardship commitment, any proposed build alternative must consider the sensitive resources of the Chesapeake Bay, including existing environmental conditions, and the potential for adverse impacts to the Bay and the important natural, recreational, socio-economic, and cultural resources it supports. As touched on previously, this Tier 2 Study will consider the full range of environmental issues at the project level, such as:

- natural resources (e.g., floodplain, wetlands, water quality, flora, fauna, prime farmland);
- coastal zone management policies;
- climate change, sea level rise, and resiliency;
- cultural resources (e.g., archaeology, historic properties);

- community resources;
- socio-economics (e.g., land use compatibility, economics);
- Section 4(f) properties (e.g., parks, historic sites, wildlife refuges);
- environmental justice and equity;
- air quality;
- noise;
- hazardous materials; and
- indirect and cumulative effects.

This study will consider community resources within the Study Area, including the Bay Bridge Airport, Sandy Point State Park, Terrapin Nature Park, Captain John Smith Chesapeake National Historic Trail, and the Star-Spangled Banner National Historic Trail. In addition, the study will consider other resources, such as the National Park Service Chesapeake Gateways Program which connects people to experiences of the natural and cultural heritage of the Chesapeake Bay and its rivers. Consistent with State priorities, counties neighboring the Chesapeake Bay including those within and neighboring the Study Area have planning documents with goals that address resource protection, growth, and development. Preservation and restoration of natural resources, including forests, steep slopes, wetlands, floodplains, watersheds, and waterways are a high priority as evident in programs (e.g., Chesapeake Bay Critical Area, Heritage Areas, Open Space, Priority Preservation Areas, Adequate Public Facilities) that limit and manage development.

Figure 19: The Bay Bridge viewed from above Terrapin Nature Park

Maryland State legislation and local land use planning policies guide development patterns throughout each county by structuring projects around designated growth areas where planned growth is suitable. This is a particularly important principle in those counties dominated by agriculture where improved access and population growth have led to increased development pressure. In these counties, development is limited to specific areas to maintain the agricultural and cultural character unique to each place. Additionally, residential and business development is typically limited to urban growth areas, with countryside preservation areas surrounding towns and villages.

The existing Bay Bridge plays an important role supporting the diverse regional economic environment. This study will also consider potential beneficial and adverse effects to regional economic activities, such as the recreational and tourism industries. Potential alternatives will be evaluated for their ability to support planned economic development. Local land uses, existing and planned development patterns, and economics will be critical elements in the evaluation of any build alternative.

The environmental implications of alternatives will also be examined in the context of equity. Executive Order 13985 defines "equity" as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality. The MDTA's mission is to deliver safe, sustainable, intelligent, exceptional, and inclusive transportation solutions in order to connect MDTA's customers to life's opportunities. One of the MDTA's core values is excellence – excellence in their people, work and environment – and the MDTA strives to reach that through their commitment to diversity and equity. The MDTA will work to ensure meaningful participation from individuals and groups within communities that have been historically excluded, overburdened, and underserved will be encouraged throughout the planning process. To establish a fair and equitable transportation decision, the MDTA will ensure the needs and concerns of individuals and neighboring communities are incorporated into the Tier 2 Study.

4.2 Cost and Financial Responsibility

To assess potential build alternatives, as well as the implications of taking no action, the MDTA will consider financial responsibility as an objective. This objective requires an assessment of how the agency will pay for the development, operation, and maintenance of the facilities (old or new). As an independent State agency, the MDTA does not receive funding from tax dollars, the Maryland General Fund or the Maryland Transportation Trust Fund. The MDTA relies solely on revenues generated from its transportation facilities. The MDTA facilities are fully financed, operated, maintained, improved, and protected with toll revenues paid by customers using those facilities.[4]

During the Tier 2 Study, the MDTA will explore funding strategies for any potential Bay Crossing improvements. The Tier 1 Study FEIS/ROD provided an estimated range of project costs for the Tier 1 Selected Corridor Alternative (Corridor 7), assuming either a bridge facility or a combined bridge-tunnel facility. The bridge assumption resulted in a range of costs from a low-end of $5.4 billion to a high end of $8.9 billion. For a bridge-tunnel, the range was from $8.0 billion to $13.1 billion. Where the Tier 1 Study was limited in its analysis of cost and financial responsibility given its scope, the analysis in the Tier 2 Study will consider specific build options and will include a greater level of detail.

For any investment of this magnitude, improvements must be deemed financially viable for them to be advanced. The MDTA will further identify potential costs based on preliminary project-level engineering and the likely timing of project construction for potential build options. In light of the already substantial difference between estimated costs depending on the proposed engineering solution, the MDTA must consider project affordability and financing in its alternatives development and screening. Engineering solutions, considered for alternatives such as the type of structure and the size of the structure, may present obstacles to fully funding a proposed action. This factor will influence identification of a reasonable range of alternatives and/or identification of a preferred alternative.

In the near term, this study is funded for planning and preliminary engineering of alternatives through NEPA, as well as post-NEPA planning activities. Funding for a subsequent study phase or phases (e.g., final design, right-of-way (ROW) acquisition, or construction) would be required in the fiscally-constrained Maryland Statewide Improvement Program prior to the FHWA issuing a NEPA decision for a build alternative resulting from this study.

The cost and financial viability of potential build alternatives will be based on, among other factors:

- the potential amount of new or upgraded approach transportation network facilities that may be required;
- the range of structure lengths required to cross the Bay (if appropriate);
- the type of structure crossing the Bay (if appropriate);
- the capacity of the Bay Crossing; and
- the anticipated operating and maintenance costs associated with the crossing improvements (i.e., amount of infrastructure required).

Costs associated with the No-Build Alternative must also be considered. As described in **Section 3.4**, approximately $3.8 billion will be required to maintain the existing structures through 2065.

[4] See https://mdta.maryland.gov/About/Finances.html

5 References

American Association of State Highway and Transportation Officials. 2018. A Policy on Geometric Design of Highways and Streets, 7th Edition. Washington, DC: American Association of State Highway and Transportation Officials.

American Association of State Highway and Transportation Officials. August 2016. Practitioner's Handbook: Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects. https://environment.transportation.org/wp-content/uploads/2021/05/ph07-2.pdf

Canal de Panamá. January 1, 2022. OP Notice to Shipping No. N-1-2022: Vessel Requirements. https://pancanal.com/wp-content/uploads/2022/03/N01-2022.pdf

Chesapeake Bay Foundation. No Date. What is the Chesapeake Clean Water Blueprint? https://www.cbf.org/how-we-save-the-bay/chesapeake-clean-water-blueprint/what-is-the-chesapeake-clean-water-blueprint.html

DriveEZMD. No date. E-ZPass Discount Plans. https://driveezmd.com/acct-types/e-zpass-discount-plans/

Delaware Department of Transportation (DelDOT). No date. Evacuation Routes. https://deldot.maps.arcgis.com/apps/webappviewer/index.html?id=dfa83d46ba27493bbebb642ff0733c40

Earthstar Geographics. World Imagery.

Esri Federal Datasets. June 22, 2021. Interstate.

General Assembly of Maryland Department of Legislative Services. January 2020. A Report to the Maryland General Assembly, Senate Budget and Taxation Committee and House Appropriations Committee regarding Publicly Operated Ferry Service for the Chesapeake Bay Crossings (2019 JCR, p. 86) https://dlslibrary.state.md.us/publications/JCR/2019/2019_86-87.pdf

Federal Highway Administration (FHWA). August 2012. Environment NEPA Regulatory Framework and Process: Purpose & Need, and Alternatives. https://highways.dot.gov/sites/fhwa.dot.gov/files/41purpose.pdf

FHWA. No date. National Highway Freight Network. https://ops.fhwa.dot.gov/freight/infrastructure/nfn/index.htm

FHWA. No date. National Statistics: All Areas, Urban and Rural. https://explore.dot.gov/t/FHWA/views/FHWAFMMNational5_1/NationalStatsDash?%3Aembed=y&%3Aiid=3&%3AisGuestRedirectFromVizportal=y

FHWA. June, 2011. Integrating Road Safety into NEPA Analysis: A Practitioner's Primer. https://highways.dot.gov/safety/zero-deaths/integrating-road-safety-nepa-analysis-primer-safety-and-environmental-4

Maryland Manual On-Line. No Date. Maryland at a Glance: Waterways: Port of Baltimore. https://msa.maryland.gov/msa/mdmanual/01glance/html/port.html

Maryland Department of Emergency Management (MDEM). No date. Know Your Zone Maryland. https://mdem.maryland.gov/action/Pages/know-your-zone-md.aspx

Maryland Department of Transportation (MDOT). No date. Capital Programming. https://mdot.maryland.gov/tso/Pages/Index.aspx?PageId=27

MDOT. 2023. Maryland Consolidated Transportation Program (FY2023-FY2028). https://mdot.maryland.gov/OPCP/CTP_2023/FY23_FY28_CTP_Full_Final_Report_Regular_Resolution_for_viewing.pdf

MDOT. November 2022. Maryland State Freight Plan. https://www.mdot.maryland.gov/OPCP/MDOT_State_Freight_Complete_2022_12_06.pdf

MDOT. August 7, 2023. Statewide Crash Summary. https://zerodeathsmd.gov/wp-content/uploads/2023/08/StatewideBR-2022Aug07-2023.pdf

MDOT. No date. Policy Manual, Bridge: Width. https://policymanual.mdot.maryland.gov/mediawiki/index.php?title=Bridge:_Width

MDOT State Highway Administration (SHA). 2021. Maryland State Highway Mobility Report 2021, Tenth Edition. https://www.roads.maryland.gov/OPPEN/2021_mobility_report.pdf

MDOT State Highway Administration (SHA). January 13, 2020. Structural Design Guidance: Design Section. https://www.roads.maryland.gov/OBD/GPM-OOS-01-Design.pdf

Maryland iMap GIS Catalog. 2019. Six-inch aerial imagery.

Maryland Port Administration (MPA). No date. Port Operations: Dredging. https://mpa.maryland.gov/greenport/Pages/dredging.aspx

MPA. No date. Vision2025. https://mpa.maryland.gov/Documents/VisionPlan2025.pdf#:~:text=The%20Maryland%20Port%20Administration%20%28MPA%29%20has%20prepared%20Vision2025,visions%20will%20focus%20the%20efforts%20of%20the%20MPA

MPA. May 2019. Strategic Plan 2019. https://mpa.maryland.gov/Documents/Strategic__Plan2019.pdf

MPA. March 2019. 2018 Foreign Commerce Statistical Report. https://mpa.maryland.gov/Documents/2018FCSR.pdf

Maryland Transportation Authority (MDTA). No date. All Electronic (Cashless) Tolling - Frequently Asked Questions. https://mdta.maryland.gov/cashless-tolling-faq

MDTA. 2004. Bay Bridge Transportation Needs Report. https://mdta.maryland.gov/Capital_Projects/BayCrossingStudies/NeedsReport.html

MDTA. 2007. Bay Bridge Transit Study Complete. https://mdta.maryland.gov/Capital_Projects/BayCrossingStudies/baycrossing.html

MDTA. No date. Bay Bridge Eastbound Deck Replacement Project. https://mdta.maryland.gov/BayBridgeEastboundDeckReplacementProject

MDTA. 2006. Bay Crossing Task Force Report. https://mdta.maryland.gov/Capital_Projects/BayCrossingStudies/NeedsReport.html

MDTA. September7, 2016. Comprehensive Rehabilitation Project Begins on Westbound Bay Bridge Suspension Span. https://mdta.maryland.gov/blog-category/mdta-traffic-advisories/comprehensive-rehabilitation-project-begins-on-westbound-bay-bridge-suspension-span

MDTA. No date. Francis Scott Key Bridge (I-695). https://mdta.maryland.gov/Toll_Facilities/FSK.html

MDTA. No date. Rewrapping and Dehumidification of Main Cables Project. https://mdta.maryland.gov/Capital_Projects/US_50_Bay_Bridge_Cable_Wrapping/Project_Home.html

MDTA. 2020. Spring 2020 Bay Bridge All Electronic (Cashless) Tolling Frequently Asked Questions. https://mdta.maryland.gov/sites/default/files/Files/Projects_and_Studies/AET/Spring%202020%20Bay%20Bridge%20All-Electronic%20(Cashless)%20Tolling%20Frequently%20Asked%20Questions%20(FAQs).pdf

MDTA. No date. Toll Rates for the William Preston Lane Jr. Memorial (Bay) Bridge (U.S. 50/301). https://mdta.maryland.gov/Toll_Rates/Bay_Bridge_Rates.html

MDTA. October 3, 2022. William Preston Lane Jr. Memorial (Bay) Bridge. https://mdta.maryland.gov/sites/default/files/Files/BRAGG/BBRAG%20Bay%20Bridge%20Contra-flow%20update%20Presentation%2010-2022.pdf

MDTA. 2015. U.S. 50/301 William Preston Lane Jr. Memorial (Bay) Bridge: Life Cycle Cost Analysis. https://mdta.maryland.gov/sites/default/files/Files/Bay_Bridge_LCCA_Report_12-2015.pdf

MDTA. No date. William Preston Lane Jr. Memorial (Bay) Bridge (U.S. 50/301). https://mdta.maryland.gov/Toll_Facilities/WPL.html

MDTA. No date. William Preston Lane Jr. Memorial (Bay) Bridge All Electronic (Cashless) Tolling. https://mdta.maryland.gov/Bay-Bridge

MDTA. No date. William Preston Lane Jr. Memorial (Bay) Bridge Automated Lane Closure System Project. https://mdta.maryland.gov/Capital_Projects/BayBridgeALCS

Maryland Transit Administration (MTA). No date. Schedules. https://www.mta.maryland.gov/schedule

Maryland Upper Shore Transit (MUST) Bus. No date. MUST Bus. https://www.mustbus.org/index

National Oceanic and Atmospheric Administration. No date. Tides and Currents. https://tidesandcurrents.noaa.gov/map/index.html

Port Authority NY NJ. June 14, 2019. Iconic Bayonne Bridge Rededication Caps Port Authority's $1.7 Billion Project. https://www.panynj.gov/port-authority/en/press-room/press-release-archives/2019_press_releases/iconic_bayonne_bridgerededicationcapsportauthoritys17billionproj.html

Sussex County. No Date. Know Your Zone: Sussex County Hurricane Evacuation Lookup Tool. https://sussexcounty.maps.arcgis.com/apps/webappviewer/index.html?id=3f03225051b44c7d957d67953b0563e6

Transportation Research Board (TRB). 2002. NCHRP Report 480 A Guide to Best Practices for Achieving Context Sensitive Solutions. Washington, D.C.

Queen Anne's County. No Date. History of Matapeake. https://www.qac.org/1022/History-of-Matapeake

Queen Anne's County. No Date. County Ride. https://www.qac.org/181/County-Ride

UPS Supply Chain Solutions. No date. Twenty-foot Equivalent Unit (TEU). https://www.ups.com/us/en/supplychain/resources/glossary-term/teu-container.page

U.S. Army Corps of Engineers. January 2006. Baltimore Harbor & Channels, Maryland and Virginia: Fact Sheet. https://www.nab.usace.army.mil/Portals/63/docs/Navigation/1DE/Map/map.pdf

U.S. Army Corps of Engineers. No date. Chesapeake & Delaware Canal. https://www.nap.usace.army.mil/Missions/Civil-Works/Chesapeake-Delaware-Canal/lang/en/

U.S. Army Corps of Engineers. No date. Chesapeake & Delaware Canal – Bridges. https://www.nap.usace.army.mil/Portals/39/docs/Civil/CandD/C-D-Bridge-Facts-Updated-2020.pdf

U.S. Army Corps of Engineers. February 22, 2023. Delaware River Main Channel Deepening. https://www.nap.usace.army.mil/Missions/Factsheets/Fact-Sheet-Article-View/Article/490804/delaware-river-main-channel-deepening/

U.S. Census Bureau. 2022. American Community Survey (ACS) 5-Year Estimates, 2017-2021. Accessed via QuickFacts. https://www.census.gov/quickfacts/fact/table/US/PST045222

U.S. Census Bureau. 2018. Cartographic Boundary Files – Shapefile (State Boundaries, County Boundaries).

U.S. Census Bureau. 2023. Decennial Census by Decade. https://www.census.gov/programs-surveys/decennial-census/decade.html

U.S. Coast Guard. January 6, 2023. Public Notice D05PN-01-2023. https://www.navcen.uscg.gov/sites/default/files/pdf/bridges/publicNotices/D05PN-01-23_DelawareMemorialBridge_NewCastleDelaware.pdf

U.S. Department of Transportation (USDOT) Bureau of Transportation Statistics (BTS). January 1, 2023. 2023 Port Performance Freight Statistics Program: Annual Report to Congress. https://rosap.ntl.bts.gov/view/dot/65990

USDOT BTS. 2023. USDOT: ArcGIS Online (Principal Ports, Navigable Waterway Network Lines).

Washington Post. September, 7, 2022. A suicidal son, an iconic bridge and the struggle to keep people from jumping. https://www.washingtonpost.com/dc-md-va/2022/09/07/chesapeake-bay-bridge-suicide-son-prevention/

Washington Post. April 17, 2022. Container ship stuck in Chesapeake Bay for more than a month is free. https://www.washingtonpost.com/dc-md-va/2022/04/17/cargo-ship-ever-forward-chesapeake-bay-stuck/

Washington Post. No Date. Facts About the Bay Bridge. https://www.washingtonpost.com/archive/local/2006/01/19/facts-about-the-bay-bridge/82c7a593-4595-4de3-819f-6ff016e9ee3e/

Washington Post. February 1, 1989. Westbound Bay Bridge Toll Ending. https://www.washingtonpost.com/archive/local/1989/02/01/westbound-bay-bridge-toll-ending/82181e67-d90e-48f0-b3d3-f9e111731782/

WBAL-TV 11. April 18, 2013. Plans made to enhance two-way traffic operations on the Chesapeake Bay Bridge. https://www.wbaltv.com/article/plans-made-to-enhance-two-way-traffic-operations-on-chesapeake-bay-bridge/7080062

Chesapeake BAY CROSSING STUDY TIER 2 NEPA

NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT

ADDITIONAL PROJECT INFORMATION DOCUMENT

EISX---XMD-1729253019

APPENDIX B: Coordination Plan

MDTA Maryland Transportation Authority

November 2024

Chesapeake
BAY CROSSING STUDY
TIER 2 NEPA

Coordination Plan

November 2024

Table 1: Lead, Cooperating, and Participating Agencies[1]

Role	Federal Agencies	Maryland / State / Local Agencies
Lead Agencies	• Federal Highway Administration (FHWA) – Maryland Division	• Maryland Transportation Authority (MDTA)
Cooperating Agencies	• US Army Corps of Engineers (USACE) • US Coast Guard (USCG) • Environmental Protection Agency (EPA) • National Marine Fisheries Service (NMFS) • US Fish and Wildlife Service (USFWS) • National Park Service (NPS)	• MDOT State Highway Administration (MDOT SHA) • MD Department of Environment (MDE) • Maryland Department of Natural Resources (MDNR)
Participating Agencies	• Federal Transit Administration (FTA) • Advisory Council on Historic Preservation (ACHP) • US Navy -Naval Facilities Engineering Systems Command (NAVFAC) • Federal Emergency Management Agency (FEMA) • Federal Aviation Administration (FAA)	• MDOT Maryland Transit Administration (MDOT MTA) • MDOT Maryland Port Administration (MDOT MPA) • Maryland Department of Planning (MDP) • Maryland Department of Emergency Management (MDEM) • Maryland Board of Public Works – Wetlands Division (BPW) • Maryland Historical Trust (MHT) • Maryland Aviation Administration (MAA) • Delaware Department of Transportation (DelDOT) • Queen Anne's County • Anne Arundel County • Baltimore Metropolitan Council (BMC)

[1] Council on Environmental Quality (CEQ) regulations define Cooperating agencies as Federal, State, Tribal, or local agencies with jurisdiction by law or special expertise with respect to any environmental impact related to the Study. See 40 C.F.R. § 1501.8. USDOT authority at 23 U.S.C. §139(d) defines the roles of Participating agencies.

Table 2: Notified Agencies*

	Federal	State
Federal and State Agencies	• US Geological Survey • FHWA – Virginia Division • FHWA – Delaware Division • US Army • Naval Support Activities (NSA) Annapolis • US Naval Academy • Natural Resource Conservation Service (NRCS)	• Virginia Department of Transportation (VDOT) • Maryland State Police • Maryland Department of Agriculture • MDOT Motor Vehicle Administration (MDOT MVA) • Maryland Commission on Indian Affairs • Maryland Natural Resources Police • Maryland Department of Commerce
Metropolitan Planning Organizations	• Baltimore Regional Transportation Board (BRTB) • Tri-County Council – Lower Eastern Shore	• Tri-County Council – Southern Maryland • Salisbury/Wicomico MPO • Wilmington Area Planning Council • Metropolitan Washington Council of Governments (MWCOG) • Calvert-St. Mary's MPO

Counties and Municipalities	County	Municipalities
	Anne Arundel County **	• Annapolis • Highland Beach
	Baltimore City	• None
	Baltimore County	• None
	Calvert County	• Chesapeake Beach • North Beach
	Caroline County	• Denton • Federalsburg • Goldsboro • Greensboro • Henderson • Hillsboro • Marydel • Preston • Ridgely • Templeville
	Cecil County	• Cecilton • Charleston • Chesapeake City • Elkton • North East • Perryville • Port Deposit • Rising Sun
	Dorchester County	• Brookview • Cambridge • Church Creek • East New Market • Eldorado • Galestown • Hurlock • Secretary • Vienna
	Harford County	• Aberdeen • Bel Air • Havre de Grace
	Kent County	• Betterton • Chestertown • Galena • Millington • Rock Hall
	Montgomery County	• None
	Prince George's County	• None
	Queen Anne's County**	• Barclay • Centreville • Church Hill • Millington • Queen Anne • Queenstown • Sudlersville • Templeville
	St. Mary's County	• Leonardtown
	Somerset County	• Crisfield • Princess Anne
	Talbot County	• Easton • Oxford • Queen Anne • St. Michaels • Trappe
	Wicomico County	• Delmar • Fruitland • Hebron • Mardela Springs • Pittsville • Salisbury • Sharptown • Willards
	Worcester County	• Berlin • Ocean City • Pocomoke City • Snow Hill
	Sussex County, DE	
	Kent County, DE	
	New Castle County, DE	

* Notified Agencies will be informed through the Study's public involvement activities along with the general public.

**Denotes a County that is also a Participating Agency

Table 3: Tier 2 Study Coordination Schedule

Blue highlights indicate public engagement.
Italicized rows indicate completed coordination.

Coordination Point	Parties Involved	Coordination Method	Coordination Required (roles and responsibilities)	Anticipated Coordination Timeframe
Study Announcement and Initiation	*Lead, Cooperating, and Participating Agencies*	*Interagency Coordination Meetings (ICMs)*	• *Announce start of the Tier 2 Study.* • *Review material being presented at the September 2022 Public Open House #1, with opportunity to comment.* • *E-Blast sent to all Agencies and Stakeholders to announce Tier 2 Study.*	*July – August 2022*
	Lead, Cooperating, Participating, and Notified Agencies, Stakeholders, and Public	*E-Blast*		
		Public Open House (Virtual and In-Person)	• *Public Open House #1 held to summarize the Tier 1 Study results, introduce, and describe objectives of the Tier 2 Study, and review the next steps.*	*September 2022*
Guiding Principles and Coordination Plan	*Lead, Cooperating, and Participating Agencies*	*ICMs and electronic document sharing via email or share site*	• *Summarize results of Public Open House #1. Agencies introduced to draft Guiding Principles and draft Coordination Plan.* • *Review and discussion on draft Guiding Principles and draft Coordination Plan, with opportunity to comment.*	*October 2022 – March 2023*
			• ***MDTA requests agreement from Cooperating & Participating Agencies on the schedule included in the Coordination Plan.***	***April 2023***
Purpose and Need (P&N)	*Lead, Cooperating, and Participating Agencies*	*ICMs and electronic document sharing via email or share site*	• *Agencies introduced to draft P&N elements.* • *Review and discussion of draft P&N elements, with opportunity to comment.* • *Agencies introduced to full draft P&N Statement.* • *Review and discussion of draft P&N Statement with opportunity for comment.* • *Discuss alternatives screening approach.*	*April 2023 – June 2024*
			• ***MDTA requests concurrence from Cooperating Agencies on Preliminary P&N Statement.***	***June 2024***

Coordination Point	Parties Involved	Coordination Method	Coordination Required (roles and responsibilities)	Anticipated Coordination Timeframe
	Notified Agencies, Stakeholders, and Public	*Postcard, E-Blast, and Public Open House (Virtual and In-Person)*	• *Public Open House #2 to present the P&N and Preliminary Alternatives and provide the public an opportunity to offer input.*	*September 2023*
Resource Assessment Methodologies	*Lead, Cooperating, and Participating Agencies*	*ICMs and electronic document sharing via email or share site*	• *Agencies introduced to draft resource assessment methodologies.* • *Review and discussion of draft resource assessment methodologies, with opportunity to comment.* • *Review updated draft resource assessment methodologies.*	*April 2023 – September 2024*
			• ***MDTA requests concurrence from Cooperating Agencies with special expertise on select resource assessment methodologies.***	***October 2023 – September 2024***
Preliminary Alternatives	*Lead, Cooperating, and Participating Agencies*	*ICMs*	• *Agencies introduced to preliminary alternatives.* • *Review and discussion of preliminary alternatives, with opportunity to comment.* • *Discuss screening results of preliminary alternatives; identify proposed Alternatives Retained for Detailed Study (ARDS).*	*July 2023 – October 2024*
	Notified Agencies, Stakeholders, and Public	*Public Open House (Virtual and In-Person)*	• *Public Open House #2 to present the P&N and Preliminary Alternatives Development and provide the public an opportunity to offer input. (Also shown in P&N)*	*September 2023*
Notice of Intent (NOI) to Prepare an EIS	Lead, Cooperating, Participating, Notified Agencies, Stakeholders, and Public	Federal Register	• NOI to prepare an EIS published in the Federal Register	November 2024
	Notified Agencies, Stakeholders, and Public	Public Open House (Virtual and In-Person)	• Public Open House #3 to announce NOI, obtain feedback on scoping of EIS, and introduce proposed ARDS.	December 2024

Coordination Point	Parties Involved	Coordination Method	Coordination Required (roles and responsibilities)	Coordination Timeframe
Alternatives Retained for Detailed Study (ARDS)	Lead, Cooperating, and Participating Agencies	ICMs and electronic document sharing via email or share site	• Agencies introduced to proposed ARDS and rationale for ARDS selection. • Draft ARDS Concurrence Package provided to Cooperating Agencies for review and comment. • Review and discussion of draft ARDS, with opportunity to comment.	September 2024 – February 2025
			• **MDTA requests concurrence from Cooperating Agencies on ARDS**.	**February 2025**
Draft Environmental Impact Statement (DEIS) and MDTA Recommended Preferred Alternative (Conceptual Mitigation coordination occurring concurrently)	Lead, Cooperating, and Participating Agencies	ICMs and electronic document sharing via email or share site	• Agencies introduced to draft technical findings. • Review and discussion of draft technical findings, with opportunity to comment. Agencies with jurisdiction by law or special expertise will be asked to review and provide comment on select technical reports • Agencies introduced to DEIS, including the MDTA Recommended Preferred Alternative. DEIS provided for Agency review and comment. • Review and discussion of DEIS and MDTA Recommended Preferred Alternative with opportunity to comment.	March 2025 – November 2025
	Notified Agencies, Stakeholders, Public	Federal Register, Postcard, E-Blast, Social Media Posts, News Release	• Notification of DEIS available for public comment	November 2025
		Public Hearing (Virtual and In-Person)	• Public Hearings to receive public testimony on the DEIS and MDTA Recommended Preferred Alternative.	December 2025
Preferred Alternative and Conceptual Mitigation	Lead, Cooperating, and Participating Agencies	ICMs and electronic document sharing via email or share site	• Agencies review and discuss preliminary Conceptual Mitigation opportunities • Review and discuss draft Preferred Alternative and Conceptual Mitigation plan, with opportunity to comment	June 2025 – April 2026
			• **MDTA requests concurrence from Cooperating Agencies on Preferred Alternative and Conceptual Mitigation plan**	**May 2026**

Coordination Point	Parties Involved	Coordination Method	Coordination Required (roles and responsibilities)	Coordination Timeframe
Final Environmental Impact Statement (FEIS) and Record of Decision (ROD)	Lead, Cooperating, and Participating Agencies	ICMs and electronic document sharing via email or share site	• Present summary of FEIS/ROD to Agencies. Review and discussion of FEIS with opportunity to comment. • FEIS/ROD complete.	March – October 2026
	Notified Agencies, Stakeholders, Public	Federal Register, Postcard, E-Blast, Social Media Posts, News Release	• Notification of Availability (NOA) of FEIS and ROD	November 2026

Note: in addition to coordination items listed above, MDTA will provide agencies with draft materials electronically for review throughout the Study as appropriate. ICMs will typically be fully virtual meetings attended by invitation only. All dates are subject to change; affected parties will be notified, and the Coordination Plan updated as appropriate during the course of the Study.

NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT

EISX---XMD-1729253019

ADDITIONAL PROJECT INFORMATION DOCUMENT

APPENDIX C:
Public Engagement Plan

November 2024

Chesapeake
BAY CROSSING STUDY
TIER 2 NEPA

Public Engagement Plan

FALL 2024

Maryland Transportation Authority

MDTA

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INTRODUCTION

The Maryland Transportation Authority (MDTA) and Federal Highway Administration (FHWA) are following a two-tiered National Environmental Policy Act (NEPA) process for the Bay Crossing Study. The Chesapeake Bay Crossing Study: Tier 1 NEPA ("Tier 1 Study") resulted in the identification of Corridor 7, the two miles wide and approximately 22 miles long Corridor containing the existing Chesapeake Bay Bridge, as the Selected Corridor Alternative. In June 2022, the MDTA launched the Chesapeake Bay Crossing Study: Tier 2 NEPA (Tier 2 Study). Public engagement activities to support the Environmental Impact Statement (EIS) for the Tier 2 Study build upon the extensive outreach efforts that were undertaken for the Tier 1 Study. Active engagement by key stakeholders and the general public has been and will continue to be essential throughout the Tier 2 Study.

The Public Engagement Plan (PEP) presents a community engagement approach for the Tier 2 Study. It is intended to illustrate procedures for how the MDTA will engage with project stakeholders and the general public throughout the Tier 2 Study process. The PEP serves as a living document that outlines the process and practices for the Tier 2 Study and will be updated as necessary.

PLAN PURPOSE

At the Maryland Department of Transportation (MDOT), dedication to customer service and innovation for the public good is inseparable from our commitment to diversity, equity, and inclusion. It is central to the mission as a government agency, to ensure that each member of the community has full opportunity to thrive in our environment, for MDOT believes that diversity is key to individual excellence and the advancement of knowledge.

The goal of the Tier 2 Study PEP is to provide a framework for the outreach tools, methods and engagement opportunities that will be provided throughout the duration of the project. While it is important to document public engagement activities as required by NEPA, the opportunity for inclusive, equitable and transparent two-way communication also improves a project's development and overall design and supports an equitable transportation outcome.

This plan outlines the process and tools that will allow stakeholders and the larger public to engage in meaningful ways, with multiple opportunities to provide feedback and input to inform the transportation decision-making process.

This PEP aligns with The United States Department of Transportation (USDOT) Publication, "Promising Practices for Meaningful Public Involvement in Transportation Decision-Making[1]," which highlights features of meaningful public engagement that proactively seeks full community representation, public comment and feedback, and incorporation of that feedback into a project, program, or plan when possible. Based on this publication, the Tier 2 Study team has identified the following elements that will guide and promote meaningful and equitable public engagement:

- Understanding community demographics and involving broad representation of community;
- Building durable community relationships;
- Understanding community wants and needs;
- Using community preferred engagement techniques; and
- Documenting and sharing community impacts on decisions.

In support of the USDOT and State of Maryland's commitment to equity in transportation planning, an Equity Engagement Plan (EEP) has been developed and coordinated with FHWA in conjunction with this PEP. The purpose of the EEP is to outline the Study's efforts to actively engage underserved, overburdened, and disadvantaged communities. The EEP is being developed in consideration of Title VI of the Civil Rights Act, Executive Order 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations;* Executive Order 13985 *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government;* and Executive Order 14096 *Revitalizing Our Nation's Commitment to Environmental Justice for All*.

It is MDTA's objective to advance equitable transportation alternatives that address existing inequities in transportation mobility, accessibility, and affordability across the Bay and create a fair transportation outcome based on the identified needs and concerns. Strategies will include determining reasonable transportation alternatives that can be implemented as part of the Tier 2 Study that will lead to a fair balance of benefit and burden by involving the historically excluded and disadvantaged individuals, groups and communities in a meaningful review of the options for input.

FOUNDATIONAL ELEMENTS AND OBJECTIVES

Based on the USDOT Publication and the unique Study needs, the Tier 2 Study team has identified the following foundational elements and associated objectives to guide and promote meaningful and equitable public engagement.

Understand community demographics & involve broad representation of community

- The Tier 2 Study Corridor contains numerous diverse communities. A key component of the team's outreach efforts will be to identify and understand unique populations within the Study Corridor. The PEP will be refined to ensure all communities are afforded access to Study information and are offered opportunities to learn about the Study and provide comments for consideration.

[1] Promising Practices for Meaningful Public Involvement in Transportation Decision-Making (October 2022)

- **Key Objectives:**
  - Identify and categorize stakeholder groups and maintain a stakeholder list for each group, to be updated throughout the Study; and
  - Ensure minority, low-income, and other underserved communities have equal opportunity to comment and participate in Tier 2 Study activities, and support all aspects of the NEPA analyses, as appropriate.

Build durable community relationships

- A core goal for the Tier 2 Study PEP is to build durable community relationships. This goal recognizes the need to build community and stakeholder trust by demonstrating proactive engagement of communities and consideration of all public comments.
- **Key Objectives:**
  - Provide regular and meaningful updates on Study progress and milestones to all stakeholders;
  - Coordinate informative and engaging public meetings that both present materials and provide the public an opportunity to ask questions and provide comments;
  - Identify and work with active voices in communities to ensure the MDTA is effectively communicating the messaging associated with the Study;
  - Provide additional opportunities for meaningful community engagement throughout the Tier 2 Study process beyond the formal public meetings.

Understand community wants and needs

- This process must be grounded in the goal of understanding the needs and desires of the community. In order to achieve this goal, it is critical to provide multiple opportunities throughout the duration of the Study for the public to provide feedback. In addition to in-person and virtual public open houses, virtual listening tours, and meetings with local community and stakeholder groups (upon request), the Study team will accept and consider public input received through various mediums throughout the duration of the Study.
- **Key Objectives:**
  - Understand stakeholder concerns as early as possible through comments, feedback, and discussions;
  - Strive to provide an effective approach for considering and responding to public and stakeholder comments during the Tier 2 Study environmental review process; and

- Solicit stakeholder input to inform the Study team as they identify and screen alternatives and ultimately recommend a preferred alternative within the Tier 2 Study Corridor.

Use community preferred engagement techniques

- It is important to employ multiple methods to distribute Study updates, obtain community input, and announce virtual and in-person open houses and additional public engagement opportunities. This will assure broad engagement and solicit input from diverse populations of public and key stakeholders.
- **Key Objectives:**
  - Analyze audiences, their interests, and potential tools for reaching those audiences;
  - Identify creative and varied communication tools and accommodations best suited to meaningfully engage each audience;
  - Solicit feedback from audiences on the effectiveness and preference of communication tools used; and
  - Ensure these preferred methods are used throughout the Study to reach and meaningfully engage stakeholders.

Document and share community impact on decisions

- Demonstrate transparency, accountability, and equity in the development of the decision-making process.
- **Key Objectives:**
  - Post all comments received on the Study website;
  - Summarize and provide responses to public feedback received during official comment periods; and
  - Document outreach efforts in the NEPA EIS and supporting documentation and clearly describe how public input affected the results of this effort;
  - Document outreach to underserved audiences (consistent with Environmental Justice and Title VI of the Civil Rights Act) and stakeholders with clear metrics and comments from this engagement.

PUBLIC ENGAGEMENT STRATEGIES

Identify and Categorize Stakeholders

In addition to the geographic and community diversity present in the approximately 22-mile-long Study corridor, the PEP must reach additional audiences and stakeholders. The following provides the approach for identifying and reaching those individuals and organizations within the Study Corridor.

Approach Includes:

- Identify and categorize stakeholders and maintain an up-to-date stakeholders list;
- Identify outreach opportunities throughout the Study Corridor, including potentially underserved stakeholder communities; and
- Identify outreach methods, tools, and themes, and determine how to deliver messaging throughout the Study.

Stakeholders Include:

- General public;
- Underserved Communities - including populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, such as:
    - Black, Latino, and Indigenous and Native American persons
    - Asian Americans and Pacific Islanders and other persons of color
    - Members of religious minorities
    - Lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons
    - Persons with disabilities
    - Persons who live in rural areas, and
    - Persons otherwise adversely affected by persistent poverty or inequality.
- Youth and students;
- 65 and older populations;
- Veterans;
- Commuters;
- Motorists within the corridor;
- Public and private transportation service users and providers;
- Trucking industry;
- Conservation groups;
- Transportation advocacy organizations;
- Users of the Chesapeake Bay;
- Individual property owners;
- Communities - including populations sharing a particular characteristic, as well as geographically bound populations;
- Civic organizations;
- Social services;
- Business community;
- Large employers;
- Schools;

- Places of worship;
- Elected officials;
- Local, State and federal government agencies;
- Special interest groups (i.e. Bay Bridge Reconstruction Advisory Group (BBRAG)); and
- Media.

Develop Key Messaging

Key messages are helpful to assure that those who communicate about the Tier 2 Study can describe it in an authentic, consistent, and compelling manner, in public outreach materials, in Study presentations, and to local media. While messaging may evolve as the Tier 2 Study progresses, communicating consistent and intentional messaging will reinforce how information regarding the Study is understood and remembered.

Key messaging will be prepared based on Study milestones, including, but not limited to:

- Project Initiation;
- Purpose and Need;
- Preliminary Alternatives Development;
- Proposed Alternatives Retained for Detailed Study (ARDS);
- Scoping for EIS;
- Evaluation of the ARDS;
- The MDTA Recommended Preferred Alternative; and
- Selected Alternative.

Stakeholder Engagement

Throughout the course of the Study, the team will use a variety of mechanisms to engage both stakeholders and the public as well as to solicit feedback and input. These mechanisms include:

Website

- Develop and maintain a dedicated webpage at Baycrossingstudy.com;
- Post project schedule, schedule of engagement events, and project updates;
- Prepare Public Open House materials and summary documents and post to the Study website;
- Post all public comments received to the Study website, with personal information redacted prior to posting; and
- Provide an ADA compliant website available in multiple languages.

Project Materials

- Develop Study materials utilizing visualization techniques and graphics templates to support consistent user-friendly look, feel, and messaging;
- Provide comment cards and/or surveys at meetings and at community events, with electronic comment forms additionally available;

- Provide updates through press releases, social media, eblasts, website updates, and paid media ads (electronic and print, local and minority), as appropriate, including key milestone updates and meeting announcements;
- Develop a series of short videos to share information on specific themes or topics throughout the course of the Study;
- Provide translated materials in Spanish. Translation to other languages will be prepared based on identified audience demographics; and
- Provide translators for Spanish, ASL and/or other languages at Open Houses and Hearings, as requested.

Elected Official, Bay Bridge Reconstruction Advisory Group (BBRAG) and News Media Outreach

- Briefings with elected and government officials;
- Press Releases;
- Media Kits - Graphics, Advertisements, Digital Toolkit, Website;
- Project updates at quarterly live streamed BBRAG Open Meetings; and
- Advanced notification of project announcements.

Consulting Party Coordination

The National Historic Preservation Act of 1966 (NHPA) is a federal law governing stewardship of our nation's cultural heritage. Section 106 of the NHPA, as amended (54 United States Code [U.S.C.] 306108), establishes a process for considering a project's effects on historic properties. As part of the process, the MDTA will consider the views of "Consulting Parties" who are organizations and individuals invited to learn about the study and provide their views.

Federally Recognized Tribes, government agencies, and other preservation organizations have been invited to participate as Consulting Parties in the Section 106 process for the Tier 2 Study. Coordination with consulting parties includes:

- Meet at least four times throughout the Study to share information;
- Provide Section 106 consultation materials for review; and
- Receive views and input related to historic properties from the consulting parties.

Interested Party Coordination

- Conduct interest group briefings;
- Provide opportunities for interested parties to comment via the website, by email, traditional mail, or phone messages throughout the Study's duration; and
- Coordinate with potentially impacted property owners as alternatives are developed and screened, and as access to property is needed.

Public Meetings/Events

- Open Houses (virtual and in-person);
- Public Hearings;
- Virtual listening events;
- Grassroots Outreach: flyers at local community centers, local government assistance offices, grocery stores, places of worship; bus and transit advertisements; sending information to local government offices for distribution to constituents; informational materials/stands at farmer's markets, local festivals; informational materials at other MDOT project event tables/booths; and
- Meeting with local community and stakeholder groups upon request.

Media Plan

The Bay Crossing Media Plan for the announcement of the public meetings includes:

- Public Notifications: email to elected officials, BBRAG, project email list, MDTA's gov.delivery platform, text to MDTA's gov.delivery platform; website update; social media posts; press release;
- Postcard Mailers to mailing list and to the carrier routes that touch the two-mile wide study corridor;
- Digital Toolkits to include graphics, banners and advertisements: shared with MDOT partners to share on their websites and social media accounts;
- Video updates; and
- List of print and digital publications for advertising including cost and dates.

MAJOR ACTIVITIES BY KEY PROJECT MILESTONES

Key Milestone(s)	Major Activities and Messaging

Project Initiation (June 2022)	• Public Open House #1 – in-person September 7 and 8; virtual September 13, 2022
	○ Initiation of Tier 2 Study
	○ Summary of Tier 1 Study Results
	○ Describe Objectives of Tier 2 Study
	○ Study Timeline
	○ Request public input on various Study factors, including:
	    ○ Individual travel patterns and use of the existing Bay Bridge,
	    ○ When and where users experience congestion on the existing Bay Bridge,
	    ○ Potential needs for the Tier 2 Study, and
	    ○ How attendees learned about the Open Houses.
	○ Posting of Public Open House Summary

Purpose and Need; Preliminary Alternatives Development (April 2023 through October 2024)	• Virtual Public Listening Meeting, focused on transit and bicycle/pedestrian facilities in the Study Area – June 27, 2023 • Stakeholder Engagement Letters • Virtual Study Corridor Tour (video) • Grassroots Outreach at Community Events and Community Centers • Public Open House #2 – in-person September 7 and 12; virtual September 14, 2023 ○ What the MDTA heard ○ Purpose and Need elements ○ Preliminary Alternatives ○ Study timeline ○ Screening criteria to identify proposed Alternatives Retained for Detailed Study (ARDS) ○ Importance of public input
Scoping for EIS; Proposed Alternatives Retained for Detailed Study (November to December 2024)	• Notice of Intent Published –November 2024 • Public Open House #3 – Virtual December 4; in-person December 9 and 11, 2024 ○ Scoping meetings ○ What the MDTA heard ○ Environmental Impact Statement (EIS) Scoping ○ Feedback on proposed ARDS ○ Screening alternatives to determine Selected Alternative ○ Study timeline • Continued Grassroots Outreach at Community Events and Community Centers
The MDTA Recommended Preferred Alternative (November to December 2025)	• Notice of Availability for the of DEIS Available for Public Comment ○ The DEIS will have a 45-day public comment period • Public Hearings for Public Testimony (in-person and virtual); Hearings to occur 15-30 after the DEIS is available for public and agency review ○ How the MDTA Recommended Preferred Alternative was identified ○ Public testimony on the MDTA Recommended Preferred Alternative and DEIS
Selected Alternative (November 2026)	• Notice of Availability of FEIS/ROD - • Selected Alternative • Public notification