Chesapeake BAY CROSSING STUDY

TIER 2 NEPA

ALTERNATIVES RETAINED FOR DETAILED STUDY (ARDS) CONCURRENCE PACKAGE

Maryland Transportation Authority

MDTA

FINAL May 2025

TABLE OF CONTENTS

1 INTRODUCTION 1-1
2 BACKGROUND 2-1
2.1 Study Limits 2-1
2.2 Traffic and Capacity 2-1
2.3 Purpose and Need 2-2
3 OVERVIEW OF ALTERNATIVES SCREENING PROCESS 3-1
4 MODIFICATIONS FROM STUDY'S NOTICE OF INTENT 4-1
4.1 Structure Location → Two Spans North and Two Spans South of Existing Bridge 4-1
4.2 TSM / TDM Improvement → Interchange Consolidation 4-2
4.3 Structure Type → Double Decker Bridge 4-2
4.4 Structure Type → Tunnel 4-3
5 ALTERNATIVES RETAINED FOR DETAILED STUDY 5-1
5.1 No-Build Alternative (Alternative A, 6-5-6) 5-2
5.2 Build Alternatives B (6-8-6 North) and C (6-8-6 South) 5-2
5.3 Build Alternatives D (8-8-8 North) and E (8-8-8 South) 5-3
5.4 Build Alternatives F (8-10-8 North) and G (8-10-8 South) 5-3
6 POTENTIAL ENVIRONMENTAL EFFECTS 6-1

APPENDICES

Appendix A: Proposed Alternatives Retained for Detailed Study (ARDS) Screening Summary Document

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 the study's potential environmental effects and to inform the evaluation of alternatives.

Tier 1 of the Bay Crossing Study (Tier 1 Study) was initiated in 2016. The Tier 1 Study evaluated 14 possible alternative corridor locations 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 was completed in April 2022 when FHWA issued a Final EIS/Record of Decision (FEIS/ROD) identifying Corridor 7, the 22-mile-long, two-mile-wide corridor including the existing 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) alternatives analysis within the Tier 1 Selected Corridor Alternative (Corridor 7). The MDTA has identified seven Alternatives Retained for Detailed Study (ARDS) for the proposed action in the Tier 2 Study, including the No-Build alternative (Alternative A, 6 lanes on Western shore, 5 lanes on Bridge, 6 lanes on Eastern shore [6-5-6]) and the following six build alternatives that were described in the Notice of Intent (NOI):

- Alternative B - 6-8-6 North
- Alternative C - 6-8-6 South
- Alternative D - 8-8-8 North
- Alternative E - 8-8-8 South
- Alternative F - 8-10-8 North
- Alternative G - 8-10-8 South

This concurrence package briefly summarizes the study background; an overview of the alternatives screening process; modifications from the proposed ARDS in the study's Notice of Intent to Prepare an Environmental Impact Statement (NOI); and a brief description of the ARDS for the Tier 2 Draft Environmental Impact Statement (DEIS).

Appendix A includes the Proposed ARDS Screening Summary Document, an abridged version of the NOI's appendix. This Concurrence Package references the information in **Appendix A** numerous times because it contains the detailed backup for the alternatives.

2 BACKGROUND

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 Chesapeake Bay and a parallel span directly north of the original Bay Bridge was opened in 1973. Today, the two-lane original span typically carries eastbound traffic and the three-lane second span typically carries westbound traffic. Under peak eastbound traffic conditions, one of the westbound lanes is typically reversed to provide a third lane of traffic heading eastbound. The approaches along U.S. 50/301 on each shore contain six lanes (three lanes per direction). 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.

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).

2.1 Study Limits

The MDTA analyzed the traffic volumes along Corridor 7 and its interchanges to determine appropriate study limits for the Tier 2 Study. The analysis demonstrated that there was 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.

On the Eastern Shore, traffic analysis showed consistency with traffic along U.S. 50/301 until the U.S. 50/301 split near Queenstown, which presents a major decision point for eastbound traffic. Thus, 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.

2.2 Traffic and Capacity

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. Since then, annual volumes have been above 25.0 million each year, with the exception of the COVID-19 pandemic year of 2020. However, 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. Additionally, several factors related to the existing bridge's design tend to reduce the capacity of existing lanes when compared to the U.S. 50/301 approach roadways. These include 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 further reduces functional lane capacity.

As traffic volumes increase over time, congestion will also increase, further reducing regional mobility and reliability that is needed for accessing employment and recreation areas, moving

commerce, and providing capacity for emergencies or evacuation events. Congestion is also increasing 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.

2.3 Purpose and Need

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 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. Five needs have been identified:

- 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 and Cost and Financial Responsibility.

3 OVERVIEW OF ALTERNATIVES SCREENING PROCESS

Due to the complexity of the project, the MDTA analyzed key elements and screened options of each element to determine which options would be reasonable to include in the end-to-end alternatives. The key elements, initially presented to the public and agencies in Fall 2023, included existing bridges, structure type, alignment, number of lanes, structure location, transit, Transportation Systems Management/Transportation Demand Management (TSM/TDM), and pedestrian and bicycle shared use path (SUP). These elements are described in **Section 2.2 of Appendix A**.

As described in the NOI and supporting materials, a reasonable alternative or option is one that is technically and economically feasible and meets the purpose and need for the proposed action (42 USC 4332(C)(iii)). Each element was evaluated and screened independently using the project needs and objectives. The options that passed the screening were used to identify and develop the proposed ARDS. Options that did not address the needs and objectives, and thus would not be able to address the Preliminary Purpose and Need for the proposed action, were not included in the proposed ARDS. The analysis performed for each element and the results of the screening are presented in **Sections 3.2 to 3.9 of Appendix A**. Tables are provided that summarize the screening results for all options and indicate the needs and objectives that are addressed, not addressed, or not determined.

Additionally, the MDTA hosted three Public Open Houses in December 2024 to share Tier 2 Study information and to collect public input on the proposed action and proposed retained alternatives to be evaluated in the EIS. Over 1,100 comments were submitted during the public scoping comment period from November 12, 2024, to January 13, 2025 through the following ways: via the email link or the online survey from the study website, in-person at the Open Houses, mailed, or by leaving a voicemail on the study phoneline. The survey included prompts to obtain feedback on the following items:

1a. Removal of both existing Bay Bridge spans and replacement with two new bridge structures.
1b. Location of new bridge spans.
1c. Number of lanes along the approach roads and on the bridge for the seven alternatives.
1d. Consideration of public transit options.
1e. Consideration of Transportation Systems Management/Transportation Demand Management (TSM/TDM) options.
1f. Consideration of a shared-use path on the bridge.

The following is a brief summary of the public and agency comments on each of these items:

- Strong support for removing and replacing the existing two bridges;
- Support for taller bridges to accommodate larger ships;
- Concern about additional traffic and overdevelopment on Kent Island and the Eastern Shore;
- Relatively equal support for the new bridges to be located north or south of the existing spans;
- Support for an eight or ten lane bridge along with matching lanes on the approaches;

- Concern about the impacts associated with the additional lanes;
- Support for transit-related improvements to reduce congestion balanced with concern about a lack of demand for transit;
- More support than opposition for interchange consolidation, congestion pricing, park-and-ride lots, and part-time shoulder use but with skepticism that these improvements would address congestion;
- Support for a shared-use path with connections to trails on the shorelines coupled with concern about safety for the users; and
- Concern about the environmental impacts on the Bay, the cost of the improvements, and the State's ability to fund it.

Additionally, National Marine Fisheries Service (NMFS) provided a comment regarding a double decker bridge and the National Park Service (NPS) repeated their comments on the Full Tunnel and the Bridge-Tunnel structure types. The MDTA response to these comments are provided in **Section 4.3**.

These comments were used to inform the MDTA about the public and agency's perspective on these elements of the alternatives. Although opposition was expressed about some of the elements, the MDTA's detailed explanation for their decisions was included in the NOI and is also included in the Proposed ARDS Screening Summary Document in **Appendix A**. No new alternatives were suggested in the public and agency comments that have not been previously considered. Therefore, the comments have not required extensive changes to the ARDS being carried forward. As MDTA continues to refine the alternatives, they will continue to consider these comments.

4 MODIFICATIONS FROM STUDY'S NOTICE OF INTENT

This section describes changes made to the proposed ARDS presented in the Notice of Intent (published November 15, 2024) and the ARDS now being presented to FHWA and the Cooperating Agencies for concurrence. The changes include the following items:

- Structure Location → Two spans north and two spans south of existing bridge
- TSM / TDM Improvement → Interchange Consolidation

Additionally, further justification for why two structure types (the double decker bridge and the full tunnel / bridge-tunnel) are not considered reasonable is provided in this section.

4.1 Structure Location → Two Spans North and Two Spans South of Existing Bridge

The Structure Location was discussed in **Section 3.6 of Appendix A**. Four alignment options were evaluated for a new bridge relative to the location of the existing Bay Bridge: north bridge location, south bridge location, in-between bridge location, and far south bridge location. The in-between and the far south bridge locations were not considered reasonable as described in **Appendix A**.

The north and south bridge locations included two options: 1) two spans completely to the north or south and 2) one span that was north or south and one span that was between the existing spans.

Building both new bridges fully north or fully south of the existing bridges would allow for the construction to proceed while maintaining traffic on the existing bridges and would eliminate the need to have construction activities occurring between the two structures. However, this approach would result in additional impacts as compared to building one new bridge to either the north or south of the existing bridges and then building a second bridge in the space between the two existing bridges after one is removed. Two new bridges fully to the north or fully to the south of the existing bridges would result in additional impacts to sensitive resources as compared to utilizing the space between the existing bridges for one of the bridges.

As compared to one new bridge to the north and one new bridge in-between the two existing bridges, two new bridges to the north would result in:

- Additional impacts to the inlet and access to Mezick Ponds on the Western Shore
- Additional impacts to Sandy Point State Park, which is a Section 4(f)/Section 6(f) historic resource, including infringement above the southern point of Sandy Point Beach on the Western Shore
- Additional impacts to Terrapin Nature Park on the Eastern Shore, which is a Section 4(f) resource
- Increased impacts to wetlands, floodplains, and Maryland critical areas

As compared to one new bridge to the south and one new bridge in-between the two existing bridges, two new bridges to the south would result in:

- On the Western Shore, the realignment of U.S. 50/301 over Old Ferry Slip Road, MDTA's maintenance facilities, and the existing piers south of the Bay Bridge. The access to the MDTA maintenance facilities would be eliminated unless relocated into a portion of Westinghouse Bay.
- Potential impacts to parking at the Bay Bridge Marina and Pier One Road.
- Towers in closer proximity to the approach path for planes using the Bay Bridge Airport on the Eastern Shore
- Increased impacts to wetlands, floodplains, and critical areas

In order to avoid these impacts, it is recommended that the alternatives with the North Bridge location would include one bridge to the north of the existing bridges and one bridge in-between the existing bridges. Alternatives with the South Bridge location would include one bridge to the south of the existing bridges and one bridge in-between the existing bridges. Building both new bridges entirely to the north or entirely to the south of the existing bridges is not retained for further consideration.

4.2 TSM / TDM Improvement → Interchange Consolidation

Interchange Consolidation was discussed in **Section 3.7 of Appendix A**. Along U.S. 50/301 on the Eastern Shore, there are many closely spaced interchanges. Interchange consolidation was considered as a means to control access to highways, thereby potentially managing congestion and reducing crashes. However, there are no interchanges where the proposed ARDS would create geometric issues with the existing successive tight ramp configurations. Additionally, there are a number of businesses and land uses in close proximity to the access points along U.S. 50/301 that rely on drive-by customers. Therefore, in an effort to maintain current access locations for local residents and businesses, the MDTA will not continue to consider interchange consolidation as part of the Bay Crossing Study ARDS. The exclusion of this type of access management from this study does not preclude consideration of interchange consolidation in the future under a separate study by State Highway Administration (SHA), who manages access to U.S. 50/301.

4.3 Structure Type → Double Decker Bridge

A double decker bridge was discussed in **Section 3.3 of Appendix A**. It was deemed not reasonable because it did not address the Tier 2 Study's Purpose and Need; however, additional justification is provided below.on both

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. This would put the top deck of the bridge at a higher elevation, more than 25 feet higher than the lower-level deck. The bridge would be longer than a single deck structure due to the higher elevation of the top deck as it would take longer to tie back to existing ground. Braided ramps would be required to access the different levels of the bridge creating additional land-side impacts on both shores. The longer structure and need for braided ramps would likely require the reconfiguration of the interchange ramps at Oceanic Drive and MD 18.

Two separate structures are preferred over one double decker bridge from a resiliency, redundancy, and safety standpoint. With two bridges, if an incident on one span 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. For example, an incident on the lower deck could result in the closure of the upper deck at the same time.

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 and have larger foundations 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. Environmental impacts would be smaller in the water but would be larger on land compared to two single deck bridge spans.

The added length of the bridge and the changes to the design of the superstructure would increase construction costs. This increase would likely exceed the reduction in costs for the substructure. Lastly, construction of two separate structures would allow more flexibility in terms of staging construction and managing funding needs and cash flow. For all of these reasons, MDTA recommends two separate structures, and the double decker bridge was not deemed reasonable. However, MDTA will continue to look for opportunities to minimize the duration of in-water activities including assessing the feasibility of combining piles, pier, or other elements of the two bridges, where possible.

4.4 Structure Type → Tunnel

A full tunnel and a bridge-tunnel are discussed in **Section 3.3 of Appendix A**. Both were deemed not reasonable because although they would address the study's adequate capacity and reliable travel times, roadway deficiencies, existing and future maintenance, and navigation needs, they would not have the potential to address the mobility need and the environmental responsibility and cost and financial responsibility objectives.

A full tunnel or bridge-tunnel option would have both advantages and disadvantages relative to a full bridge option. The MDTA completed an additional review of tunnel considerations in response to comments received from NPS:

- Tunnels would not be subjected to wind restrictions.
- Tunnels would not restrict marine traffic.
- Tunnels would eliminate impacts from lighting and reduce noise impacts caused by a bridge; however, noise associated with the tunnels would be concentrated at the portal areas on the shorelines, and tunnel ventilation islands would require lighting in the middle of the Bay.
- Tunnels would limit mobility because flammable and hazardous materials such as propane (more than 10 lbs), bulk gasoline (for gas stations), explosives, certain farming fertilizers/chemicals, and numerous other materials could not be transported through a tunnel, as specifically noted in COMAR 11.07.01.04 Tunnel Restrictions. This restriction would affect local/regional deliveries and long-distance transport to and from the Eastern

Shore. The alternative route for the transport of these goods is potentially more than one hundred miles out of the way around the north end of the Chesapeake Bay in Maryland and Delaware.

- Bicycle and pedestrian crossings could not be allowed in a tunnel, due to the substantial length and related safety and security concerns associated with these facilities in a tunnel.
- Tunnels would result in a large quantity of disposal or dredge and boring material, over 10 million cubic yards for an 8-lane tunnel.
- Given the location and depth of the Chesapeake Bay shipping channel, a tunnel would have steeper maximum grades than a bridge thereby reducing speeds and roadway capacity.
- With any of the build alternatives, the existing bridge piers would be removed and the Bay bottom habitat would be restored in those areas. However, any type of tunnel would also have impacts to the Chesapeake Bay bottom due to the tunnel approach portals, and a full tunnel would impact environmental resources on land in/near sensitive resources.
- Manmade tunnel ventilation islands could provide land for species in the middle of the Bay; however, the islands would also have a substantial impact on the Bay bottom habitat, specifically given the depth of the water.
- Large ventilation structures would be required on tunnel ventilation islands that would concentrate vehicle emissions at the ventilation shafts. The ventilation system would be in operation 24/7 and would generate constant noise.
- Tunnels would be approximately two to three-and-a-half times more expensive than a new bridge that provides the same number of lanes.

An option that would include one bridge and one tunnel running parallel across the Bay was also suggested by NPS. Similar to the all-tunnel and bridge-tunnel options, the one bridge/one tunnel option would have advantages and disadvantages.

- The one bridge/one tunnel option could accommodate a shared use path on a bridge.
- With this option, vehicles carrying hazmat materials could use a bridge.
- Non-hazmat trucks could use a tunnel at times of wind restrictions.
- This option would likely cost less than a full tunnel.
- This option would allow provide travelers with a crossing structure choice
- With this option the navigational clearance and air space constraints of a bridge remain.
- The impacts associated with tunnel portals, ventilation structures, and possibly ventilation island(s) remain.
- The visual and noise impacts of a bridge remain.
- This option requires operations and maintenance of both types of facilities.
- This option would have higher cost and life cycle cost than full bridge.
- The one bridge/one tunnel option requires braided ramps and likely reconfiguration of the interchanges at Oceanic Drive and MD 18, increasing impacts.

The vertical clearance requirement for new bridge spans at this location will be established by the U.S. Coast Guard (USCG). The MDTA will prepare a navigational impact report that will inform the USCG's clearance determination. MDTA will comply with the USCG clearance determination when constructing a new Bay Bridge. It is expected that the USCG would base their decision on

the current and anticipated future ship clearance needs, and would take into account the anticipated size of ships that could travel on the Chesapeake Bay within the lifespan of the bridge.

Lastly, the public and agencies have had multiple opportunities to review and comment on the bridge, tunnel, and bridge-tunnel structure types during the Tier 2 Study which began in Summer 2022. Most recently, comments regarding the structure types were received during the comment period from November 12, 2024 to January 13, 2025, which included public open houses, a public comment survey form, and Interagency Coordination Meetings.

Based on the analysis that was provided in the NOI, and the additional analysis resulting from NPS comments described above, any alternative that includes a tunnel structure is considered not reasonable.

5 ALTERNATIVES RETAINED FOR DETAILED STUDY

The proposed action would replace the existing Bay Bridge spans with a new bridge over the Chesapeake Bay. Both existing Bay Bridge spans would be removed. Based on the results of the screening analysis and public/agency input, 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 ARDS. The ARDS are based on the number of lanes provided across the new bridge and on the approaches as well as the bridge location. The No-Build Alternative is being advanced as a baseline and will be evaluated in the EIS. The ARDS are:

- **Alternative A - No-Build, 6-5-6**: retains the existing 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.

The build alternatives will include options for or consideration of transit-related improvements, TSM/TDM improvements, and the safe inclusion of a pedestrian/bicycle SUP as described in more detail below.

- **Transit-related Improvements:** The MDTA will further consider potential transit priority treatments, such as bus-on-shoulder, and improvements to park-and-ride facilities. The ARDS will explore financial support for bus improvements to encourage transit use in the region. Impacts and feasibility associated with these improvements will be studied as part of the ARDS.

- **TSM / TDM Improvements:** Two TSM/TDM measures will be considered with the ARDS: congestion pricing and part-time shoulder use (PTSU) lanes.

  The Bay Bridge will continue to be a tolled facility. If a Build Alternative is selected, congestion pricing could be considered in the future to provide flexibility for management

strategies that could be modified over time to reduce congestion and achieve transportation goals.

The MDTA will continue to study options for a PTSU configuration on the Bay Bridge. A PTSU on the bridge could be used for general vehicular operations or bus-on-shoulder operations. The shoulders on the Bridge would be wide enough to accommodate future maintenance needs and incident management. The MDTA will also continue to study options for PTSU on the US 50/301 approaches to the Bridge where there is adequate existing median width to accommodate a full-width paved shoulder, without needing outside widening.

- **Pedestrian / Bicycle Shared Use Path (SUP):** The MDTA will consider the option of including a SUP along a new bridge as part of the ARDS. The SUP would be separated from the roadway lanes by a barrier. This analysis will include study of the environmental impacts, tie-in locations to existing pedestrian and bicycle facilities, and the cost associated with constructing an SUP.

5.1 No-Build Alternative (Alternative A, 6-5-6)

The EIS will consider a No-Build Alternative ("no-action alternative") that would retain the existing 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 (Alternative A, 6-5-6) will include regular maintenance of the 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 ARDS.

5.2 Build Alternatives B (6-8-6 North) and C (6-8-6 South)

Alternative B (6-8-6 North) and 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); and six lanes along U.S. 50/301 on the Eastern Shore (three per direction). Both Alternatives would replace the existing Bay Bridge spans with two new bridge spans. 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 beyond the lane transitions. These alternatives are estimated to be 8.3 miles long, centered on the existing Bridge.

Alternative B would have one bridge span north of the existing spans and one bridge span in-between the location of the existing bridge spans. Alternative C would have on bridge span south of the existing spans and one bridge span in-between the location of the existing spans. The maximum grade on the bridge would be 3.0 percent. The vertical navigational clearance was established by the U.S. Coast Guard at 230 feet to the underside of the main span over the 1,500-foot-wide main channel. The bridge would also maintain the vertical navigational clearance over existing secondary channel close to the Eastern Shore.

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. The typical sections for Alternatives B and C are shown in **Chapter 4 of Appendix A**. The locations of the transitions between eight lanes across the bridge and six lanes on the approaches will be identified as part of the detailed analysis in the DEIS. Preliminary footprints for an eight-

lane bridge approach connecting with a northern and southern bridge location were used to determine the approximate magnitude of impacts as shown in **Chapter 5 of Appendix A**.

5.3 Build Alternatives D (8-8-8 North) and E (8-8-8 South)

Alternative D (8-8-8 North) and Alternative E (8-8-8 South) would consist of eight lanes along the entire length of the study limits including U.S. 50/301 on the Western Shore, the Bridge, and U.S. 50/301 on the Eastern Shore. Both alternatives would increase the number of lanes along the U.S. 50/301 approaches on both the Western and Eastern shores from six lanes to eight 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. Both alternatives would increase the five existing bridge lanes to eight lanes (four per direction) and replace the existing Bay Bridge spans with two new bridge spans. These alternatives are estimated to be 20.4 miles long, centered on the existing Bridge.

Alternative D would have one bridge span north of the existing spans and one bridge span in-between the location of the existing bridge spans. Alternative E would have on bridge span south of the existing spans and one bridge span in-between the location of the existing spans. The vertical navigational clearance was established by the U.S. Coast Guard at 230 feet to the underside of the main span over the 1,500-foot-wide main channel. The bridge would also maintain the vertical navigational clearance over existing secondary channel close to the Eastern Shore.

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 path. The typical sections for Alternatives D and E are shown in **Chapter 4 of Appendix A**. Preliminary footprints for the eight-lane typical section were used to determine the approximate magnitude of impacts as shown in **Chapter 5 of Appendix A**. The footprints are one potential alignment for the north and south bridge locations; but they are not the only potential alignment. Additionally, the locations of the transitions between the proposed eight lane sections and the existing six lane sections will be identified as part of the detailed analysis in the DEIS.

5.4 Build Alternatives F (8-10-8 North) and G (8-10-8 South)

Alternative F (8-10-8 North) and Alternative G (8-10-8 South) would consist of eight lanes along U.S. 50/301 on the Western Shore, ten lanes on the Bridge, and eight lanes along U.S. 50/301 on the Eastern Shore. Both alternatives would increase the number of lanes along the U.S. 50/301 approaches on both the Western and Eastern shores from six lanes to eight lanes, similar to Alternatives D and E. On the Western Shore, widening would occur to the outside in both directions. 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. Both alternatives would increase the five existing bridge lanes to ten lanes (five per direction) and replace the existing Bay Bridge spans with two new bridge spans. These alternatives are estimated to be 20.4 miles long, centered on the existing Bridge.

Alternative F would have one bridge span north of the existing spans and one bridge span in-between the location of the existing bridge spans. Alternative G would have on bridge span south of the existing spans and one bridge span in-between the location of the existing spans. The

vertical navigational clearance was established by the U.S. Coast Guard at 230 feet to the underside of the main span over the 1,500-foot-wide main channel. The bridge would also maintain the vertical navigational clearance over existing secondary channel close to the Eastern Shore.

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 path. The typical sections for Alternatives F and G are shown in **Chapter 4 of Appendix A**. Preliminary footprints were used to determine the approximate magnitude of impacts as shown in **Chapter 5 of Appendix A**. The footprints are one potential alignment for the ten-lane north and south bridge locations; but they are not the only potential alignment. The locations of the transitions between ten lanes across the bridge and eight lanes on the approaches will be identified as part of the detailed analysis in the DEIS. Additionally, the locations of the transitions between the proposed eight lane sections on the approaches and the existing six lane sections will be identified as part of the detailed analysis in the DEIS.

6 POTENTIAL ENVIRONMENTAL 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 or reasonably foreseeable impacts from the proposed action. 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);
- 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; and
- Noise.

The table below presents the quantified potential environmental effects from the 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 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.**

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, 6-5-6	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
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
	Surface Waters - Tidal Area	acres	0	2-3	1	7	5	7	5-6
	Benthic Habitat	acres	0	0	0	3	3	3	3

Resource Type	Resource	Unit	Alt A No-Build, 6-5-6	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
	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 calculation.